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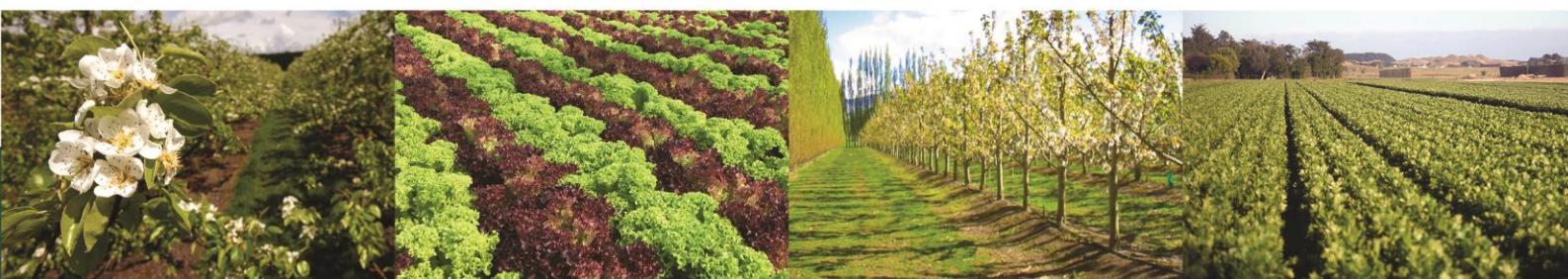
Action on Agriculture Emissions

13 August 2019

TO: Ministry for Environment

NAME OF SUBMITTER: Horticulture New Zealand

Supported by: Potatoes New Zealand, Vegetables New Zealand, Onions New Zealand, New Zealand Kiwifruit Growers, Katikati Fruit Growers, Asparagus New Zealand, Strawberries New Zealand, Tomatoes New Zealand



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Introduction

Horticulture New Zealand (HortNew Zealand) thanks Ministry for Environment for the opportunity to submit on the Action on Agriculture discussion document and welcomes any opportunity to work with Ministry for Environment and to discuss our submission.

Background to HortNew Zealand

HortNew Zealand was established on 1 December 2005, combining the New Zealand Vegetable and Potato Growers' and New Zealand Fruitgrowers' and New Zealand Berryfruit Growers Federations.

HortNew Zealand advocates for and represents the interests of 5000 commercial fruit and vegetable growers in New Zealand, who grow around 100 different crop types and employ over 60,000 workers. Land under horticultural crop cultivation in New Zealand is calculated to be approximately 120,000 hectares.

The horticulture industry value is \$5.7 billion and is broken down as follows:

Industry value	\$5.7bn
Fruit exports	\$2.82bn
Vegetable exports	\$0.62bn
Total exports	\$3.44bn
Fruit domestic	\$0.97bn
Vegetable domestic	\$1.27bn
Total domestic	\$2.24bn

For the first time New Zealand's total horticultural produce exports in 2017 exceeded \$3.44bn Free On Board value, 83% higher than a decade before.

It should also be acknowledged that it is not just the economic benefits associated with horticultural production that are important. The rural economy supports rural communities and rural production defines

much of the rural landscape. Food production values provide a platform for long term sustainability of communities, through the provision of food security.

HortNew Zealand's mission is to create an enduring environment where growers prosper. This is done through enabling, promoting and advocating for growers in New Zealand.

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Basic Questions

What is the best way to incentivise farmers to reduce on-farm emissions?

Fertiliser

Horticultural agricultural emissions are related to fertiliser use. In our opinion the best way to reduce fertiliser use is through the implementation of good management practices and ongoing research into methods for better measuring and managing fertiliser use to achieve optimum yields with reduced risk of losses to both water and air. In our opinion, the following methods are likely to be most effective:

- Audited Farm Environment Plans (FEP) that include Good Management Practice (GMP) measures for reducing fertiliser use and therefore nitrous oxide emissions.
- Ongoing research into tools and technology to improve our understanding of crop uptake, plant residue breakdown and soil mineralisation, and improved methods to better match crop demand, soil supply and fertiliser requirements.
- Ongoing research into fertilisers, that have less emissions and are better matched to the uptake of plants, and the relationship with soil processes.
- Ongoing research into the nitrous oxide losses from different growing systems (orchards, outdoor vegetable growing, indoor growing) and different growing locations to enable GMP to be better tailored to growing system and location.

- Ongoing research and development into decision support tools that are tailored to assist growers in making decisions relevant to their operations.

The horticultural sector is involved with and developing research projects¹ to improve understanding of nutrient management to reduce nitrate leaching risk. These projects could be built on to improve our understanding of on-farm emissions.

Land use change

For farmers, one of the ways they can reduce their emissions is through changing to a land use that has lower emissions. If farmers have suitable land for horticultural activities, this may provide a potential opportunity to reduce emissions and increase food production and profitability.

The area of land that is potentially suitable for horticulture is much greater than the area currently in horticulture, or predicted by the industry to be converted to horticulture in the next 10 years. The horticultural industry's current predictions are based on the existing international market access and current competitive advantage.

Industry predicted change

HortNew Zealand surveyed product groups to estimate the degree of expansion predicted over the next 10 years.

The following crops were surveyed: avocado, blackcurrant, boysenberry, buttercup squash, citrus, feijoa, kiwifruit, kiwi berry, passionfruit, persimmon, pipfruit, tamarillo, potatoes, onion, process vegetables and fresh vegetables.

The surveyed crops made up 100,000 ha of an estimated 120,000 ha of horticulture in New Zealand in 2018.

There was a predicted increase of 10,000 ha of additional fruit growing 2028. Half of this

Vegetable Production PNew Zealand-79 Potatoes Emissions Project

¹ Rootzone Reality, Measure it and Manage it, N mineralisation, Maximising the Value of irrigation, Don't Muddy the Waters, Future Proofing

with most growth expected in avocado, pipfruit and kiwifruit for export.

Vegetable production is expected to increase in line with domestic population². There is also a predicted 2000 ha expansion of potatoes and onions for export.

Of the crops surveyed, there was an average predicted land area growth of 30% and an average predicted yield growth of 40%.

The survey indicates that horticultural land area is predicted to expand from 120,000 ha to 140,000 ha by 2028 (or slightly more to account for unsurveyed crops).

Accelerating land use change to horticulture

In order for farmers to decide whether it would be worthwhile for them to convert part of their farm to horticulture, or to increase the proportion of crops for human consumption within arable rotations, they will need to know a range of factors to determine what is possible:

- Soil, water, climate requirements of crops
- Labour requirements
- Environmental requirements
- Revenue, gross margin for crops.
- Market requirements and market access for products

This information wouldn't be required at the farm scale. It would be possible for this to be developed at a national scale to provide a screening level of information, for farmers to then explore in more detail with experienced and qualified horticultural advisors.

Barriers to land use change

To maximise the potential of converting more land to horticulture at an accelerated rate, to provide greater opportunities for farmers to diversify into lower intensity horticulture crops, barriers would need to be removed.

² We have assumed land area will grow proportional to the projected 20% population

These barriers exist at an international, national and regional scale, rather than at a farm scale.

Market access

Fresh fruit and vegetables from New Zealand achieve a premium price internationally because our products are a high-quality and counter-seasonal. To maintain this premium New Zealand will need to be careful to maintain quality and reputation if the volume of product increases into established markets.

New Zealand export growers are audited to meet global good agricultural practice (Global G.A.P.) standards to gain access to international markets. Maintaining the rigour around Global G.A.P and the domestic equivalent (New ZealandGAP) is essential to provide confidence that growers meet standards for food safety, social practice and environmental performance.

There are international markets that we do not currently have access to. If we are able to negotiate access to new international markets, this will provide an opportunity to expand export production. The process for gaining access to new markets for fresh horticultural products is slow. If this process could be expedited, greater market access could be achieved; this would provide a greater opportunity for horticultural expansion, however we recognise this relies on international agreements being reached.

With international diets potentially changing to include more plant-based foods, there is an opportunity for New Zealand to expand into new products. We already have a successful process industry that exports processed vegetables and fruit. There may be opportunities to expand this sector particularly if we can develop processed and lightly processed products that are unique or desirable, for example high value nutrition foods. Currently there is a National Science Challenge looking into opportunities for foods

growth to 2030, which would be an additional 8,000ha

with high-value nutrition. One of the National Science Challenge projects is looking at Kumara as a first food for babies. New Zealand already has reputation as a producer of food for infants. This project presents an opportunity to build on that reputation with a highly nutritious plant-based food for babies that also presents an opportunity to build on traditional Maori knowledge.

Labour

There are a range of employment opportunities within the horticulture industry, from permanent and highly skilled careers through to seasonal and unskilled work. Currently we experience seasonal labour shortages. We need investment in programmes for skills development and education and to attract and upskill the workforce. There are opportunities for highly skilled people in developing new varieties and growing systems, environmental management and marketing. We need to invest in maintaining strong and positive relationships and programmes with Pacific Island nations who participate in our seasonal labour scheme (RSE) and continue to provide opportunities for productive work for New Zealanders. We also need to invest in technological solutions, such as robotics, to reduce the amount of unskilled labour required to harvest and pack products.

Access to water and land

Vegetables and fruit require good soils. Currently vegetable and fruit growing land is being lost to urban and lifestyle development. It is highly unlikely that conditions would shift so much that horticulture became a more profitable use of land than housing development. A housing crash would likely need to coincide with booming demand for local vegetables and probably a number of other favourable conditions. In an uncertain future the risk should not be ignored as once premium growing soils are built on it is almost impossible to change the land use again. (Moore, Barton, & Young, 2019)

We are hopeful the proposed National Policy Statement for High Class Soils, will direct

Councils to plan urban and lifestyle development in a manner that is more mindful on the potential impact on domestic food supply, and the ability of New Zealand agriculture to transition to a lower emissions land uses.

Vegetables in New Zealand are grown mostly for domestic markets. The implementation of the National Policy Statement for Freshwater Management (NPSFM) is, in many regions, is preventing new vegetable growing areas being able to be established, due to the water quality allocation policies developed by regional councils. These regulatory barriers, threaten the ability of New Zealand to continue to provide vegetables for domestic supply. Preventing new vegetable growing in New Zealand has potential negative health impacts on our population and increases the risk of carbon leakage with New Zealand becoming increasingly dependent on imported vegetables. For example, in the Waikato Region the proposed Plan Change One makes new vegetable growing a non-complying activity, this is despite the re-zoning of vegetable growing land in Auckland as urban. This policy prevents vegetable growing areas lost from Auckland being replaced in the Waikato. Similar policies are making new vegetable growing areas difficult or impossible to develop in Canterbury and Horizons. These regional policies fail to account for the impact of the provisions on domestic food supply, or to recognize that vegetable growing is a national food system.

Fruit in New Zealand is mostly grown for export. The implementation of the NPSFM is, in many regions, is making fruit growing less certain, due restrictions on water abstraction. Fruit trees are parsimonious users of water however, fruit trees need water are specific times to prevent crop failure and the risk or long-term damage to trees or risk the death of rootstock. Some regional councils have provisions to allow some water to continue to be taken below minimum stream flows, to prevent long-term damage to fruit trees, others only allow water abstraction to prevent death of trees, and some regions

make no provision in water allocation for horticulture – this is in contrast to animal agriculture where stock drinking water can continue to be taken in most regions in most circumstances. There are a number of factors that may increase competition for water as we transition to a low emissions economy:

- Climate change, with predicted drier and warmer conditions in some important growing regions
- Increased forestry, which reduces water yields
- The design of pastoral free allocation, an output-based method may incentivise irrigated pastoral activities.

To maintain existing horticulture and to provide for the expansion of horticulture to assist in the transition to a low emissions economy, greater investment in science supporting water allocation decision making is required.

In some locations, a shift from irrigated pasture to irrigated horticulture, would result in no additional demand on water resources, but may require a change in the timing of abstractions. In other regions, or where water is already over allocated, other options such as storage, recharge, augmentation and ongoing efficiency improvements will be required to facilitate horticultural expansion.

Infrastructure

If horticulture is to expand in Northland, Eastern Bay of Plenty, Hawkes Bay, Tasman and Gisborne, infrastructure investment will be required.

Lease arrangements

It should be recognised that farmers may not have the skills or desire to manage horticultural operations on their land. One way that more rapid uptake of horticultural land use change could be facilitated is through enabling lease arrangements. One barrier to lease farming currently is that in many regions

the implementation of the NPSFM has resulted in grandparenting of land use, which reduces land use flexibility for vegetable rotations.

For example, in the Horizons region, changing locations to reflect lease arrangements or to provide for crop rotation would require a new resource consent. In the Waikato, proposed Plan Change 1 allows growers to relocate within sub-catchments without triggering a discretionary consent, however the sub-catchment constraint is onerous as many growers operate crop rotations across sub-catchment and regional boundaries.

Do the pros of pricing emissions at farm level outweigh the cons, compared with processor level, for (a) livestock and (b) fertiliser? Why or why not?

Fertiliser

In our opinion fertiliser should be priced at the processor-level. The administration costs of pricing at the farm scale will outweigh any benefit of pricing at the farm-level.

We are of the view that the benefits of on-farm pricing are related to achieving on-farm action. However, an audited FEP approach is more likely to drive action to reduce fertiliser use in horticultural operations.

If in future there was information that indicated any of the following:

- Growing systems that have very different levels of emissions (e.g. indoor versus outdoor)
- Different levels of emissions depending on location
- Different level of emissions depending on verifiable practices – other than reducing amount of fertiliser used.

Then it may become worthwhile to price emissions from fertiliser at the farm-level. However, before a decision was made to shift pricing from the processor-level to the farm-level, consideration would have to be given to whether the potential improved accuracy

would justify the increased administration costs.

Sequestration

Currently only the sequestration from trees that meet the criteria under the Climate Change Response Act 2002 and Climate Change (Forestry Sector) Regulations 2008 are eligible for carbon credits through the Emissions Trading Scheme (ETS).

In reality sequestration is achieved by all plants and some soils. We are of the view that research should be undertaken to quantify the degree of sequestration being achieved by horticultural growing systems in New Zealand.

We recognise that in order to account for sequestration as part of our international obligations, the change in sequestration has to be accounted for nationally. We cannot just count those trees and vines planted over a period of time, but must also account for trees and vines of similar scale that have been lost over the same period. From a practical perspective, if the current criteria was altered to enable the sequestration from a greater range of on-farm trees to be accounted for, it is likely there will be some practical threshold, below which New Zealand cannot reliably account for changes in sequestration as part of our international accounting obligations.

We are of the view that it is worthwhile undertaking research into the level of sequestration achieved by trees and vines of various sizes and scales and the degree to which the change in sequestration at these scales could be accounted for. We recognise that the threshold of eligibility for carbon credits maybe above the scale of sequestration achieved by many horticultural plants.

The threshold at which sequestration would be eligible for ETS carbon credits is relevant for determining whether an on-farm level of reporting is worthwhile for horticultural operations.

For many operations, for example most vegetable growers, it is unlikely that the level

of sequestration achieved on-farm would be eligible for carbon credits. For some growers, perhaps those growing on mixed farms or those with significant numbers of trees, it may be worthwhile to calculate carbon credits at the farm scale, and use these to pay for the price of fertiliser emissions and/ or receive carbon credits that could be sold back into the ETS.

However, regardless of whether sequestration achieves a threshold that can be accounted for as part of New Zealand's international accounting obligations, sequestration is still occurring at the farm scale. Farm-scale sequestration has benefits and should be recognised and encouraged. We are of the view this can be achieved through the design of free-allocation criteria.

What are the key building blocks for a workable and effective scheme that prices emissions at farm level?

If fertiliser is included within the on-farm pricing scheme, in our view it is essential that the opportunity is provided for growers to opt out and pay at the processor level.

If credits from sequestration can only be accounted for via the on-farm pricing tool, then some growers may wish to opt-in to the on-farm pricing scheme (and they should be able to do so).

What should the Government be taking into consideration when choosing between Option 1: pricing emissions at the processor level through the New Zealand ETS and Option 2: a formal sector-government agreement?

The formal sector agreement demonstrates commitment from the sectors to work with farmers and growers to achieve on-farm behaviour change.

As an interim measure, would Option 1: pricing emissions at the processor level through the New Zealand ETS with recycling of funds raised back to the sector to incentivise emissions reduction or Option 2: a formal Government-industry

agreement for reducing emissions be best? Why?

The formal sector agreement has the benefit that it would harness the commitment from the sectors to work with farmers and growers to achieve on-farm behaviour change.

What additional steps should we be taking to protect relevant iwi/Māori interests, in line with the Treaty of Waitangi?

Any policy must fulfil the Tiriti o Waitangi principle of partnership and good faith with iwi/hapū.

Horticulture presents an opportunity for Maori land and for communities where Maori make up a larger proportion of the population.

Some of these areas have not attracted investment in the infrastructure in the past. If the opportunity to expand horticulture into Maori land and Maori communities in Bay of Plenty, Gisborne, Hawkes Bay and Northland is to be achieved, then greater investment in the infrastructure, for example water storage to support this development, will need to be considered.

What barriers or opportunities are there across the broader agriculture sector for reducing agricultural emissions? What could the Government investigate further?

As well as emissions from fertiliser, there are also emissions from vehicles and machinery, packhouses and processing facilities and transport. Glasshouse growers have emissions related to heating.

Glasshouse growing, provides an example of how the ETS rebates and contestable funding could be designed to be more effective. With a changing climate, glasshouse growing may become more important as glasshouses provide a resilient growing system for some crops.

In our view there could be ETS rebates and contestable funding, which should be risk based and include criteria, to achieve:

- Emission reductions in New Zealand, and globally
- Improved overall greenhouse gas efficiency across the whole food basket produced in New Zealand, while maintaining domestic food security.
- A balance between investment in high-impact/high-risk research and investment that are long-term and/or uncertain but have the potential to achieve large reductions and investment in lower-impact/low-risk research and investment that promises lesser reductions, but that are certain and can be achieved quickly.

Glasshouse growers are already in the ETS and recognise the need to reduce emissions. The design of the industrial allocation is output based and incentivises low carbon production. However, crops are grown close to markets throughout New Zealand, including some places where low carbon fuels are not readily available.

The experience of glasshouse growers is of paying into the ETS, without seeing reinvestment that would enable a transition to lower emissions alternative fuels. For example, one grower spends \$500,000 per annum on the ETS units, of which 25% is returned by way of industrial allocation per annum. The ETS cost makes it more difficult for them to fund the investment required to transition to lower emissions alternative fuels.

Proven technology has recently become available from the Northern Hemisphere, such as installing biomass burners that can heat glasshouses, but these systems would cost \$8-10m, which is cost prohibitive.

The glasshouse growers industrial allocation is proposed to be phased out. This phase out assumes that carbon leakage will be a lesser risk in the future, however this is not certain. If it becomes uneconomic to grow glasshouse crops in the South Island, these crops are likely to be transported in with carbon

leakage risk or it may become uneconomic to supply, reducing the domestic supply of fresh food. Investing in assisting South Island growers to convert to lower emissions fuels would achieve certain emissions reductions immediately and would contribute to reducing the overall carbon intensity of New Zealand's food, while also supporting domestic food security.

When considering global emissions and New Zealand's influence on global food security, the most useful measure may not be how much food New Zealand can produce, but the technology and plant varieties that New Zealand can develop to assist the transformation of the global food system to one that feeds more people with lesser emissions.

For example, New Zealander growers have rights for new varieties they develop. Research into new varieties presents an opportunity for New Zealand to gain from selling the rights for other countries to grow healthy, sustainable fruit and vegetables to feed their populations.

What impacts do you foresee as a result of the Government's proposals in the short and the long term?

We are of the view, that the implementation of good management practices will be the most effective method of achieving reduced nitrous oxide emissions from fertiliser use. Growers are already working to improve their practices to increase the efficiency of fertiliser use.

A greater potential impact on horticulture is related to how free allocation is designed, and how the pastoral sector responds to the proposals.

For horticulture, the pricing of emissions from fertiliser is unlikely to have a significant impact on growing operations.

If free allocation is designed simply to drive greater efficiency for animal emissions this has the potential to drive some animal agriculture into achieving greater intensity on

high-class land. This high-class land is the most likely to be suitable for conversion to horticulture or for growing an increased proportion of crops for human consumption. This could result in a lost opportunity for New Zealand to reduce our overall emissions, without reducing the amount of food we produce.

However, whilst we want to facilitate expansion of horticulture onto suitable land, there are risks with expansion of horticulture if it occurs in a way or at a rate that erodes the premium price achieved for New Zealand products, or results in increased pressures on labour markets or environmental limits.

Do you have any other comments on the Government's proposals for addressing agricultural emissions?

The Eat- Lancet Commission found that food is the single strongest lever to optimize human health and environmental sustainability and without action, the world risks failing to meet the United Nations Sustainable Development Goals and the Paris Agreement. The Report recommended a transformation to healthy diets by 2050 requiring substantial dietary shifts, with global consumption of fruits, vegetables, nuts and legumes having to double, and consumption of foods such as red meat and sugar being reduced by more than 50%. "*The food we eat and how we produce it will determine the health of people and planet, and major changes must be made to avoid both reduced life expectancy and continued environmental degradation.*" (Eat-Lancet, 2019)

The IPCC Climate change and land report recognizes the global food system is underpressure from non-climate stressors (e.g., population and income growth, demand for animal-sourced products), and from climate change. These climate and non-climate stresses are impacting the four pillars of food security (availability, access, utilisation, and stability). (IPCC, 2019)

The contribution New Zealand makes to global food security, like our contribution to

emissions, is relatively small. However, improving the global food system so it contributes more to the health of people, and less to climate change, requires global action.

We believe the Climate Change Response (Zero Carbon) Amendment Bill, provides an opportunity for a national commitment to reduce the overall carbon intensity of New Zealand's food system, without reducing production. This could be achieved both by:

- reducing the carbon footprint of each food product; this metric could include on-farm carbon off-setting, but exclude off-farm offsetting, and
- increasing the proportion of food that has a lower carbon footprint relative to other food products New Zealand produces

It would be possible to achieve the greenhouse gas emission reduction target, by reducing the food New Zealand produces. However, in our view, the combination of climate and food targets, will direct New Zealand to making a more meaningful contribution to climate action, and is more likely achieve the aim of the Paris Agreement.

Therefore, we are of the view that the purpose of the Climate Change Response (Zero Carbon) Amendment Bill should be amended to include an additional purpose:

Provide a framework by which New Zealand can develop and implement clear and stable food policies that contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5° Celsius above pre-industrial levels without threatening food production.

We are of the view that agricultural free allocation should be designed to achieve both climate and food aims of the agreement.

Free Allocation

Do you agree that the method for free allocation of emissions units at processor

level should be output-based? Why or why not?

We are of the view that clear principles should be developed for the industrial and agricultural allocation of units, that achieve the purpose of the Paris Agreement.

We note that the Interim Climate Change Committee (ICCC) considers the main reason for providing free allocation is to help manage the social impacts of emissions pricing, such as impacts on employment. While we acknowledge and agree that social impacts are a valid reason for providing free allocation as part of a just transition, we think that free allocation designed to ease social transition should be for a finite period, with a predictable phase out.

As well as social transition, which might be the dominant purpose initially, we are of the view that in the longer-term free allocation can assist in driving the transition to a lower emissions agriculture in New Zealand to deliver a meaningful contribution from New Zealand to achieving the aim of the Paris Agreement which is to limit the temperature increase to 1.5°C in a manner that does not threaten food production.

Free allocation principles

Free allocation principles should be designed to account for global emissions and food security.

When considering food security, the first priority for New Zealand should be to domestic food security, secondly on food security for the Pacific and finally the most useful contribution New Zealand can make to global food security.

New Zealand already produces carbon efficient products, for example, commercial vegetable growers and arable farmers in particular have been adopting technologies such as: GPS, controlled traffic, minimum tillage, improved fuel emission powered tractors and machinery, combination tillage equipment which minimise cultivation passes for soil preparation, use of rotational crops

such as mustard which effectively 'lock' up nutrients and soil carbon between crops and build other beneficial to soil health such as humus. New Zealand has an ideal climate with medium to high annual rainfall, rich topsoil and median temperature range in most growing regions of New Zealand. Our natural resources and growing systems enable us to produce food with less reliance on irrigation and other inputs which reduces our overall emissions when compared to other countries.

All of these measures and natural features continue to assist New Zealand to produce food with a low carbon footprint.

As other countries develop systems to meet their Paris Agreement commitments, the risks of carbon leakage will be reduced. However, there is still an opportunity for New Zealand growers and farmers to differentiate our products by their lower carbon footprint. This low carbon footprint could be achieved both by increasing efficiency and with on-farm sequestration.

The measure for this goal is the reduction of the overall carbon intensity of New Zealand's food production, without reducing production.

Carbon footprint of products

Achieving reliable carbon footprint would not need to form part of the on-farm pricing scheme (because it would not be eligible for credits), but could be managed as part of an audited FEP, and be used as a means of demonstrating that the carbon efficiency threshold required to qualify for free allocation is met.

Carbon footprint of whole food basket

While carbon footprinting of individual products and comparison with similar products (either imported or export competitors) is important to reduce the risk of carbon leakage, this method on its own could result in New Zealand producing less food and specialising in producing efficient but carbon intensive food products. This outcome would not achieve the aims of the Paris Agreement, because it could result in reduced food

production. To achieve the aims of the Paris Agreement, we need to look not only at individual products, but also seek to reduce the overall carbon intensity of the whole New Zealand food basket. This could be incentivised with carbon intensity thresholds that apply across products.

Domestic food supply

New Zealand's food policy tends towards self-reliance, where we export a limited range of products (mainly food) and import goods including food. Linking free allocation only to products carbon footprints would support the ongoing importation of food that has a lower carbon footprint than food produced in New Zealand. This policy is reasonable for processed food, but for vegetables which are mainly eaten fresh it has limitations. New Zealand is too remote to import most fresh vegetables, except by air-freight, which can only provide for a fraction of demand and has a high carbon footprint. Most vegetables that New Zealand imports are processed. If we continue to lose the ability to grow fresh vegetables due to policy settings, there is a risk that fresh vegetables will become unaffordable, and contribute to reduced domestic food security. Therefore, the free allocation design should be designed to avoid adverse effects on domestic food security.

The benefits of fruit and vegetable consumption are well established, particularly their role in preventing general micronutrient-deficiencies and chronic diseases. (Moore, Barton, & Young, 2019)

The Institute for Health Metrics and Evaluation (IHME) carry out the Global Burden of Disease (GBD) study. This study attempts to quantify the health loss due to various diseases and risks. For vegetable intake, this study only considers the link with cardiovascular disease. The study estimated that almost 800 deaths were caused by low vegetable intake in New Zealand in 2017, as well as quality of life lost due to morbidity (IHME, 2017)

The price of meeting micronutrient requirements it is very expensive in New Zealand and much less in other countries. Without changing the land use the situation could get worse and is unlikely to get better. (Moore, Barton, & Young, 2019)

Local production may provide a pseudo-subsidy through increased access to seasonal discounts and holding transports costs down. This would have long term public health benefits. (Moore, Barton, & Young, 2019)

Higher food prices don't affect everyone equally; generally low-income households have a stronger response to changes in cost. Healthier food has been the first essential that low income families compromise on in times of hardship, exacerbating existing nutritional deficiencies resulting from general lack of money (Cheer, Kearns, & Murphy, 2002) In New Zealand, for families living in deprived areas, increases in vegetable prices especially around their off-season compel them to substitute the purchase of healthier whole fruit and vegetables with cheap energy-dense nutrient-poor products (Rush, Savila, Jalili-Moghaddam, & Amoah, 2018)

Allocation methodology

The allocation method should be one that achieves the goal of reducing the overall carbon intensity of New Zealand food production. It is doubtful that a simple output-based method would achieve that goal. It may drive improved efficiency for some products, however for other products where on-farm offset could be used to achieve a lower carbon footprint, a simple output-based method may not achieve the best outcome.

As the free allocation principles described in this submission differ from those considered by the ICCC, it is uncertain the degree to which the free allocation methods explored by them would achieve the objectives, and therefore we recommend further analysis is undertaken.

Do you agree that free allocation of emissions units should be provided at the

same time emissions obligation are due? Why or why not?

Free allocation could be used to incentivise behaviour change ahead of pricing.

In the case of fertiliser, we are of the view that free allocation should be provided for at the processor-level.

If free allocation became dependent on achieving carbon efficiency and intensity thresholds, an audited FEP could demonstrate eligibility for free allocation, and free allocation could be paid at the processor-level.

Do you agree with the ICCC that allocation factors should be updated in line with business-as-usual improvements in emissions intensity? Why or why not

Allocation factors should be linked to achieving lower emissions in a manner that does not threaten food production, in the context of domestic food security and the role New Zealand will play in global food security.

If free allocation was linked to the carbon intensity of products to prevent carbon leakage, it should be linked to the carbon intensity of competitors products, unless this would threaten domestic food security. In that respect it would be linked to the business as usual improvements of competitors products.

However, we are also of the view that free allocation should not only consider the carbon intensity of individual products, but be designed to drive down the overall carbon intensity of the food produced in New Zealand without reducing the amount of food produced. This metric would not need to be linked to business as usual emissions reductions, because it would be achieved by both increased carbon efficiency and changes in type of food produced to less carbon intense products.

Do you agree the process for making decisions on any phase down of free allocation of emissions units should be set

in legislation and informed by the Climate Change Commission? Why or why not?

We are of the view that clear principles for free allocation and the triggers for phase down should be established. These should be aligned with achieving the outcomes of the Paris Agreement and the targets within the Bill. We agree these should be informed by the Climate Change Commission.

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