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Low-emissions economy inquiry
New Zealand Productivity Commission
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Submission from the Bioenergy Association

Response to draft Low-emissions Economy report

The Bioenergy Association represents a significant portion of owners of biomass fueled heat plant, biomass fuel producers and suppliers, waste-to-energy consultants, researchers and equipment/appliance suppliers across New Zealand. It has members who have an interest in policies relating to the utilisation of biomass and waste for the production of energy; reduction of emissions to air in communities from both residential and commercial/industrial scale heating applications, and from decomposition of waste; and wise use of our renewable natural biomass resources for the betterment of communities. Residual organic waste is considered to be a renewable biomass resource.

The Association has Interest Groups whose members manage the Association's specific technical matters relating to the wood energy via combustion, waste-to-energy via anaerobic digestion, and liquid biofuel sectors, specifically with regard to standards and best practice. The Interest Groups host workshops and dissemination of information to those interested in the respective sectors, or considering investment.

This submission is complementary to the individual submissions from members which provide more detail on specific aspects of the draft report.

Overview

The Bioenergy Association is pleased that the Productivity Commission has undertaken the inquiry and produced its draft report but is concerned that there are significant aspects of the opportunities to reduce greenhouse gas emissions from use of bioenergy which the Commission has got wrong or not understood. This is particularly with regard to the proven technologies available for process heat and the emerging and growing solid biofuels supply market.

Key points that the Association would like to bring to the Commission's attention area:

1. Solid, gaseous or liquid biofuels are a carbon neutral drop-in fuel for a range of heat, electricity and transport applications across the economy. Each of these can make a significant contribution to reducing greenhouse gas emissions.
2. An advantage of many bioenergy technologies are that they are proven and readily available for replacement of equipment currently using fossil fuels. The draft report is wrong when it suggests there is a need for innovation in the process heat and waste-to-energy sectors.
3. A number of applications of bioenergy technologies are already being installed to provide economic and externality benefits contributing to a low-emissions economy so new government policies should focus on speeding up the number being installed. Speeding up what is already naturally occurring is possible and would result in the domestic greenhouse gas emission reduction targets being achieved and avoid the need to purchase international carbon units. Thus keeping investment within the New Zealand economy and reducing economic leakage.
4. Reliance on the ETS alone to address the emissions will be a slow long process and should be supported by complementary measures of assistance to achieve the "low hanging fruit" emission reduction opportunities that are available for immediate implementation. The "early wins' will provide demonstration of what is possible and encourage emitters to adopt emission reduction technologies such as bioenergy because their 'proven' can be seen.
5. Achievement of a low-emissions economy requires a cross sector (forestry, regional growth, energy, waste and environmental) policy platform as recommended by the Commission.
6. An increased investment in the use of bioenergy technologies requires a greater focus on the policies and strategies for the supply of wood and residual organic waste as biomass feedstock as these are both emerging markets requiring assistance.

The draft report fails to recognize that biomass in the form of wood or residual organic waste is an opportunity for a low-emissions economy across all of the potential uses including for process heat, electricity generation and as a transport fuel. The draft report fails to recognize that to transition to a low-emissions economy requires a paradigm shift in thinking in the use of these renewable carbon neutral natural resources. The draft report perpetuates traditional thinking of bioenergy only being an energy source. It also has an electricity bias. Approaching the opportunity for a low-emissions economy from a holistic use of renewable natural resources for economic growth, regional

economies, employment and achievement of sought after environmental benefits, via the energy pathways, will make achievement of a low-emissions economy self-funding.

Recommendation 1: That the inquiry include consideration of the economy wide benefits of the adoption of low-emission technologies.

The Bioenergy Association has identified[1][2] that the following targets are achievable by implementation of the National Energy Efficiency and Conservation Strategy (NZEECS) . These targets are recommended be adopted for the sector. They will be a stretch for the sector but are considered achievable. Adoption of such targets by Government and serious pursuit of the actions in the NZEECS would make a big dent in the emissions level and assist achievement of the 2050 zero net emissions target. Such targets should be set for each contributing sector so that there is a focus on outcomes rather than inputs. Associated annual monitoring should also be implemented so that progress can be assessed. A major problem of the current climate change programmes is that there is no plan, no targets and no monitoring on a sector level that is associated with an Action Plan. A World Biogas Association report identified targets are one of the most powerful tools for getting action[3].

Waste to Energy	PJ pa	Kt CO_2-e pa
2030	2.2PJ	90
2040	2.7PJ	150
2050	3.4PJ	220

Wood Fuels	PJ pa	Kt CO_2-e pa
2030	4PJ	400
2040	11PJ	1000
2050	15PJ	1300

Recommendation 2: That Government set emission reduction targets for all sectors capable of reducing emissions

[1] https://www.bioenergy.org.nz/resource/is31-ghg-reduction-using-biogas-technologies

[2] https://www.bioenergy.org.nz/resource/is32-ghg-reduction-using-biomass-energy-for-heat

[3] https://www.bioenergy.org.nz/resource/global-food-waste-management-an-implementation-guide

Part one: Setting the scene

Chapter 2 The New Zealand context

The report limits itself to the commitments covered in the Paris Agreement, excluding international transport where biofuels are likely to have a significant impact. However the need to consider international transport is bought in by the "need to consider the different pathways along which the New Zealand economy could grow and develop so as to achieve New Zealand's emissions targets …". International transport represents ~12% of New Zealand's fossil fuel end use (PJ), and ~19% of our transport fossil fuel use and that is liquid fuel dominated.

Without including consideration of international transport results in future fuel supply pathways being seriously distorted and opportunities lost. Further, as a nation that relies upon international trade and tourism , no credible pathways can be constructed without considering both the impact of GHG emissions, market responses to them and the potential IMO and ICAO requirements placed on our economy

Recommendation 3: International transport fuels should be in scope and explicitly considered, particularly when looking at subsector analysis.

Part Three: Policies and institutions

Chapter 4 Emissions pricing

Bioenergy Association agrees with the Commission on the need for a set of policies that support emissions pricing;

"Emissions pricing needs a supporting package of low-emissions policies and institutions including legislation, regulations, an independent expert body, a fair distribution of costs and benefits, and widespread understanding and support from business and the wider population."

Our focus is on what might achieve the "…support from business and the wider population"

We note from the Commission's draft report:

"New Zealand's emission prices under its past and current versions of the ETS have been too low to incentivise meaningful reductions in emissions. All evidence points to the need for emission prices to rise to at least $75 a tonne, and possibly, if new emissions-reducing technologies are slow to emerge, to more than $200 a tonne, over the next three decades. Prices at these sorts of levels will flow naturally from the government setting effective emissions budgets which then translate to emissions caps in a reformed NZ ETS."

The draft report states further that:

"Options that would be cost-effective at a low (or even zero) emissions price include afforestation, many forms of improved energy efficiency, and, increasingly as their price falls, electric vehicles (EVs). Economic options in the medium-cost range are likely to include electric heating for mid-level industrial heat and EVs for freight. Technology options in the high-cost range include CCS and the electrification of high-temperature heat."

We note from the economic modelling supporting this report there are more specific references to how effective various options may be economically over the medium to long term but we believe that much of the analysis has been undertaken without full knowledge of the options. We are therefore pleased to have this opportunity to correct the obvious lack of knowledge and experience of non-electricity solutions for greenhouse gas emissions reduction.

In all three pathways, the expansion of forestry is central to the achievement of large reductions of emissions. This is particularly the case if New Zealand is to achieve net zero greenhouse gas emissions in 2050. This reliance on forestry however, could create challenges in the longer term – with continued emissions reductions post - 2050 (or maintaining emissions at around net zero) requiring New Zealand find other ways to reduce emissions. While the expansion of forest sinks cannot continue indefinitely, this is not a reason for immediate concern, with technological developments likely to provide the potential for further cost - effective mitigation from non-forestry activities, and there are options available to support continued sequestration from New Zealand's forests after 2050. Thought will also need to be given to the mix of the different types of forest sinks. Native reforestation reduces emissions more gradually than plantation forestry but stores more carbon over the long - term and provides other environmental benefits.

The analysis considers the sequestration benefits but not the drivers for forestry and the other national benefits such as the use of wood as a fuel to replace fossil fuels.

Recommendation 4: The analysis of forestry GHG sequestration also consider the other national benefits arising from biomass use, and how they can be a driver for greater areas of forestry.

In all three pathways, emissions reductions in the agricultural sector are delivered through a mix of technological and structural change. With emissions intensity improvements, it appears that dairy production may be able to expand, although this expansion may be limited due to separate water quality concerns. Even with intensity improvements, the area of land in beef and sheep farming is likely to contract, in a continuation of recent trends. Some sheep/beef farmers might supplement their income by investing in plantations, others might choose to fence off higher altitude land to enable regeneration of native forest. The

scale of this shift will be driven by demand for land from an expanding forest sector, increasing the opportunity costs of maintaining livestock. The analysis fails to consider the vast amount of biological emissions offset which farmers can do as part of normal farm management.

It is clear that afforestation and agriculture analysis as considered in the draft report, in the context of the climate change challenges, arrives at only a relatively short-term fix and thus is not a sustainable climate change solution without further consideration of carbon archiving from possible biomass products arising from each of these activities. It is also clear to Bioenergy Association that broad afforestation and agriculture programmes that is likely to be Policy Driven can be quite disruptive and have much longer-term consequences in terms of land use change and disruption to existing land use. The Association believes that these disruptions are unnecessary if the analysis is undertaken from a natural resource use approach. This can result in emission offsetting which can be a positive financial benefit for forestry and farm business, and not a cost.

Recommendation 5: That the Commission should guide government to developing new policy packages which are strongly oriented towards creation of business financial benefits rather than presenting policies which result only in cost.

For example, whilst the Report has presented considerable context and evidence for assessing the pros and cons associated with Afforestation and Land Use Change, which can only be utilised over the medium term for offsetting and achieving Net Emissions, there is comparatively little information or argument presented for and against the economy better utilising biomass and afforestation resources to reduce Gross emissions in perpetuity.

There is already a body of evidence available to government that supports energy efficiency; the development of a more productive forest and wood processing sector; and the opportunity to utilise direct geothermal and bioenergy resource in the low, medium and high-level industrial and commercial heat market segments. There seems little evidence these recent bodies of work have been included or modelled to the same extent that the electricity sector has been modelled to reach the draft conclusions.

These recent reports indicate that there is considerable scope for reduction in industrial, food processing and general heat market Gross Emissions through biofuels substitution and our members' businesses have more than enough evidence (as outlined in their submissions) that wood fuels are economic in all these markets at carbon prices under $50/t_C compared to the electricity market findings that carbon prices at over $100/t_C will be required to get electricity fuel switching into these markets.

Wood fuels and wood processing residues can account for around 15-20% of harvested forests. These carbon neutral fuels can offset fossil fuel burning

forever and cyclically, whereas the Afforestation cycle can only be used in a carbon accounting sense only once. The land resource is a natural constraint on afforestation, but utilising wood harvest offsets is in perpetuity on the same stretch of land. The economic trade-offs are a relatively short-term afforestation fix vs a longer term fossil fuels offsetting strategy. These two strategies go hand-in-hand and should provide a lower cost, higher value outcome than renewable electricity heating.

We would be very interested to see a comparison for the relative economic value, on a full life cycle basis, of offsetting fossil fuel Gross Emissions in perpetuity with Afforestation/Biofuels programmes versus using Afforestation/Sinks to achieve Net Emissions targets?

Bioenergy Association would like to highlight important points which it agrees with:

- A single emissions price has important benefits: it provides a strong incentive to reduce emissions at least cost; and it decentralises decisions to invest, innovate and consume across the economy to people who have the best information about opportunities to lower emissions given their circumstances.
- A good emissions pricing scheme needs to handle several challenging issues including carbon leakage and free allocation for emissions-intensive and trade exposed firms, policy stability over time, the strategic use of government revenue from the scheme, points of obligation, and rewarding sequestration of carbon through forestry.
- The Government severed the international link and the NZ ETS became a domestic scheme from 2015. This is desirable for now, and the price has risen to around NZ$21 a tonne of carbon dioxide equivalent (CO_2e). Despite reforms announced in mid-2017, the NZ ETS needs a combination of greater control over permit supply (a robust domestic cap), greater price stability, and cross-party agreement on policy stability, to make it work well.
- Modelling and other available evidence suggests that New Zealand's emissions price will need to rise to at least NZ$75 a tonne of CO_2e and possibly over NZ$200 a tonne over the next few decades for reductions in domestic emissions to make a substantial contribution to New Zealand's international commitments under the Paris Agreement.
- Emissions pricing needs a supporting package of low-emissions policies and institutions including legislation, regulations, an independent expert body, a fair distribution of costs and benefits, and widespread understanding and support from business and the wider population.

- In addition, pricing has another important efficiency property: it can decentralise options and evaluations about the cost of mitigation or absorption to individual agents across the economy. The alternative of gathering all this information at some central point to make decisions about which options to pursue – would be impractical and very expensive.
- The level of the emissions price in an economy will strongly influence the overall reduction in emissions. A higher price will incentivise a greater reduction than a lower price.

A major barrier to the uptake of opportunities for reducing greenhouse gas emissions is that many of the opportunities are each small. They are also achieved by small to medium business who fall outside the ETS directly. There needs to be a capability for the aggregation of small emission reductions so that those investors gain the financial benefits of selling carbon units. It is administratively inefficient to allow each small player to sell credits but as has been shown in Australia with their Renewable Energy Credits (RECs) that the ability to aggregate and buy/sell RECs has provided a major incentive for uptake of small photovoltaic electricity systems. This was facilitated by the ability to aggregate credits.

Recommendation 6: That small emission reductions be able to be aggregated in order to participate in the ETS.

Chapter 5 Innovation

The report makes a number of general references to the need for bioenergy and biofuels related innovation but fails to focus on the proven technologies that are being used already and which can be used to get greater amounts of greenhouse gas emission reductions almost immediately.

The technologies for use of biomass for process heat and anaerobic digestion are well proven and require no innovation. Work can be done to improve knowledge and experience on the use of different feedstocks but that is operational research and wouldn't come under a class of innovation. Internationally a wide range of feedstocks are used in both technologies but we have limited experience in use of some feedstocks in New Zealand.

However in the transport biofuels area there is a lot more innovation required for the commercialization of emerging technologies. This is addressed in the response to Chapter 11.

While well proven the sector does lack a lot of data and written material on demonstration plant, best practice and market information. There is also a large need to provide information and experience to new entrants. The sector suffers

from not having many large players and lacks the resources to undertake the amount of knowledge dissemination required for what is essentially an infant industry. EECA provides some financial assistance but it is way below what should be spent if the greenhouse gas emission reduction targets are to be achieved by 2050. There is virtually no financial support to the sector for reducing methane emissions from waste via anaerobic digestion solutions.

EECA's 2018/19 Statement of Intent indicates that it will be reducing activities in the use of biomass energy to reduce emissions as it plans to focus only on EV and energy efficiency solutions. This retrenchment indicates that Government is not serious about pursuing domestic greenhouse gas emission opportunities. EECA's budget should be expanding and not reducing.

The Bioenergy Association does what it can but it lacks paid staff and the financial ability to fullfil its objectives. If Government is serious about reducing greenhouse gas emissions through use of bioenergy related solutions then these are the areas where investment is required.

Recommendation 7: That the mechanisms for facilitation of the development of the bioenergy sector be developed and fully funded.

The Association supports F5.3 – 5.7, 5.12 – basically that investing in innovation in clean tech should be a priority. However from a biomass energy perspective it is the concepts of clean technology being part of business which needs encouragement rather than innovation in the clean technologies themselves.

The Association also supports R5.1 i.e. to stop subsidising fossil fuels, and R5.2 – 5.5, *priority should be given to clean tech innovation, the development of an international scanning service, and market flexibility to allow resources to flow away from dirty fuels. Government currently has no programmes or responsible energy agency for promoting clean technology. This would be a suitable area for EECA to expand into as it builds on EECA's existing but retrenching capabilities.*

Part Four: Emission sources and opportunities

Chapter 10 Land use

The draft report focuses on biological emissions from stock and from land use change but fails to cover the opportunities that farmers have to offset their emissions. Applying the ETS to agriculture will incentivise farmers to investigate and invest in emission reduction opportunities which they all have available such as supply of biomass fuel to their food processors. From this they can gain revenue and they should be able to gain carbon credits.

Because there is currently likely to be only enough biomass from forestry and farm operations to replace around 60% of current coal[4] used for process heating this provides an opportunity for farmers to manage their shelterbelts, riparian buffer zones, erosion control planting and wood lots so that biomass can be harvested to provide fuel to nearby heat plant owners. Transitioning farmers from only producing food, to producing food plus energy fuel will improve the farm sustainability and business resilience.

Managed riparian buffer zones can reduce nitrogen discharge to waterways and through selective harvesting biomass provide a revenue stream for the farm business. The biomass can be sold as logs, energy chip or chip for stand-off pads or the manufacture of engineered wood products.

In forestry areas the managed riparian buffer zones can assist stop damming of waterways when slash gets into the waterway at time of large floods eg Tolaga Bay 2018 and Nelson 2017.

Animal welfare is requiring farmers to put back into practice shelter for stock. They can do this in the manner they have done for the last 100 years which is based on a single row of a single species which results in period of no shelter for extended periods when the shelterbelt reaches end of life, or they can plant managed shelterbelts which will give continuous animal protection. A managed shelterbelt may be 3 row and multi-species. With selected harvesting the extracted biomass can be sold as logs or energy chip.

If other farm plantings are also designed to be managed and with end uses such a harvesting in mind when laid out then the value for erosion control etc can be augmented by the revenue that can be gained by selective harvesting.

A key opportunity which should be included in the report is the opportunity for farmers to be part of the solution for climate change and their own business objectives. This is currently missing.

We are not aware of research which has gone into this area but recommend that the report encourage work to be done to give guidance to farmers and forest owners on the opportunities, best practice and the benefits.

A big benefit of farmers producing managed biomass is that increased harvest residues will become available for upgrading to be an energy fuel to replace the use of fossil fuels for heat.

The quantum is unknown but it would make a very big dent in greenhouse gas emissions.

Recommendation 8: That programmes be developed to assist farmers identify and implement bioenergy solutions to provide biological emission offsets.

[4] https://www.bioenergy.org.nz/resource/residual-biomass-fuel-projections-for-nz

Chapter 11 Transport

Bioenergy Association agrees that "transport is one of the main sectors where deep emission cuts are both necessary and possible given existing and emerging technology" and believe that biofuels produced in New Zealand from sustainable feedstocks such as those from our plantation forests have a role to play in achieving this".

The draft report addresses the immediate options for low-emission transport but fails to give importance to the longer term research and development requirements[5]. It also fails to consider the transition pathways out to 2050. The Scion led Biofuels Roadmap[6] gives a picture of what is achievable by 2050 but there is a need to consider the policy options for achieving this vision, particularly what should be being done now in order to help secure this future. Considering the importance of achieving emission cuts in the transport sector compared to other sectors it would be expected that greater analysis of options would be included in the report.

The Scion Roadmap also requires linkage of liquid biofuels production to land use and this is missing.

11.1 Wider than the light vehicle fleet

The draft report should give greater consideration to how to reduce fossil fuel use in sectors other than the light vehicle fleet. We agree that EVs are a good option for decarbonisation of the light vehicle fleet – and should be supported. However the bias towards solutions for the light vehicle fleet results in a failure to address opportunities for heavy transport, long distance land transport, marine and aviation. While electric vehicles are suitable for some short distance or repetitive travel it will have limitations because of range, the time to refuel, gravimetric and volumetric fuel density and more limited life time. Until these issues can be addressed then long distance vehicle travel will be constrained on uptake and in some cases, such as long haul marine and aviation, alternative fuels will need to be used on the timescales under consideration (and be supplied from NZ) if the objective of moving from fossil fuels is to be achieved.

The proposed feebate scheme for EVs has the consequence of biasing against alternative fuels such as drop-in biofuels by reducing the cost of EVs relative to ICEs. Transport emission reduction support programmes should be on a level playing field so the same support policies should apply to all similar transport options.

The draft report shows a bias to a single low carbon transport fuel solution eg electricity, whereas from a policy angle the policy should be on setting low carbon emission fuel standards and letting the market work to meet that

[5] Refer to National Energy Research Institute Energy Research Strategy
[6] https://www.bioenergy.org.nz/resource/webinar-180315-nz-biofuels-roadmap

standard. Such an approach will encourage innovation and result in the best outcomes.

Support to specific low carbon emission fuels such as electricity or alternative fuels, should be on a total national interest life cycle analysis basis. For example the community cost of building more electricity power stations in order to supply electricity to electric vehicles should be included, as should be the benefits of planting trees as a feedstock for the production of transport biofuels. The non-monetary benefits on transport biofuels production are currently not considered in evaluation of options.

Before focusing on only some options we believe that there is a need for a more balanced and comprehensive evaluation of the different decarbonisation options, particularly for the heavy duty transport where there are a number of emerging solutions. Bullet point 5 in the Key points section at the start of the chapter does not provide a balanced view of the different options for heavy duty transport.

The report in Fig 11.2 simply looks at end point emissions, and this does give a sense of the relative significance of the fleet using a crude categorization based on weight. It doesn't however follow directly from that that EVs will be the most suitable technology for all light vehicles. This assessment needs to take account of the different dimensions (advantages of a drop in solution, the relative weight users place on the characteristics of the various fuel solutions, energy carrier availability, energy infrastructure/fuel distribution and vehicles) which must be changed to allow large-scale deployment of the different decarbonisation options.

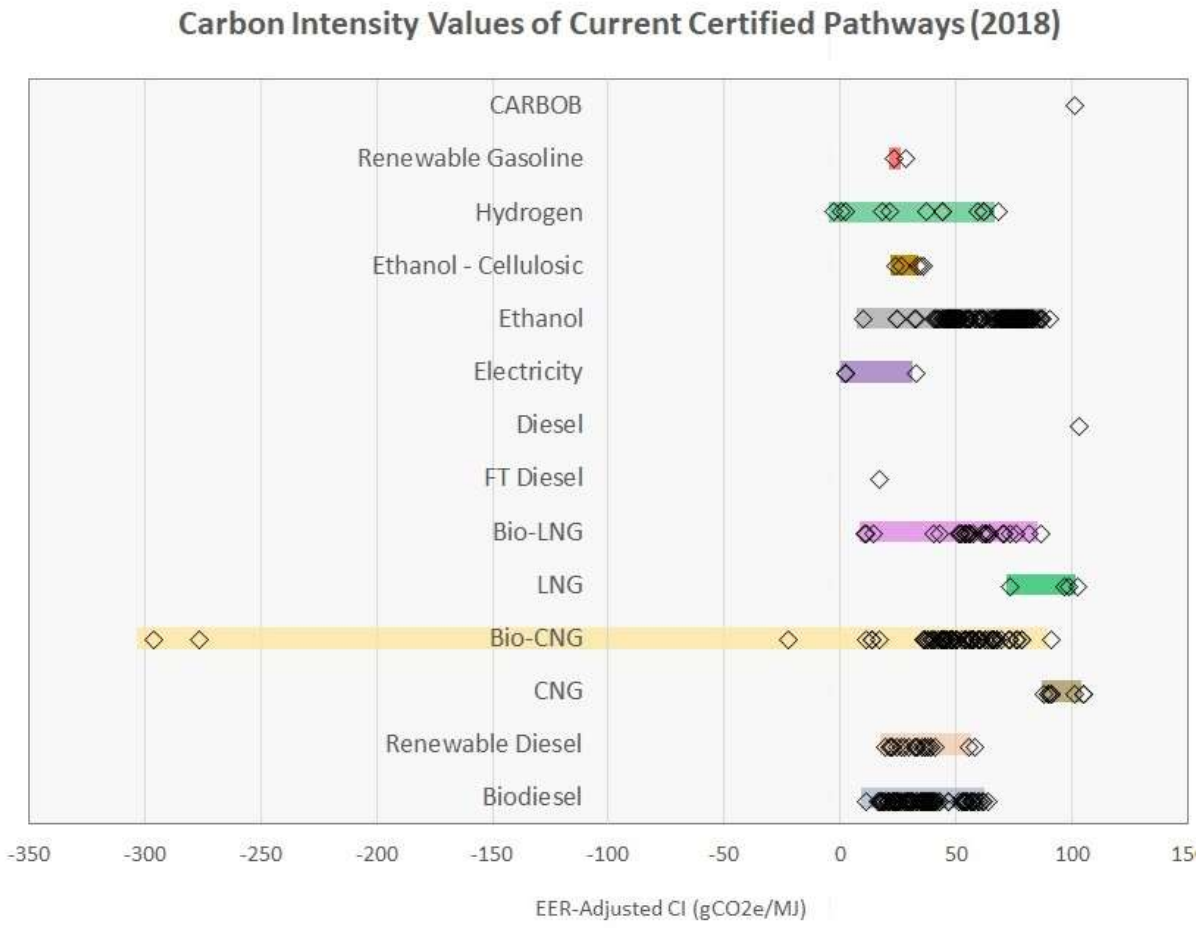
11.4 – Regulating vehicle emissions - Low Carbon Transport Standard

Due to the technical immaturity of some options, and recognizing that the Inquiry covers out to 2050, the best options for decarbonising heavy duty transport are currently not clear, so the main policy interventions for decarbonisation should be focused around decarbonisation targets rather than facilitating specific solutions or options. As pointed out (p. 286, middle) technical developments are difficult to predict over the timeframes considered – and the rate of developments is even more challenging, so policy interventions such as an ETS or low-carbon fuel standards which allow a technology-neutral approach to decarbonisation, favouring those which offer the deepest decarbonisation at the lowest cost and minimising the risk of locking in what turn out to be sub-optimal technology solutions.

With this approach the more proven technologies such as electric vehicles will come earlier where they meet users' needs, but more significantly it will provide incentives for the alternatives which may be more suitable for other transport requirements.

Regulation and support programmes should be on the basis of fuel carbon intensity. Carbon intensity is the measure of GHG emissions associated with producing and consuming a fuel, which is measured in grams of carbon dioxide

produced by this fuel per megajoule of energy (gCO_2e/MJ) generated by this fuel. The table below gives some indicative figures of carbon intensity for relatively well known renewable fuels. Carbon Intensity for traditional mineral petrol and diesel are around 100 so these figures are a good benchmark to compare other fuels with.



Source: https://www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm

Note that compressed biomethane from waste can have a very significantly negative value because of the waste sources used as feedstock.

The California Air Resource Board https://www.arb.ca.gov/fuels/lcfs/lcfs.htm has developed the Low Carbon Fuels Standard (LCFS) programme[7] and sets annual Carbon Intensity (CI) standards for gasoline, diesel, and the fuels that replace them.

The key objectives of LCFS are as follows:

- Reduce petroleum dependency
- Reduce carbon intensity of transportation fuels
- Transform and diversify fuel pool and allow alternative fuels to compete in the fuels market

[7] https://www.iscc-system.org/wp-content/uploads/2017/08/Floyd-Vergara_Ursula-Lai_Californias-Low-Carbon-Fuel-Standards_TC-Las-Vegas-2017.pdf

Adoption of the LCFS programme or similar would set out a framework for encouraging development and use of alternative low emission fuels.

Similar standards are also in other areas such as British Columbia and coming in Brazil.

Recommendation 9: That transport emission reduction policies be based on the Carbon Intensity of the respective fuels

Support programmes

The current EECA administered Low Emissions Contestable Fund supports only electric vehicles and electric vehicle infrastructure, and other alternative fuels are not acceptable. This support mechanism should be revised to include all low emission transport options including electric and biofuels.

With a widening of the Low Emissions Contestable Fund the allocation of funds to any fuel or scheme should be on the basis of Carbon Intensity. Ideally this should be within the context of a Low Carbon Fuel Standard scheme or similar.

To improve accessibility to low Carbon Intensity fuels the support from the Low Emissions Contestable Fund for infrastructure such as filling stations for alternative fuels should be similar to that being done for electric vehicles.

Recommendation 10: That the criteria for the Low Emissions Contestable Fund be widened to allow application from all low emission transport options.

An additional incentive to encourage an early transition to low emissions would be for transport companies importing or producing petrol, gas or diesel fuels to be obliged to match a percentage of those quantities with alternative fuels according to a calculation based on the Low Carbon Fuel Standard.

Exemption of Road User Charges is currently used as an incentive for electric vehicle uptake and this should be widened to cover alternative fuels as currently occurs for ethanol. Road User Charges for each vehicle should be calculated on the basis of the application of the Low Carbon Fuel Standard to the respective fuel types.

11.6 Using biofuels to reduce transport emissions

Technology developments are resulting in a number of drop-in biofuels being available on a commercial basis within a few years. Some would be economic now if there were economies of scale. Future drop-in biofuel plants are likely to produce a mixture of drop-in petrol, drop-in jet, and drop-in diesel, meaning that if biofuels are used to decarbonise aviation and marine, drop-in replacements for petrol and diesel will also be available to replace fossil fuels in other sectors. This doesn't need the fuel to be the same, producing multiple fuel streams to meet different markets is typically cheaper than just producing a single fuel.

Drop-in biofuels are hydrocarbon fuels produced from biomass that is chemically identical to its fossil fuel equivalent and can be used in existing engines and fuel distribution infrastructure without significant modification. This advantage means that the cost of entry into use of biofuels is low for users and uptake rates are not limited by the need for new vehicles. Banning fossil fuel imports would limit options for reducing emissions.

Biofuels offer the only significant medium-term decarbonisation option (on top of efficiency improvements) for long distance land transport, heavy transport, marine and aviation. The production of the biofuels also produce regional economic, employment and environmental benefits so climate change policies must be developed in conjunction with other Government policies.

New Zealand's specific geographic location means that lignocellulosic and organic waste will be the primary feedstocks for the production of biofuels. Already ethanol and biodiesel is produced in New Zealand in small quantities but capacity is constrained because of the lack of demand. Emerging fuels are likely to be pyrolysis bio-oils, renewable diesel, bio-dimethyl ether, and biomethane.

Feedstocks

New Zealand's comparative advantage is in having fast growing plantation forests and organic waste. Both of these are appropriate for the production of liquid biofuels for transport.

Scion in the biofuels Roadmap project has identified possible feedstock requirements for large scale liquid biofuel production and shown that plantation forests are a major possible feedstock. Evaluation of the options shows that use of new forest wood would also provide significant regional economic benefit. If the production of liquid biofuel is considered as an economic and social as well as an greenhouse gas emission reduction opportunity then the options are most attractive. However liquid biofuels production is still being considered as a private good and the non-monetary benefits are not being considered in policy making.

While limited in volume, the availability of organic waste as a feedstock for liquid biofuel production is financially attractive because of the avoided waste levy which can improve project economics. Such waste to energy projects are being installed overseas (https://enerkem.com/) and can be a good transition pathway to use of future forest volumes once they reach maturity. It has been signaled by Government that the levy will be increasing so production of transport fuels from waste should be included as an option within the report.

Liquid and solid waste treated in waste water treatment facilities or anaerobic digesters produces biogas which can easily and cheaply be upgraded to biomethane suitable for use as a vehicle fuel. For many years the Christchurch Waste Water Treatment Facility fueled all their vehicles on biomethane until it became unfashionable.

An advantage of biomethane is that it can be used as an on-site vehicle fuel for tractors and farm trucks even from small anaerobic digesters such as would be installed at a food processor or on a dairy farm. Because of this on-site use capability the infrastructure requirements are very low.

Import of biofuel

There is a danger of only looking at domestic produced alternative fuels. We need to focus on the objective of achieving a low-emissions economy and that may involve import of alternative fuels. The import option may also be part of a transition pathway to encourage growth of a domestic solution.

There should not be any concern about imports of liquid biofuels as Queensland alone has a very large liquid biofuels development programme. They have good feedstocks and the opportunity to grow more if the price is right.

Sustainable fuels

If liquid biofuels are imported there should be no concern about their sustainable sources as we can set standards that require that the appropriate environmental credentials apply to every drop of fuel. This would be reinforced if we sign up to the international sustainability standards so that we are following world practice and cannot be accused of using a standard for trade advantage. In addition we have seen how consumer pressure can stop the use of palm oil and or palm kernel. Provided the leadership comes from Government then any concern over the sustainability of imported biofuels should not be a problem.

Hydrogen

The report puts an undue emphasis on hydrogen as a fuel as the high technical risk associated with hydrogen fuel cell vehicles is not adequately acknowledged in the report. We note that while some countries believe hydrogen is a potential transport fuel, and there is a lot of global research on its production and application in fuel cells, the technical risk remains very high, to the extent that significant deployment even by 2050 is questionable.

However hydrogen as a fuel may provide economies of scale as we need hydrogen as a precursor to production of many biochemicals and biofuels. We are going to have to find a source of hydrogen (particularly with NG now looking limited).

The report should also consider other biogases as fuels. A number are pretty much drop-in to bigger engines (NG, DME, even NH3 for ships) and can be liquefied at reasonable temperatures. At this point in time we should be agnostic as to fuel type as a lot of international development is underway.

Should NZ aim to phase out fossil fuel vehicle imports?

No. Such a question indicates the bias in the report towards electricity for transport. New Zealand's low emissions transport will be a mix of a number of

fuels and that will be a strength as it will encourage the market to pursue low carbon intensity fuels according to the state of the technology and the market at any time. The unintended consequences are likely to be substantial as it will limit options and flexibility to respond to technology developments.

Marine and aviation

While international aviation and shipping currently lie outside international reporting frameworks and commitments there is a real risk that as climate change becomes more important our export markets focus more on GHGs emitted in getting our goods to them, and tourists on the GHGs emitted bringing them to the country Given the strategic importance of international shipping and aviation to New Zealand exports of goods and services, it is important that decarbonisation of these sectors be considered as part of a low-carbon future for New Zealand.

The marine market for biofuels may also be a suitable pathway for developing a domestic biofuel production capability and this sector would not require extensive infrastructure and refining costs may be lower.

F11.1 – 11 are generally supported although focused on EVs in the main**.**

F11.12 identifies HFCV as an option but the report's comment about challenges for uptake also includes cost effective routes to produce hydrogen.

F11.13 gets it right on biofuels**.**

R11.1 GHG emission standards should be supported**,**

R11.2-3 feebate and infrastructure support should not just be for EVs. Alternative low carbon intensity fuel schemes would provide better signals.

Q11.1 Government could signal a commitment to move away from fossil fuel vehicles by having a proper low emissions transport programme and not just an EV programme which only signals use of EV. Fossil fueled cars will be required for many years and they are also suitable for use with biofuels**.**

Q11.2 A feebate scheme could be supported but needs to handle the role of clean drop-in fuels.

Integration of transport policies with other policies

The report *Driving renewable energy for Transport – Next generation policy instruments for renewable transport* https://www.bioenergy.org.nz/resource/transport-fuel-policy sets out a number of policy options which are recommended for inquiry

Bioenergy Association agrees with the linked report which says that 'the main challenge for the biofuels pathway for the short- to medium-term is the availability of sustainable biomass feedstock and the competition for this with

other sectors (e.g industry, power generation, built environment) and other (non-road) transport modes (e.g. aviation, maritime shipping). Therefore the policy strategy for the transport pathway should be well integrated in a broader multi-sectorial approach. Such an approach should include allocation principles like cascading of biomass1 and a level playing field for all types of biomass in electricity, heating and cooling, and transport.'

Because the transition to low-emissions transport is primarily a public good the Association concurs that biofuel demand has to be strongly policy driven and this situation is likely to remain so for a long time.

Chapter 12 Electricity

Bioenergy Association believes the 100% renewable electricity debate is potentially a major distraction for our policy-makers in the context of the New Zealand economy capping Gross Emissions on the journey to Net Zero by 2050. The draft report fails to consider the full range of electricity options available.

Our premise for making this observation is:

- The dry year hydrology problem in New Zealand is solvable with around 600MW of low cost, standby open cycle generation. We believe this is low cost relative to other options referred to in the supporting reports. The investment could be <$1.2bn in standby plant, running very periodically on either biogas or biodiesel fuels (or both), and would have a capital cost to government annualized at less than $300m p.a. In the context of the more than $2bn p.a. carbon offset account this is not a big problem to solve to electrify the transport sector.
- The cost to electrify the heat sector as is being proposed is far greater than the dry year problem. The report notes that electrifying medium and high temperature heat fits within the mid to higher range of carbon prices, or prices over $120/tonne_C. The cost to the economy of this Option is high and more than $50/t_C higher than conversion to biomass fuels that can cover low, medium and high temperature heating requirements.

  We should not build standby power plant supporting electricification of the heat industry at $120 per t_C, when lower life cycle cost biomass heating is already available at $50 per t_C.
- MBIE's 2017 Industrial Symbiosis Project has identified more than 10PJ of biomass heating conversion is available against a current 25PJ coal demand. The balance can be delivered by combined heat and electricty at lower cost than electricity or biomass alone. The draft report has under-explored the value of biomass and combined heat and electricty

in the industrial and commercial sectors. Both can deliver energy at considerably lower costs than electricity heating at over $100 per t-C.

In our view then, the economic case for conversion of the heating sector to electricity does not stack up and will have unintended consequences for business and the wider public. More work needs to be done on the alternatives, including the use of biomass from the afforestation programmes designed to reduce Gross Emissions rather than create Net Emission sinks.

- The cost to the economy of electrical heating of industry will be very high[8] – as electricity market prices are set at the marginal cost for all consumers. That is, by creating policy supporting higher than necessary heat conversion costs will have material flow-on pricing effects to all other sectors of the economy. For example, increasing the demand of electricity to supply industrial heat, at a delivered energy cost of more than $45/GJ (vs. a gas combined heat and power or biomass heating costs below $25/GJ) will increase market electricity costs to consumers by more than 30%, as calculated by Stevensen et al
- The analysis of energy market options is dominated by advisers with a lifetime in the electricity sector so when they talk energy they think electricity. This is being reflected in current policy work which is not focused on energy but electricity. Evidence of this is in many statements where the heading will talk about 100% renewable energy when actually they only mean 100% renewable electricity. It is only in the last year that MBIE strategy documents have included heat and transport and finally become truly energy focused documents.

Diversity of heating fuels is an important economic resilience consideration to ensure competitive advantage for New Zealand businesses. The current NZEM market design is not fit-for-purpose for 100% renewable electricity. Whilst modern renewable plant is relatively low cost, the market marginal prices are likely to increase in volatility, supply cost risk and thus contracted prices.

As more electricity is generated from renewable resources the ability to meet peak electricity demand becomes more crucial to the economy9. Biogas production from waste with storage is one of the options available to meet peak electricity demand. While not likely to be a mass market solution it could have significant benefit for on-site security of supply or for meeting local peak electricity requirements. It is a proven technology and can be built around existing large infrastructure such as a waste water treatment facility. Eg with biogas storage at the Mangere sewage plant additional generation equipment

[8] https://www.bioenergy.org.nz/resource/wood-energy-industrial-symbiosis
[9] https://www.transpower.co.nz/resources/te-mauri-hiko-energy-futures

could be installed so that the site became a "peaker" electricity generating station. Similar facilities could be built at a food processor to reduce the need to purchase electricity at peak cost times.

Recommendation 11: that stored biogas and liquid biofuels be recognized as near term and longer term opportunities for peaking electricity generation.

Chapter 13 Heat and Industrial processes

Bioenergy Association supports the finding that medium and low grade industrial heat have the most opportunities to decarbonize, and should be the initial focus of the government through policy and support[10]. However the high temperature/pressure heat applications have potentially the biggest gains and should be pursued in the latter decades once the solutions have been developed by the early movers.

The reference in the draft report that biomass needs much higher emission prices and resolution of significant technological and logistical improvements is not supported as is shown by the number of biomass fueled heat plant currently being installed. In niche situations the economics work today. Increased emission prices will assist but they are too far off for decisions being made every day now.

The draft report incorrectly discounts wood biomass as a feasible alternative for industrial heat and focuses heavily on the use of electricity to replace fossil fuels. Wood biomass is a feasible alternative, if there are sufficient volumes available to meet end user energy demands, available at a cost-competitive price, and the high capital cost can be met. There are no known technological improvements required **(F13.4)** – in fact, modern biomass boiler technology is at a higher technological level than a comparable coal boiler. The technology for combustion of biomass is far in advance of the combustion technology of coal which has effectively stagnated as the worldwide demand for industrial sized coal boilers has dropped significantly.

The main barrier is that the use of biomass by those who do not have a ready access to the fuel is in its infancy. This is a normal infant industry situation and requires normal startup industry support to encourage new entrants. The uncertainty creates a perception of risk as to the availability of biomass fuel. While a perception, it is only true if we make no effort to extend the efficacy of the biomass fuel supply market.

The view that carbon capture is a potential solution is in our consideration an extremely risky technological solution to utilize as an emission reduction solution.

[10] https://www.bioenergy.org.nz/resource/is32-ghg-reduction-using-biomass-energy-for-heat

How is the risks of fugitive emissions handled, what is the earthquake risk for leakage. The carbon cost to enable carbon capture to be financial would exceed the equivalent carbon cost to drive reforestation as a solution.

The commentary ***(Fact 13.1)*** that there is little scope for high temperature heat process emissions reduction has no viable economic solution is false as there is no reason why biomass combustion cannot produce temperatures approaching 800°C. In effect any existing combustion process can be switched to biomass as that is still a combustion process.

Biomass is critical for above 90°C heat users as it's the only renewable energy source that is cost effective now, and is complementary to heatpumps below 90°C.

With regard to the dairy processing sector, and as noted above, the medium to low grade industrial process heat especially for diary processing are very suitable for biomass utilization. The main hurdles for this sector are the significant sunk capital costs in existing coal boiler equipment which is not suitable for direct utilization of low cost forest residual biomass fuel due to the reduced energy content versus coal.

The issue of being able to accurately forecast the volume of forest residuals available out into the future is critical comparably with the ability to quantify the life span of coal or gas reserves accurately. Therefore, the government also has to drive the perception of biomass availability via policy, and the billion trees initiative. Typically most regions only have an immediate guaranteed volume of 50,000t ahead at any one time, which is suitable for a $15MW_{th}$ boiler. With better market development this immediate availability can be extended considerably.

The draft report does not mention the ability of wood biomass to be utilised by way of co-firing within existing coal boiler assets to assist with reducing emissions. We see this as an option for the current coal boiler fleet, once energy efficiency initiatives are undertaken which would lower energy demand, enabling co-firing or potentially conversion to occur. This could be a lower cost capital option to enable wood biomass use to increase.

For large boilers over $1MW_{th}$ the opportunity for emissions reductions through control upgrades and tuning is limited as these low hanging opportunities will invariably have already been utilized and therefore any modeling that counts on this benefit will overestimate the scope of opportunities.

Yes, natural gas is half the emissions of coal but it's value as a transition fuel is questionable when the cost to convert a coal boiler to gas and the future cost/availability of natural gas is questionable. Modeling with these conditions might indicate that it is better to jump straight to biomass combustion instead where the fuel will never run out.

The view that biomass is unlikely to be a viable economic low emission fuel in

the short term is not supported. Forest residual supply prices are cheaper than coal when ETS current prices are included let alone future ETS prices. The issue becomes the required price differential required to recover the capital cost to retrofit or replace the existing coal boilers.

The commentary that biomass combustion generates high amounts of pollution is spurious when compared to the emissions from a coal boiler. A modern purpose-built biomass boiler will operate with lower emissions than a similar sized coal boiler, but regardless can be designed to meet any consent conditions for discharge to air applied by a regional consent authority.

The international commentary around the carbon neutrality of biomass combustion should not have been used in a New Zealand based document as it has no relevance in our emissions trading scheme regulation. That comment is based on a report which had the view point of Europe and America where land use change carbon emissions are not accounted for. In the New Zealand context the majority of biomass that will be used for industrial heat will come from plantation forests that are replanted after harvest thereby negating the emissions released during combustion.

Yes biomass boilers have a lower combustion efficiency when burning low cost forest residuals compared to sub bituminous coal, but the same combustion efficiency if compared to lignite coal combustion, or higher if comparing wood pellets to any type of coal combustion. Biomass boilers also lend themselves to extended efficiency via the use of condensing economisers as the combustion emissions are not as acidic as coal combustion emissions.

Fact box 13.4 is clearly false as there is no significant technology improvements required to utilize biomass, the boiler technology is more advanced than coal combustion and it is often being installed. In fact the strength of using biomass energy is that the technology is proven and research and development is not required. The logistical improvements are not required as the existing forestry industries are well versed in the cost optimization of biomass movement at the scale of millions of tonnes per year. What is required is encouragement to the utilization of existing technology and biomass fuel logistics. The encouragement should be aimed at speeding up the current growth and expanding capacity.

We agree with ***Fact box 13.5*** that rising ETS prices will be central in driving emissions reduction investments over the long term. But the ETS changes to the price of carbon is a very slow tool and complementary measures should be taken to speed up the rate of emissions reduction if we are to achieve the 2050 target.

Key to the sped of emissions reduction is that boiler plant is purchased with the expectation that it will be in operation for at minimum 25 years. Therefore, it is critical that future emissions prices are signaled well in advance, but even then standard discounted cashflow calculations reduces the impact of future emission

prices beyond 20 years.

Response 13.1 We agree that EECA needs to change its focus to driving low emission solutions but it also needs to be mandated to take into account other Government policies such as regional economic development, employment and wood processing. A focus on achieving some of these policies will result in greenhouse gas emissions being automatically reduced for free.

If EECA's mandate changes to focus on lowering GHG emissions (R13.1), energy efficiency improvements will still be the lowest cost abatement option and should be a continued focus area for EECA. However it is not the only area where they can add value and they need to continue their focus on wood biomass by the development of focus hubs, particularly in Otago, Canterbury and Southland.

Through EECA the Government can actively support the use of wood biomass for heat by supporting the solutions to improve long term supply visibility and depth of market. The Government can effectively becoming a market maker by the utilisation of wood biomass at hospitals and other government institutions that require heat all year round.

The need for a change of focus is demonstrated in the current criteria for Crown Loans which EECA administers. Currently the criteria is based only on energy savings and there is no consideration of the benefits of greenhouse gas emission reduction. This has to change.

Response 13.2 We agree that EECA needs to assist the small to medium sized organisations that do not have the depth of resource to assist with the required changes to a low carbon economy. However EECA should also continue to engage with large firms due to the increase in knowledge and experience that can be shared from the larger to the smaller firms. The larger firms may have greater resources available to undertake new initiatives and bear a higher risk than smaller firms.

EECA needs more engineers on its staff than policy analysts and they need to be out working with businesses. Many of the barriers to the implementation of projects which can reduce emissions arises from the lack of information and experience of advisers and decision makers. Bioenergy Association tries to fill these gaps but because of the lack of resources can do little. EECA as the agency acting in the public good needs to step forward and provide the facilitation and assistance required. In the bioenergy sector Bioenergy Association could do this instead of EECA but would require funding for the public good activities.

Bioenergy Association has assessed that around 80% of the benefits of process heat from biomass is related to public goods and only 20% able to be captured by the commercial investor. This reinforces the importance of the public good programmes which EECA administers.

Because of the large public good benefits of transitioning from fossil to biomass fuel there is a need for a range of complementary policies to support the creation and use of mitigation technologies, assist behaviour change, and manage risks. EECA is an appropriate body to administer the energy related complementary measures but they must do that in association with industry.

As boiler capital investment is a long horizon proposition, to meet New Zealand's targets as outlined by the IPCC coal boilers need to stop being built now otherwise the emissions are locked in for the next 40 years. Even Fonterra has identified that the need to stop building coal boilers has arrived but with the complexity of the DIRA requirement to take all milk they have set 2030 as the year in which no future coal boiler will be built. As industrial heat is one of the lowest cost and technologically easiest sectors of emissions to decarbonize the government must draw a line in the sand and stop the consenting of new coal boilers.

As mentioned in the draft report, and we agree, a range of complementary policies are needed to support the creation and use of mitigation technologies, assist behaviour change, and manage risks. Such policies are being applied in transforming New Zealand's light vehicle fleet, and should also apply for the heavy transport fleet and industrial heat which also faces high transition costs and hurdles with lower emission alternatives. While no analysis has been undertaken we believe the level of support for industrial heat from biomass would be similar to that currently being given to encourage the uptake of electric vehicles.

The draft report does not address in detail how to overcome any of the hurdles that are associated with transitioning industrial process heat to lower emission energy sources. For example the draft report could expand to assess how the wood biomass availability hurdle is addressed with the proposed increase in forestry planting to identify if there is increased future supply that could be an option for industrial heat transition. We encourage the Commission to widen this section of its investigation to identify opportunities to overcome these barriers and not rely just about carbon price driving change. As noted several times in the draft report, policy to support the adoption of new technology is required in addition to an effective emissions price. Our suggestions on appropriate complementary measures are summarised later in this submission.

Chapter 14 Waste

The Bioenergy Association generally agrees with the conclusions and recommendations made in the report in regards to waste. In particular:

- The primary driver for reducing emissions at landfills should be by gradually increasing and diversifying the waste levy, with a higher levy applied to organic waste to motivate diversion. The government

should regularly review the efficiency of this action in reducing the amount of waste disposed and GHG emissions generated. If ineffective, the levy level should be increased or a zero-disposal policy of organic waste to landfill should be considered.

- The strength of a levy mechanism is that it puts an incentive for the originator of the waste to pay or take alternative action without the need for other regulatory actions.
- New specific national goals should be established with regard to waste disposal reduction (those were removed from 2002 version of Waste Minimisation Act).
- Incentives (offset credits) should be put in place for beneficial treatment and use of methane generated at all waste treatment sites (landfills and WWTPs). However these incentives (offset credits) should be extended to industrial sites that treat their waste on site using GHG-beneficial technologies and therefore reduce the GHG emissions at landfills.
- Extending the landfill levy and coverage of the ETS on to unmanaged landfill sites will increase the control and recording of disposed waste as well as encourage better management (eg diversion of specific organic waste to facilities with anaerobic digestion facilities).

The Bioenergy Association would strongly support the introduction of legislation regulating the use of farm dumps and other waste disposal sites. This will need to be strongly enforced to assist with reducing illegal dumps.

Question 16.1 The ETS should be extended to WWTPs. This will motivate them to think carefully about the technologies they use. For example consider that aerobic treatment uses high energy which has to be imported to the site. Also, most WWTP have, through trade waste bylaws, the tools to motivate producers of high-strength organic waste to treat on site or deliver their waste to an AD facility. Use of anaerobic technology would allow all on-site electricity demand to be met by own generation.

The report mentions only briefly the emphasis on education of the public on effects of waste disposal to landfills and GHG emissions. This will be essesntial for the success of the initiatives taken.

Farms have the capability of economically treating on-site large amounts of their organic waste in order to reduce nitrogen discharge to waterways. The anaerobic technologies available are proven but because of their infancy with regard to use on New Zealand farms there are few demonstration applications and little guidance to design and implementation. The evaluation of use of anaerobic digestion opportunities has been hindered because they have tended to be treated as an energy solution and thus compared to other energy sources. The

non-monetary environmental benefits have often not been considered, yet by being considered as a nitrogen discharge reduction tool the economics of anaerobic treatment of the organic waste to produce biogas by the production of energy, can be a financial offset for nitrogen discharge reduction.

As New Zealand transitions to greater food processing the treatment of organic wastes produced should be included within any new processing facility consenting evaluation. Many of the organic wastes can be economically treated on-site whereas for others (smaller facilities) transfer to centralized treatment facilities will be the best option:

- Incentives (offset credits) should be designed or extended to encourage industrial sites that treat their waste on site using GHG-beneficial technologies and therefore reduce the GHG emissions at landfills.
- Most WWTP have, through trade waste bylaws, the tools to motivate producers of high-strength organic waste to treat on site, or deliver their waste to a central AD facility.
- Accepting that municipal WWTP can be a good solution for the processing of separated organic trade wastes can result in them being designed for that purpose and thus;
    - Diverting liquid organic waste from landfill, and
    - Producing energy from the waste which can reduce WWTP operating costs.

Anaerobic digestion produces both biogas which can be used for electricity generation, process heating, and as a vehicle fuel, and digestate which in many cases can be used as a high grade fertilizer[11]. Many WWTP are constrained from expanding to take more organic waste because of the lack of guidance available on the uses of the biogas and the digestate:

- Biogas can be used as a low carbon vehicle fuel as was done previously in New Zealand for a number of years. It then became unfashionable and is no longer done. Improving the incentives of using biogas as a vehicle fuel could be achieved by including biogas within the current Low Emission Vehicles Contestable Fund. The Fund currently allows only electric vehicles despite claiming that "The Government has established a contestable fund to encourage innovation and investment to accelerate the uptake of electric and other low emission vehicles in New Zealand, which might not otherwise occur."

[11] http://adbioresources.org/map

- There is currently no guidance and assistance given to the use of biogas. More waste would be processed into energy if there were more demonstration on biogas use[12]. Addressing this information barrier would increase the processing of residual organic waste and reduce the amount disposed of to landfill.
- The use of digestate from anaerobic digestion is under researched within New Zealand with a perception that it "cant be done" when internationally the use of digestate as a fertilizer is well understood and encouraged. Addressing this information barrier would increase the processing of residual organic waste and reduce the amount disposed of to landfill.

Chapter 15 The built environment

Residential heating is a key aspect of the built environment which should not be ignored. While not large in energy or GHG emission terms it is an area where all New Zealanders have an interest and have opportunities to make a difference. The decisions on choice of heating also have significant impacts on other environmental public goods such as air quality.

Engaging home owners in the choice of residential heating encourages their own financial investment for achievement of public goods in the form of greenhouse gas emission reductions. There is also the implied encouragement to apply their experience in the residential environment to their business decision making.

Wood pellets are a means of residential heating which can achieve many public goods, including low emissions, because of their controlled combustion. Use of biomass for heating will also take the pressure off an increasing demand for electricity and need to build more electricity generating plant with their own consequential environmental impacts.

Where there is a good alternative to the use of electricity, such as with residential heating, then electricity should be reserved for use where it is most valuable and where there are no or limited other low carbon options such as in transport.

[12] https://anaerobic-digestion.com/anaerobic-digestion-plants/anaerobic-digestion-plants-uk/

Part Five: Achieving a low-emissions economy

Measures complementary to the NZ ETS to speed up the reduction of greenhouse gas emissions

Government has established the Emissions Trading Scheme (ETS) to assist in transitioning to a low-emission economy. However the ETS is a very slow tool for transitioning to low-emissions fuels when capital investment decisions are made infrequently to replace or install new energy or waste treatment plant. Complementary measures are required to speed up the process if the zero emissions by 2050 target is to be achieved. The Bioenergy Association suggests the following complementary measures would assist speed up the transition.

A. Non-specific measures

1. **Government adopt procurement policies so that renewable energy greenhouse gas emission reduction options must be considered when making government entity capital investment decisions; and all costs and benefits are included in a full life cycle analysis of options; and reasons provided for not adopting a renewable energy solution.**
   - Because of the annual budget process and the way government entity capital expenditure is allocated there is a tendency to base capital expenditure decisions on least capital cost criteria. There is also little incentive for the inclusion of other Government policy benefits to be included in the evaluation of options eg regional growth, employment or environmental outcomes. This is despite Treasury guidelines for lifecycle analysis to be undertaken.
   - Energy efficiency and renewable energy options often have high up front capital costs and lower operating costs, but have long term benefits, compared to low capital cost fossil fuel options. A proper comparison of options should be on a full life-cycle analysis basis.
   - Government should introduce policies to change government entity procurement practices so that renewable energy and efficient energy use options must be considered when making investment decisions, and both monetary and non-monetary benefits are included in a full life cycle analysis of options.
   - Evidence exists that where advisers to government decision makers have been required to consider energy efficiency and renewable energy options that they have often discovered that such options should be pursued.
   - Evaluation of government entity CO_2-e reduction projects requires guidance from Treasury as to the CO_2-e cost profiles to be used. Energy related capital projects often have an economic life of around 30 years so

the Treasury guidance should extend for that period even though discounted cash flow costs and benefits after 20 years have little effect on evaluation results. Current guidance CO_2-e cost profiles to be used in project appraisal is difficult to obtain, but to ensure consistency across investment options, is necessary when undertaking life-cycle analysis. Improved guidance would also demonstrate that the Government is taking clear long term decisions that reflect the likely real price of carbon over the life of the heat plant (i.e. 20 years plus).

- Local councils should be required to use procurement policies similar to those adopted by central Government, and use the same CO_2-e cost guidelines.

2. Extend the financial criteria for Crown Loans

- Current financial criteria for Crown Loans is a five year payback period on the energy savings. There is no recognition of the CO_2-e cost reduction benefits.
- Government should extend the criteria for Crown Loans for investment in projects to better reflect the monetary and non-monetary lifecycle costs and benefits of a proposal which reduces greenhouse gas emissions..

3. Government introduces policies to allow for accelerated depreciation of renewable energy, methane reduction and energy efficiency capital investments which reduce greenhouse gas emissions.

- Renewable energy and energy efficiency equipment is more capital intensive but often has lower on-going operating costs than alternatives.
- Access to capital is a major barrier to investment in renewable energy and energy efficiency solutions. Allowance of accelerated depreciation is fiscally neutral to Government except for timing. However accelerated depreciation can provide a significant assistance to plant investors.

4. Introduce programmes to assist farmers offset biological emissions via on-farm solutions

- Farmers have a number of potential opportunities for offsetting biological emissions if agriculture is brought within the ETS. These include:
    - Production of biomass suitable for sale and use as fuel in process heat plant. The biomass useable as fuel may come from:
        - Managed riparian buffer zone planting where suitable trees are selectively harvested so that revenue as well as environmental benefits and waterway protection are achieved from riparian planting.
        - Managed shelter belts which are planted in say 3 rows of different species so that there is always at least one row providing shelter and another row may be selectively harvested and sold as an energy biomass.

        - Managed erosion control planting which are planted with the objective of not only providing erosion protection but can be selectively harvested and sold as an energy biomass.
        - Managed woodlots on low food production areas of a farm where planting includes species which may be short rotation, thus providing a more regular revenue, or are planted so that harvest residues can be collected and sold as energy biomass.
    - Planting of short rotation biomass energy crops such as Miscanthus along riparian areas to stop nitrogen discharge to waterways.
    - Collection of animal effluent and treatment in anaerobic digester plant to:
        - reduce discharge to waterways;
        - allow recycling of stock water;
        - produce pathogen free fertiliser;
        - produce biogas for use in heating and cooling, generation of electricity or use as an on-farm vehicle fuel; and
        - reduce discharge of methane to atmosphere.
- While each farm has a number of opportunities for offsetting their biological emissions in many cases there will be a need for economies of scale to be achieved by aggregation across a number of farms. The ETS system should allow for aggregation of liabilities and offsets in order to reduce administrative costs.

5. Aggregation of small emission reductions

- Many process heat or waste initiatives that contribute to greenhouse gas emission reductions are too small to be included within the ETS. The ETS system should allow for aggregation of liabilities and offsets in order to reduce administrative costs.

6. Programmes to investigate extraction of non-energy coproducts from wood and waste

- While process heat and production of biogas from use of biomass is economic in niche situations today these applications are entry activities for higher value use of biomass in the long term.
- The extraction of the chemical co-products of energy out of biomass such as lignin, sugars, etc will be the feedstocks for the production of biobased materials which replace the plastics and other petroleum based materials currently derived from oil and natural gas.
- The high value of the coproducts improve the economics of the extraction of energy from biomass and so research and development into these products will also assist greater use of biomass for energy.
- In the future the biogas from waste is likely to be a valuable feedstock for the production of many plastic substitutes. Early investment in treating

waste to produce biogas will also assist an early transition to production of these higher value products.

B. Methane emissions reduction

The following measures complementary to the NZ ETS would encourage increased methane emission reduction from waste via anaerobic digestion applications.

7. Identify and report regional methane emissions from organic municipal and industrial waste and publish annually within the Greenhouse Gas Inventory.

- The objective is to encourage the reduction of methane emissions from landfills, waste water treatment plants and industrial processes at a regional level where specific projects can be initiated. A regional rather than national focus will put greater priority on action. Regional reporting will put pressure on regions to take action.
- The each region should be required by Government to establish specific targets and an Action Plan for the Reduction of Methane Emissions within that region.
- Government, through progressive targets, bans the deposition of organic waste in landfills, e.g. 35% of food wastes from households, restaurants and shops should be recycled through biological treatment by 2022, 75% by 2035 and 100% by 2050

8. Government puts high emphasis on educating municipal and industrial solid and liquid waste producers and treatment managers on opportunities to reduce methane emissions

- Establish a programme of work to address inefficiencies or barriers to municipal solid and liquid waste treatment managers reducing methane emissions
    - Hosting regional meetings to assist liquid and solid waste facility owners to be up-to date with methane reduction opportunities and practises.
- Review and provide guidance on:
    - Methods and evaluation of options for methane collection and processing at WWTP, farms, industrial sites and landfills
    - Demonstration case studies including detailed business case on projects already implemented
    - The discharge of digestate to land as a fertiliser
- Collating and publishing useful information from existing demonstration facilities:
- Collating information from local government on their existing policies with regard to methane reduction. Reviewing the information and report back to local government as a whole with useful information.

- Government requires local councils to set up dedicated organic waste collection schemes and educational programmes for public regarding food waste recycling through AD.
- Regulations around biogas facilities are not codified and so regulations for natural gas and various other regulations are applied at the discretion of the local authorities which introduces uncertainty in developing a project.

9. Use of the biogas for generating electricity at peak demand periods

- With more and more wind and solar electricity generation NZ will have a problem of peak electricity generation.
- The production of biogas from co-located WWTP and AD facilities using industrial food waste, and by use of biogas storage, the biogas can be used for generating electricity at peak demand periods when the revenue will be significantly above the price of base load electricity generation. Economies of scale are achieved by co-location.

C. Substitution of coal by biomass fuel to reduce GHG emissions

Bioenergy Association analysis shows that because of the high value of the public good benefits of switching from use of fossil fuels to biomass fuels for heating it would be more cost effective for the Government to introduce some light handed complementary measures to assist Crown agencies and businesses to switch. This leadership would provide encouragement for private sector heat facility owners to also consider transitioning to wood fuels.

The following complementary measures would encourage transition from coal to wood fuel and thus achieve significant GHG reductions from public sector, and industrial heat applications.

10. Government and industry agree targets for switching the use of wood fuels for coal by 2030, 2040 and 2050.

- The objective is to encourage the use of biomass fuel for producing heat and to reduce the amount of coal used. Current signals from Government for switching from use of coal are weak. This lack of leadership perpetuates a perception that biomass energy is risky, yet it is no more risky than the supply of other fuels.
- Establishment of targets by Government would signal to local government and industry that the use of biomass as fuel is encouraged. The current targets in the New Zealand Energy Efficiency and Conservation Strategy (NZEECS) are meaningless for decision making. The targets need to be specific in energy and greenhouse gas emission reduction terms.
- The NZEECS is an existing strategy, but currently appears ignored by Government, which sets out specific plans which in themselves would be a stretch so are an ideal first start to achieving greenhouse gas emission reductions. If the NZEECS was seriously promoted and monitored by

Government it would provide adequate encouragement to business and local government.

- By Government adopting a collaborative approach to implementing the NZEECS on reducing GHG emissions by using biomass fuels to substitute for coal this would address perception which is the biggest barrier.
    - Improve efficacy of the wood fuel supply market
    - Support regional development programmes similar to the Wood Energy South in the Waikato and Otago/Canterbury regions.
    - Establish a work programme for switching in each target sector and region.
    - Preparation and promotion of the value of using accredited biomass fuel suppliers and registered wood energy advisers.
    - Collating and publishing useful information from existing demonstration facilities into Technical Guides.
    - Collating technical information from case studies and publishing.
    - Hosting regional meetings to assist heat users and their advisers to be up-to date with switching opportunities and practises.

11. Improved efficiencies of the biomass fuel supply market

- The biomass fuel supply market is growing but will need to grow faster if the targets for transitioning from fossil fuels are to be achieved.
- There are adequate volumes of biomass already or potentially available but resource owners have been slow to see the growing revenue opportunity. Forest owners need to be encouraged to use harvest residues rather than leave as slash in the forest where they can be damaging during floods and a missed revenue opportunity. Farmers also have opportunities of using the sale of biomass as fuel from their farms as an offset for biological emissions, provision of waterway protection, and as a revenue stream. Disemmination of information can address these issues.
- The biomass fuel supply chain is complex and has a number of players so improvements in communication and perceptions can assist improve efficiency of biomass fuel supply.
- Review and provide guidance on:
    - Sourcing and use of non-wood biomass fuels eg straw, herbaceous material etc.
    - Methods for managed riparian buffer zone harvesting, managed erosion planting, and managed shelterbelts

12. Assistance to municipal and industrial heat users to transition from use of coal to biomass fuel to reduce greenhouse gas emissions

- Support for domestic added value processing of wood. Wood processing residues make the best fuel so the more wood that is processed within New Zealand, instead of overseas, means that they is more top quality fuel available for heat users. If Government encourages more domestic

added value processing of wood with the consequence that greater volumes of high quality wood fuel become available.

- Review and provide guidance on:
    - Improved processes for consenting of heat plant. Current regional air quality rules incur unnecessary costs on applicants and the consent authorities.
    - Fuel standards
    - Relative costs and benefits of heating by alternative energy sources such as biomass, solar, electricity and geothermal.

13. Widening the scope of the Trading Standards group of MBIE to include solid, gaseous and liquid fuels

- Trading Standards within the Consumer Protection and Standards branch of the Ministry of Business, Innovation and Employment (MBIE) currently monitors the safety and performance of only liquid fuels. If biofuels are to be taken as a serious option then the activities of this section should be widened to also include gaseous and solid biofuels.
- The use of gaseous fuel (LPG) is currently the responsibility of another arm of Government. All fuels should be under the same roof.

D. Reduction of GHG emissions from transport

The following complementary measures would encourage the reduction of GHG emissions from transport

14. Government and industry through the Bioenergy Association develop a transport biofuel development programme based on the results of the Scion led New Zealand Biofuels Roadmap project.

- While electric vehicles will have a high level of penetration into the private vehicle fleet there will remain vehicle owners who have travel which will require them to continue to use liquid fuels. This includes long distance travel and heavy vehicles.
- Liquid biofuels are increasingly being used overseas and similar but different demand could occur in New Zealand. In addition there are marine and aviation applications where liquid fuels are likely to be required for many decades.
- There will also be limits on the amount of new electricity generation which will be able to be built while keeping electricity prices low.
- A prudent approach is to have a liquid biofuels development programme, even if only in order to manage contingencies.

15. Low emissions transport programme

- Revise the current Low Emissions Contestable Fund to include all low emission transport options including electric and biofuels. (Currently the scheme is limited only to electric vehicles and electric vehicle infrastructure).

- The level of support from the Low Emissions Transport Programme should be based on a Low Carbon Fuel Standard similar to that of the Canadian Air Resource Board with allocation based on carbon intensity of the fuel.
- To improve accessibility to low carbon intensity fuels the support from the Low Emissions Contestable Fund for infrastructure such as filling stations for alternative fuels should be similar to that being done for electric vehicles.
- To encourage an early transition to low emissions transport companies importing or producing petrol, gas or diesel fuels are obliged to match a percentage of those quantities with alternative fuels according to a calculation based on the Low Carbon Fuel Standard.
- Road User Charges for each vehicle should be calculated on the basis of the application of the Low Carbon Fuel Standard to the respective fuel types.

16. Review and provide guidance on:

- Use of biomethane as a vehicle fuel. The economies of scale from combined WWTP and AD facility can produce enough biogas that could be used in say a local bus company. Guidance as to the safe production, storage and use in vehicles is required.

17. Government R&D funding increases for:

- Advanced liquid biofuels research having regard for the likely areas of application in NZ that will be economic before 2050 (eg targeting biofuels for industrial, marine and aviation applications, for strategic reserves and for their lower health related emissions)
- High value bio-products where biofuels are a co-product

Conclusion

The Bioenergy Association supports the work of the Productivity Commission in its Inquiry but suggests that the inclusion of the points raised in this submission are critical to getting an enduring and successful transition to a low-emissions economy.

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