Emissions Intensive Trade Exposed Businesses' Contribution to New Zealand's Low Emissions Economy

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Acronyms and Abbreviations

EITE	Emissions Intensive Trade Exposed
ETS	Emissions Trading Scheme
FTE	Full-time Equivalent
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
NGA	Negotiated Greenhouse Agreement
NZU	Unit of 1 Tonne of Carbon Dioxide Equivalent Emission

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Executive Summary

Emissions Intensive Trade Exposed (EITE) businesses are acutely aware of the importance of emissions reduction targets. Significant effort has been put towards reducing emissions by EITE businesses already, and more is planned. EITE businesses are also acutely aware of the potential risks and unintended consequences that emissions reduction policy can impose on the economy.

New Zealand has international obligations to reduce its greenhouse gas (GHG) emissions. The Government is currently committed to reducing emissions by 50 percent below 1990 levels by 2050. Furthermore, discussion of The Zero Carbon Bill is underway, with the goal of reaching net zero emissions by 2050.

The New Zealand Emissions Trading Scheme (ETS) is sensitive to unintended consequences and provides EITE businesses an allocation of industrial units

Current policy settings (the ETS) recognise that if uncompetitive emissions pricing forces domestic businesses to close, production can be forced overseas to countries that potentially have higher emissions intensity. This is referred to as 'carbon leakage'.

Emissions pricing therefore needs to ensure that it:

- reduces emissions of GHGs globally and does not result in carbon leakage;
- avoids inefficient, or unnecessary, trade-offs to the economy

EITE businesses involve production processes that use significant fuel, energy, and produce emissions. They usually either export into international markets or are open to competition from imports. The range of EITE businesses is wide ranging, from fresh vegetables to paper and cardboard, and metal production.

EITE businesses represent a significant segment of New Zealand economic activity, which is concentrated in the regions

Policy involving emissions pricing must carefully consider EITE businesses' role in New Zealand's economy. EITE businesses are direct employers of approximately 15,000 Full Time Equivalent (FTE) employees and support significantly more jobs indirectly with flow-on effects through suppliers and other regional businesses.

EITE business is concentrated in the regions with two thirds of EITE employment outside of Auckland, Wellington and Christchurch compared with around forty percent of all employment. EITE businesses are significant contributors to regional GDP, such as Methanex, which contributes approximately 8 percent to Taranaki's GDP, New Zealand Aluminium Smelter which contributes approximately 10.5 percent of Southland's GDP, and Refining NZ which contributes approximately 10 percent of Northland's GDP.

EITE businesses have improved their emissions intensity and reduced their proportion of emissions as a sector

EITE businesses have been constantly seeking ways to reduce their emissions. The major EITE business industries are responsible for approximately 6 percent of New Zealand's total emissions. This percentage has reduced from 7.5 percent in 1990, despite the businesses significantly increasing their output.

The industrial processes of EITE businesses are diverse, each with different abilities to modify their emission intensity

Despite many EITE businesses making significant efforts to reduce emissions in all available ways, policy must recognise that there are some essential industrial processes that

currently have no viable alternative to releasing GHG emissions when products are created including the core processes of steel, aluminium and cement.

The only viable options to achieving GHG emissions neutrality for these processes is to offset the emissions or shut down the activity. If overall demand for the process does not reduce internationally, then this loss will not have an offsetting environmental benefit. New Zealand will simply have shifted the activity outside of the country, only to import carbon through end products. There is a significant potential that this imported emissions profile could exceed the original NZ one.

EITE businesses support an effective[1] price of carbon that is no higher than their industry's trading partners

EITE businesses support the Government in targeting GHG emissions reductions and agree that emissions pricing through the NZ ETS can be an effective way to help achieve this.

EITE businesses support policies that will:

- **Reduce emissions of greenhouse gases globally:** Effective policy changes must contribute to a reduction of emissions at the global level and not inadvertently shift emissions to other jurisdictions.
- **Avoid inefficient, or unnecessary, trade-offs to the economy:** EITE businesses wish to ensure that all the potential impacts on the economy are known and minimised where possible to avoid significant unemployment and the flow-on social impacts.
- **Provide stability for long-term investment:** Low emissions-intensive production processes often require a significant investment in new equipment and significant ongoing maintenance. Policy certainty assists investment by reducing sovereign risk and the downside risk of incentive structures being removed after projects are committed to.

EITE businesses propose a framework to discuss their emissions reduction projects, and the appropriate policies that can be used to support them

EITE businesses wish to contribute to emissions reduction goals through implementing specific projects that have emissions reduction benefits. Different types of initiatives will require different policy approaches to help EITE businesses work with the Government and support national emissions reduction goals.

EITE businesses seek an ongoing dialogue with the Government, specific to each industry, to ensure that unnecessary trade-offs are avoided, and investment can be encouraged

GHG emissions reduction policy must be sensitive to the technological limitations and international trading environments for each of the industries that EITE businesses operate in. EITE businesses want to approach a policy dialogue proactively: working with Government to find genuinely effective policy solutions that meet the policy principles for each business.

Figure E.1 below describes examples of emissions reducing projects within EITE businesses, categorised within the proposed framework by, environmental impact (A-C), policy approach (I-IV), and economic & technical feasibility (1-4).

[1] An effective price of carbon is distinguished from the general price of carbon for EITE businesses in New Zealand through the use of free unit allocations within the ETS

Figure E.1: Examples of Emissions Reduction Projects in EITE Businesses

	1: Completed Projects (Runs on the board)	2: Planned Projects (the next wins)	3: Projects that are not economically viable, but technically possible and known	4: Emission producing industry processes that have no technological substitute
A: Large Environmental Impact	**New Zealand Steel - Electricity co-generation** Electricity is generated at the New Zealand Steel Glenbrook site using off-gases and heat from the iron making process. The cogeneration facility produces an average of 550GWh of electricity each year (equivalent to 69,000 houses) with peak output of 90MW. This provides enough electricity for approximately 60% of site requirements.	**Methanex - Methanol as a marine fuel** In New Zealand, methanol could be used as an economically viable marine fuel. Methanol is an ultra-clean burning fuel that reduces sulphur oxides by 99%, nitrogen by 60%, particulate matter by 95% while lowering carbon emissions. In 2016, Methanex converted the first of its shipping fleet to run on methanol. It has invested approximately $500 million and has ordered eleven methanol fuelled chemical tankers that significantly reduce shipping emissions.	**Golden Bay Cement (GBC) - Waste tyre fuel** The Government is helping to fund 75 percent of an $18.1m project working with GBC to use old shredded tyres as a source of fuel. The new technology will help deal with the significant issue of increasing waste caused by old tyres, by replacing the use of coal with burning the tyres. The substitution is expected to result in a reduction of 13,000 tCO2/ pa. **Methanex – Carbon Recycling** Methanex has invested in Carbon Recycling International in Iceland to create carbon neutral methanol. To replicate this in NZ would require cheap renewable electricity and supportive policies for carbon neutral fuels.	**New Zealand Steel - Steel production without coal** Steel makers worldwide continue to seek out an alternative to coal which is an essential raw material source of carbon for the iron making process. New Zealand Steel is actively engaged through its parent BlueScope in Australia. In NZ possibilities that arise are investigated, and the iron making processes are fine-tuned with the objective of reducing carbon emissions by 20,000 tonnes per annum.
B: Moderate Environmental Impact	**Fonterra - Biomass co-firing** To reduce steam requirements of the processing plant, existing coal boilers can be converted to co-fire with wood biomass to further reduce emissions. After a successful trial at Fonterra's Brightwater plant which resulted in a 2,400 tonnes CO2-e/pa reduction, commitments have been made to install dual-fuel boilers at the proposed Studholme plant expansion.	**Pan Pac - Heat Recovery** Heat recovery is important to reduce energy consumption. Pan Pac has projects planned that allow for additional heat recovery, such as boiler flue gas to dry incoming fuel thereby increasing cogeneration output, and additional heat recovery from secondary refiners to reduce drying energy requirements.	**Fonterra - Integration of heat pumps** Integrating heat pumps into processes to generate hot water can help to meet thermal energy needs at the Fonterra factories, rather than utilising steam from fossil fuels. Installation costs are significant, ranging up to $6M, but allowing for a reduction of 18,000 CO_2-e per annum.	**Methanex - Renewable electrification of gas-fuelled methanol plants** Renewable energy electrification of gas-fuelled methanol production plants would require low cost, 100 percent renewable electricity, gas as a feedstock and significant capital to replace existing infrastructure given a 25+ year investment horizon
C: Small Environmental Impact	**New Zealand Aluminium Smelter - Energy efficiency around the plant** In 2017-18 NZAS carried out a cluster of projects to reduce energy all around the plant including: ▪ The installation of sensor and LED lights in the casthouse ▪ Improved synchronisation of site air compressors ▪ Installation of additional gas heating to changehouse Electricity efficiency has continued to improve every year for the least 5 years.	**Refining NZ - Improved hydrogen consumption** Refining NZ have made many significant investments to reduce their emissions profile, including their new $365m petrol making process unit Te Mahi Hou, which has reduced emissions by approximately 120,000 tCO_2 per annum. However, they have also concentrated on many smaller projects, and one in the pipeline is their project improving hydrogen consumption on a process unit (BRU), which is expected to cost approximately $1.8 million and result in a 700 tCO2 /pa reduction.	**Pan Pac - Use of forest wood-waste** Increased mechanisation in forestry has meant that much wood-waste (e.g. bark) no longer comes in attached to logs, and is left in place to rot. If wood-waste was able to be brought in from forests, it could be used as a potential fuel source in wood-waste boilers.	**Pan Pac - Efficient log transportation** Currently transportation of whole logs to the overseas market can be very inefficient due to logs being 55% water and round shape. Dried pulp would be significantly more efficient, at just 13% water and compressed, but is entirely subject to customer demand. New Zealand being an isolated country means there is no alternative to long distance transport of products overseas.
	I: Information sharing and awareness	**II: Incentives for businesses could accelerate these projects**	**III: Co- Funding from targeted funds could make these projects happen**	**IV: Maintain appropriate EITE allocations, avoid increases in global emissions and unnecessary reduction in employment**

1 Responding to Climate Change Poses Serious Challenges to the New Zealand Economy

There is international scientific consensus that human impacts are contributing to disruptive climate change. Greenhouse gas (GHG) emissions intensity has increased by over 30 percent in the last 60 years, and is now at the highest ever level in human history.[2]

The Intergovernmental Panel on Climate Change (IPCC) released a report in October 2018 that stressed the importance of limiting global warming to 1.5°C above pre-industrial levels, and the rapid, far-reaching and unprecedented changes in all aspects of society that this would require.

It is likely that New Zealand will feel some of the direct impacts of climate change, and will certainly be affected by its indirect impacts

Even if New Zealand isn't severely impacted by climate change itself, it is likely to affect our markets and trading partners. New Zealand needs global stability as a trading nation, and even though New Zealand only makes a small contribution of less than 0.2 percent to global emissions, it is important that we play our part in the international effort to reduce GHG emissions.

1.1 What commitments has New Zealand made to reduce its greenhouse gas emissions?

The New Zealand Government is currently committed to three official GHG emissions reductions targets:

- An unconditional 2020 target;
- A 2030 target under the Paris Agreement; and
- A 2050 long-term target.

The 2020 target is to reach 5 percent below our 1990 emissions levels

In 2013, New Zealand announced an unconditional target to reach 5 percent below our 1990 emissions level by 2020. The target is not taken officially under the Kyoto Protocol, which was internationally legally binding, but follows the Kyoto Protocol rules to ensure transparency. New Zealand was able to meet its Kyoto Protocol target between 2008 and 2012 with use of international Emissions Trading Scheme (ETS) credits. New Zealand is currently on track to meet its 2020 target.

The 2030 target is to reach 30 percent below our 2005 emissions levels

Following the Paris Agreement in 2016, there was an international commitment to try and limit the global temperature rise to between 1.5°C and 2°C above pre-industrial levels this century. New Zealand set a nationally determined target of reducing its emissions by 30 percent below 2005 levels by 2030, equivalent to 11 percent below 1990 levels.

The 2050 target is to reach 50 percent below 1990 emissions levels

Notified in 2011, New Zealand has also set itself a 2050 reduction target of GHG emissions reduction of 50 percent below 1990 levels. The target is consistent with the rules of the Kyoto Protocol.

[2] "Carbon Dioxide in the Atmosphere Hits Record High Monthly Average." Scripps Institution of Oceanography, May 2018

New Zealand is also currently investigating more ambitious emissions targets

Recently, the Government put forward a suggestion to increase the Paris Agreement target, and is currently consulting on the introduction of a Zero Carbon Bill. The current proposal under discussion is for a net zero emissions target by 2050.

1.2 How can New Zealand achieve its emission reduction targets?

New Zealand faces some common international challenges for reducing emissions:

- A growing population
- A growing economy with international trade and competition

However, we also have unique challenges that set us apart from other nations:

- Approximately 82 percent of our electricity supply already derives from renewables,[3] whereas for most nations that burn fossil fuels, electricity production is an industry where there is a large scope for emissions reduction. When considering all energy use in New Zealand, 40% comes from renewable sources.[4]
- Approximately 50 percent of emissions come from agriculture, where there are currently few commercially viable options to reduce emissions
- We are an island nation, with our closest neighbour over 2,000km away; this means that all exports and imports have significant distances to travel, requiring energy usage; and
- We have no back up sources of energy from our neighbours

There are multiple policy tools used internationally to incentivise emissions reduction, such as emissions targeting taxes, or tax rebates for research and development on sustainability.

New Zealand uses an emissions trading scheme, the NZ ETS, as the key policy tool to help achieve its emissions reduction targets

The NZ ETS began under the Climate Change Response Emissions Trading Amendment Act 2008, one of the first international ETS schemes to be launched. ETSs are based around the economic premise that pricing emissions will incentivise businesses and individuals to make decisions that will lower their GHG emissions. There are currently 47 GHG emissions pricing initiatives implemented internationally, including national, regional, and subnational jurisdictions.[5]

The NZ ETS is 'upstream' based. This means the businesses responsible for surrendering units (permits to emit) are generally the suppliers of fossil fuels, or industrial businesses which produce emissions directly, rather than industries consuming energy. These sectors are expected to pass on the costs to their customers. This is only achievable when competitors face similar costs.

There are currently approximately 300 total participants within the NZ ETS. The only sector currently exempt from participating is agriculture. Emissions are referred to as carbon dioxide equivalent (CO_2-e) and include all GHGs, which in New Zealand are

[3] "Energy in New Zealand 18" Ministry of Business, Innovation and Employment, October 2018

[4] "Energy in New Zealand: Renewables data tables", Ministry of Business, Innovation and Employment https://www.mbie.govt.nz/assets/Data-Files/Energy/764bf53b2a/renewables-statistics-june-18.xlsx

[5] "Carbon Pricing Dashboard", The World Bank, https://carbonpricingdashboard.worldbank.org

predominantly made up of methane (60%), carbon dioxide (21%), and nitrous oxide (16%).[6]

GHG emissions prices have varied significantly since the NZ ETS's introduction, starting at approximately $20 per metric tonne of CO_2-e (known as an NZU), and dropping to below $2 in 2013 when the scheme was opened to international markets. The scheme closed to international markets again in 2015 and the price is currently capped at $25. Figure 1.1 shows the daily NZU prices from 2010 to present, where it has reached the current $25 cap.[7]

Figure 1.1: New Zealand ETS Unit Prices 2010 – 2018

Until 2016, the number of units that needed to be surrendered was halved due to a one-for-two transitional measure. One-for-two is currently being phased out, and full allocations will apply from 1 January 2019.

1.3 What are the challenges associated with emissions trading?

Pricing GHG emissions is generally considered a sound domestic policy tool, but there are challenges that need to be considered in a global context. Raising emissions prices can incentivise businesses to reduce their emissions, however, pricing emissions can also lead to un-intended consequences if not all countries follow a similar strategy.

Businesses facing competition with lower emissions prices can become uncompetitive and may result in closure, or production being exported to countries with lower emissions prices. These countries are often higher in emissions intensity, which would result in an overall increase in global emissions, even if it resulted in emissions reduction in New Zealand. This is referred to as 'carbon leakage'. Even if emissions intensity is similar, New Zealand would lose economically while achieving no net reduction in emissions.

These issues are well recognised, and the NZ ETS has developed an industrial allocation component which addresses this risk. This allows for the allocation of a free proportion of NZUs to Emissions Intensive Trade Exposed (EITE) businesses. These businesses have an emission-intensive production process when compared to the overall revenue from what is produced. The Government provides an allocation to these trade exposed

[6] "New Zealand's Interactive Emissions Tracker", Ministry for the Environment, https://emissionstracker.mfe.govt.nz

[7] www.carbonnews.co.nz

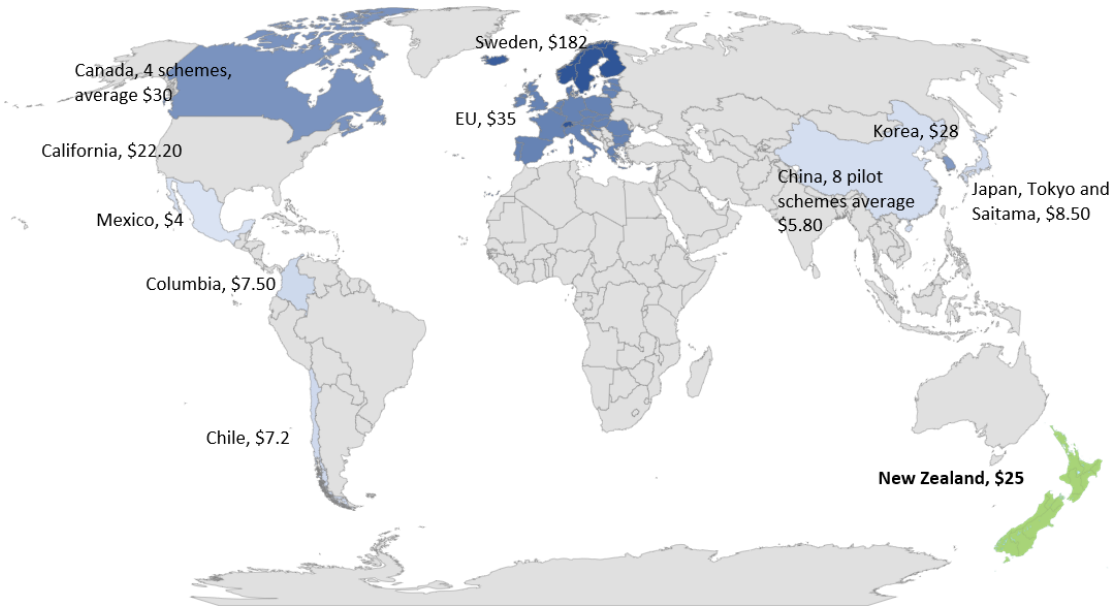
businesses to cover part of their emissions costs, so that the NZ ETS costs do not unduly put these businesses at a disadvantage compared to their international competitors who do not face a similar price on emissions.

The carbon pricing schemes of the majority of New Zealand's biggest competitors are lower

The World Bank's Carbon Pricing Dashboard considers the main forms of carbon pricing to be ETS, carbon tax, carbon pricing offset mechanisms, results-based climate finance, and internal carbon prices set by organisations. The Dashboard contains data for all international carbon pricing and provides an average price per CO_2-e. It is calculated that as of 2018, only approximately 14 percent of global GHG emissions are covered by some type of carbon pricing initiative.

As shown in the map in Figure 1.2, most schemes, particularly in important competitive regions including USA, Japan, and China (8 pilot schemes covering only the electricity sector), have lower carbon rates than New Zealand. This is a selection of the explicit carbon pricing schemes currently implemented and does not include many subnational schemes. There are other measures such as energy efficiency incentives which implicitly raise the price of carbon emissions. Conversely, many of these explicit schemes contain exclusions for various categories of emissions. The large majority of trading countries have no carbon pricing mechanism at all, including Brazil, Russia, India, USA, Australia, and South Africa.

Figure 1.2: World Carbon Pricing 2018 (NZD)



Keeping track of other countries emissions pricing, and tracking which other countries are planning to introduce carbon pricing initiatives, is an important factor in decisions made around the emissions pricing that trade exposed businesses are subject to. It is not just the headline pricing, but also to account for exclusions, country-by-country and industry-by-industry, as to the costs actually being incurred by business.

A 2018 report by Sense Partners on climate targets and implications for competitiveness, leakage, and innovation found that New Zealand EITE businesses will likely face declining competitiveness based on uneven application of emissions policies around the world, particularly in Asia-Pacific. They concluded that industrial allocations would remain crucial

for limiting the competitiveness impacts if the rest of the world does not also take strong action to increase carbon prices.[8]

Current modelling indicates that for New Zealand to meet its GHG emissions reduction targets there will have to be a significant domestic increase in emissions pricing

There have been multiple efforts to model the effects of lower GHG emissions targets on the New Zealand economy. One of the most critical factors in determining outcomes is the future of innovation and technological developments, which are extremely hard to predict for targets as distant as 2050.

The models commissioned by the Productivity Commission by CMV and NZIER vary enormously in the potential emissions prices that would have to be reached in order to achieve the net zero 2050 emissions target. CMV prices predict between $150 and $250 per tonne of CO_2-e, whilst NZIER predict to over $2,000, which would cause serious concern to the New Zealand economy and likely result in all EITE businesses being forced to close if they were exposed to them.

All the modelled pathways indicate that expansion of forestry sequestration, reduction of agricultural emissions and replacement of fossil fuels with electricity and biofuels are the most significant factors in emissions reductions. The gradual removal EITE industrial allocations was shown to only have a very minor impact in helping reduce emissions. This is an important factor to consider and shows that there is scope for EITE industrial allocations to remain and allow protection against carbon leakage and unnecessary economic trade-offs should international emissions prices remain low. [9]

The Government is currently undertaking a review of the NZ ETS and will introduce a bill amending the Climate Change Response Act 2002 in the second half of 2019

The Government announced the first set of decisions relating to changes to the ETS in December 2018. The decisions relate to including a framework which would enable New Zealand's emissions under the ETS to be capped through limiting the number of units supplied into the scheme, and adding provisions for crediting permanent post-1989 forests to provide more incentives for landowners to plant trees.[10]

Other points still up for discussion are:

- The potential phase-down of NZU allocations to EITE businesses from 2021
- A potential price floor
- The use of international GHG emissions markets
- Infringement offences for non-compliance

EITE businesses believe they have an important role to play in working with the Government to ensure that New Zealand delivers on its GHG emissions reduction targets

Whilst the NZ ETS is under review, EITE businesses believe it is an important time to consider how they can work with the Government regarding the GHG emissions

[8] "Countervailing Forces", Sense Partners, April 2018

[9] "Low-emissions economy", New Zealand Productivity Commission, August 2018

[10] https://www.beehive.govt.nz/release/government-announces-set-improvements-new-zealand%E2%80%99s-emissions-trading-scheme

reduction framework within New Zealand. EITE businesses support the fundamental concept of emissions trading, but believe there are several important factors that need to be considered.

2 EITE Businesses Play an Important Role in the New Zealand Economy

New Zealand's EITE businesses cover a diverse range of industries from across the country. EITE businesses are responsible for the production of goods that form the backbone of New Zealand's modern and expanding economy, including fresh food, building materials, important industrial chemicals, and industrial metals. EITE businesses create jobs, wealth, regional diversification, and contribute significantly to increased living standards for all New Zealanders. Any emissions reduction policy must carefully consider the economic effect and resulting social impacts it will have on this important sector.

In this section, we describe:

- The definition of EITE businesses;
- The economic and social benefits that EITE businesses contribute to New Zealand; and
- The exposure of EITE businesses to international trade, and the unique circumstances this creates.

2.1 How are EITE businesses defined?

New Zealand EITE businesses are not a typical sector related by process or customers, but rather they are defined in the Climate Change Response Act 2002, and may be eligible to apply to receive an industrial allocation of NZ ETS units. In 2017, 82 businesses received some level of industrial allocation out of approximately 300 participants in the NZ ETS. The industrial allocation of EITE business units accounts for approximately 20 percent of all ETS NZUs.

Emissions intensive businesses involve a production process that has significant fuel, energy, or process emissions when compared with the overall revenue generated from what is produced

Two categories of emissions-intensive businesses are:

- Moderately Emissions-Intensive—if the specified emissions from the activity are equal to or greater than 800 whole tonnes per $1 million of specified revenue from the activity, but less than 1,600 whole tonnes per $1 million of specified revenue from the activity. Moderately intensive businesses receive an industrial allocation that covers 60 percent of their emissions activity.
- Highly Emissions-Intensive—if the specified emissions from the activity are equal to or greater than 1,600 whole tonnes per $1 million of specified revenue from the activity. Highly emissions-intensive businesses receive an allocation that covers 90% of the emissions activity.

The majority of EITE businesses are eligible to receive industrial allocations because they are high energy users, compared to direct GHG emitters, such as over half of the business that produce fresh tomatoes, cucumbers, capsicums, and cut roses. Only fifteen EITE businesses are mandatory NZ ETS participants, meaning their own production is directly responsible for the release of GHG emissions, e.g., carbon produced from the chemical reaction required to produce aluminium.

Refining NZ, New Zealand's only oil refinery, is not a participant of the NZ ETS, or recognised as an EITE business because of the Negotiated Greenhouse Agreement (NGA) the company has with the Crown. This 20-year agreement signed in 2003 with the purpose of putting the company on an emissions reduction pathway is due to expire in 2023. Refining NZ is currently negotiating its post-NGA status with the Crown, including recognition for the refinery as an EITE business.

Trade-exposed businesses can trade overseas or be open to competition from international imports

Trade-exposed is defined broadly, and includes all prescribed industrial activities, unless there is no international trade of the output of the activity across oceans, or if it is not economically viable to import or export the output of the activity. This can mean the business competes in the New Zealand domestic market with overseas competitors, or exports and competes internationally.

Table 2.1 shows the industries, along with the predominant uses of the goods they produce.

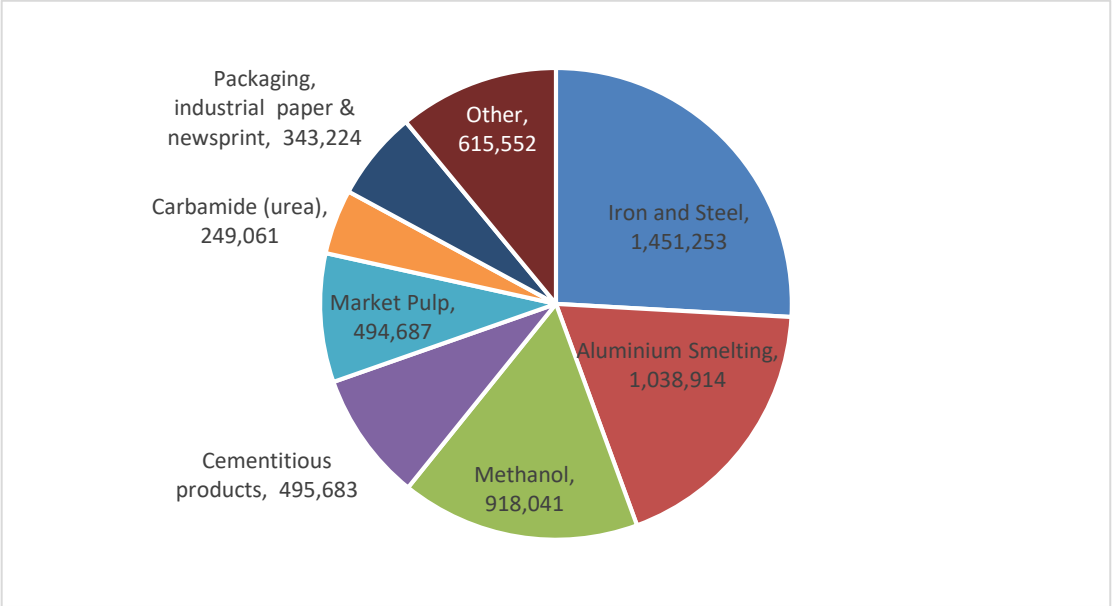
Table 2.1: Activities Eligible for Industrial Allocations of NZUs

Highly Intensive (90%)	Moderately Intensive (60%)
Aluminium smelting ▪ Lightweight recyclable metal can be used in transport vehicles	Production of clay bricks and field tiles ▪ Housing and construction
Iron and steel manufacturing from iron sand and manufacture of carbon steel from cold ferrous feed ▪ Construction and manufacturing sectors ▪ Essential component of infrastructure	Production of ethanol ▪ Made from dairy ▪ Alcoholic beverages, reduced emissions petrol, other industrial uses including pharmaceuticals, cosmetics, cleaning products
Production of burnt lime ▪ Roading construction, steel manufacture, paper manufacture	Production of fresh tomatoes
Production of carbamide (urea) ▪ Source of nitrogen traditionally used as fertiliser on farms	Production of fresh capsicums
Production of cartonboard ▪ Boxes	Production of fresh cucumbers
Production of caustic soda ▪ Multiple uses including water treatment, manufacture of pulp and paper	Production of gelatine ▪ Clarification of wine and fruit juices, candy, pharmaceutical
Production of cementitious products ▪ Construction, housing and infrastructure building including bridges, tunnels, seawalls	Production of glass containers ▪ Packaging for beer, wine, cosmetics
Production of cut roses ▪ Domestic and exported roses, bouquets etc.	Production of lactose ▪ Made from dairy ▪ Pharmaceuticals, infant feed formulas
Production of hydrogen peroxide ▪ Bleaching for paper production	Production of protein meal ▪ Pet and farm food supplements
Production of market pulp	Production of reconstituted wood panels

▪ Paper and tissue production	▪ Used inside houses
Production of methanol ▪ Development of many everyday products including building materials and pharmaceuticals ▪ Cleaner burning use as a fuel	Production of tissue paper
Production of newsprint ▪ Newspapers	Production of whey powder ▪ Made from dairy ▪ Addition to food and beverages, such as infant formula powder, as source of additional protein
Production of packaging and industrial paper ▪ Boxes	

The top ten emitting EITE businesses received 90 percent of the 5.6 million units that were allocated. Figure 2.1 shows the allocation of industrial NZUs across the EITE business sectors.

Figure 2.1: 2017 NZ ETS EITE Businesses Sector Unit Allocations



Note: If oil refining were participating in NZ ETS, based on their emissions they would be likely to receive the fourth largest allocation, between methanol and cement products.

2.2 What role do EITE businesses play in the New Zealand economy?

EITE businesses play a significant role in New Zealand's economy, and are important in maintaining diversity in production for domestic markets and exportation. The businesses range from small private businesses, such as a cut roses company with two shareholders, through to some of the largest public businesses in New Zealand.

EITE businesses are important contributors to New Zealand employment

EITE businesses are employers of approximately 15,000 Full Time Equivalent (FTE) employees, roughly equivalent to the total number of doctors in New Zealand[11]. This relates to jobs directly connected to the production of EITE products and therefore does not include the total employment numbers for large organisations such as Fonterra and Fletchers Infrastructure, which only have a small proportion of employment allocated to EITE production.

As well as direct employees, EITE businesses contribute to significant additional employment in the areas they are based due to the flow on effect of additional jobs being supported within suppliers and other businesses. For example, New Zealand Steel directly employ approximately 1,400 people, but are estimated to support an additional 2,550 jobs through indirect flow-on effects in secondary markets. [12]

EITE businesses based in regional areas help to create sustainable jobs and build resilient communities

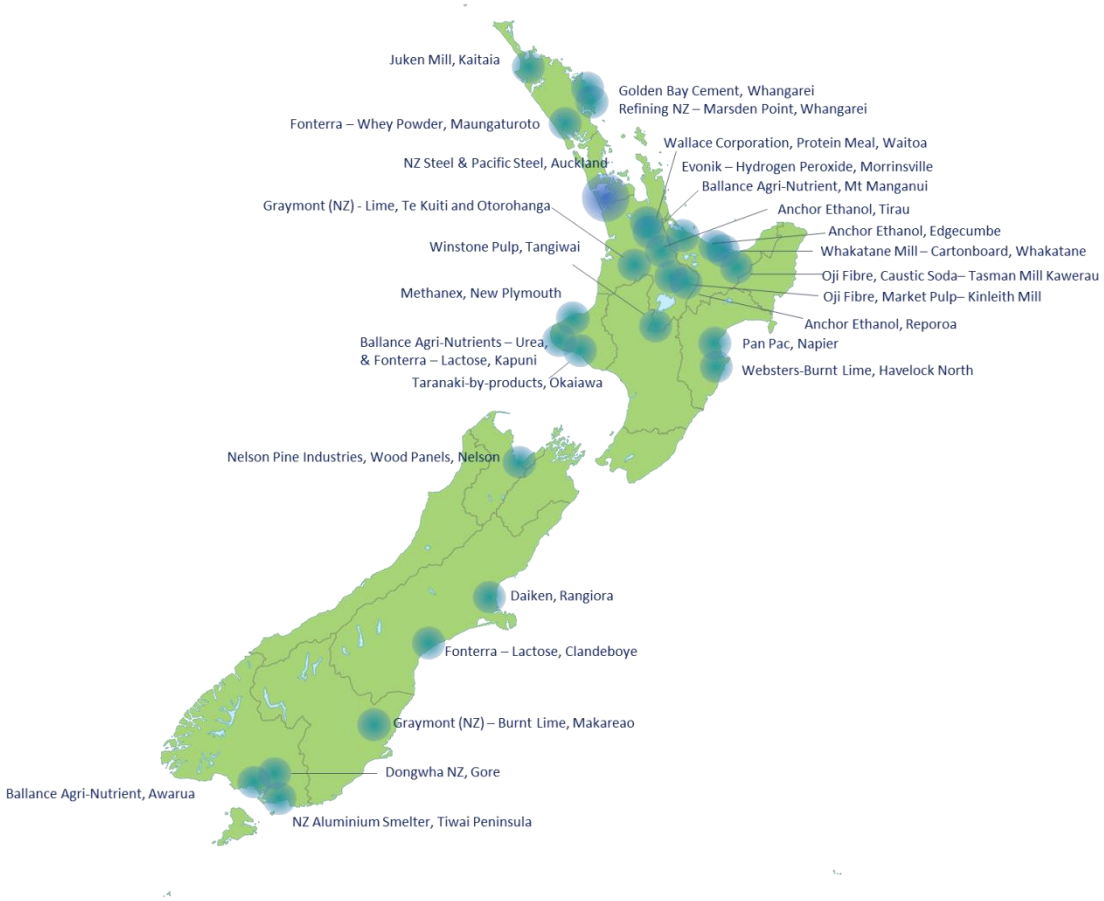
New Zealand Steel is based in the rural southern region of Auckland, and many EITE businesses are based in regional areas and are important employers within these areas. These regions often rely on the manufacturing plants as the major source of employment, and in small towns any potential job cuts can have significant effects for small businesses that support the industry or rely on the economic activity.

Figure 2.2 shows a sample of some of the regional locations of the high employment EITE businesses in New Zealand.

[11] 15,078 in 2016. "The New Zealand Medical Workforce", Medical Council of New Zealand, 2016

[12] "Economic contribution of New Zealand Steel", Deloitte Access Economics, September 2017

Figure 2.2: Regional Distribution of Sample of EITE Businesses



EITE businesses make a significant contribution to Northland's employment through Refining NZ and Golden Bay Cement. They are both located near Whangarei and together account for approximately 3 percent of Whangarei's (direct) employment. This is particularly important in the Northland region, which has the highest level of unemployment within New Zealand, at approximately 6.2 compared to 3.8 percent nationally, and is therefore not as resilient to potential economic shocks.

At the opposite end of the country, the New Zealand Aluminium Smelter, at Tiwai Point Southland, employs 754 permanent FTEs and 220 FTE contractors, and supports approximately 1,100 further jobs upstream, through engineering and metal product manufacturing. 1.4 percent of Southland's entire population are estimated to be present as a result of the smelter.[13]

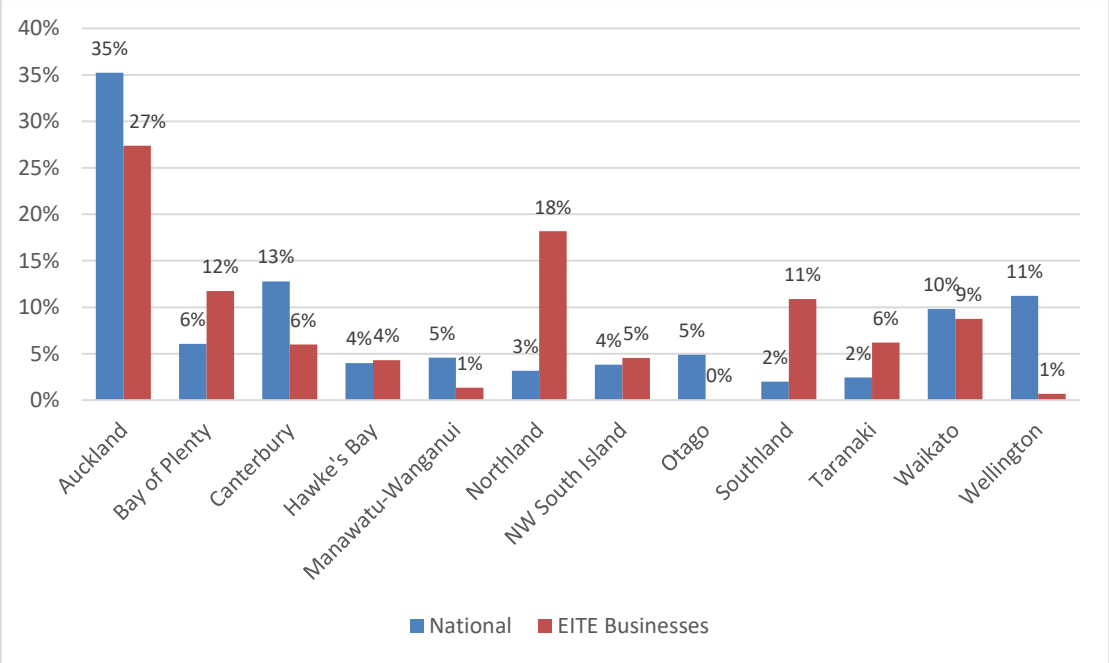
Approximately 59 percent of total employment in New Zealand (approximately 2.65 million) takes place within the Auckland, Wellington, and Canterbury regions.[14] Only 34 percent of the employment within the EITE businesses takes place in those urban centres.

The complete breakdown can be seen in Figure 2.3.

[13] "The economic and social impacts of the New Zealand Aluminium Smelter on the Southland economy" Venture Southland, 2018

[14] Statistics NZ, Employed Labor Force, September Quarter 2018

Figure 2.3: Breakdown of National v EITE Business Jobs by Region



EITE businesses make significant economic contributions to the regions where they are located

Previous studies of specific New Zealand EITE businesses have shown the important contribution they add to the gross domestic product (GDP) of the region in which they are located:

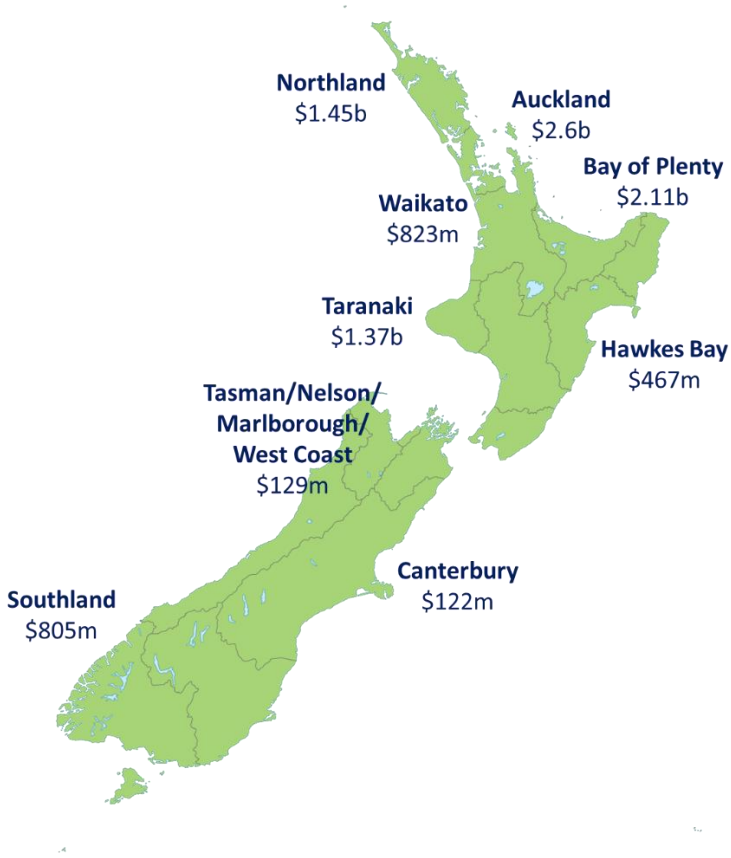
- Methanex was estimated to contribute $640 million to Taranaki's GDP (8 percent of the total region) and $834 million to New Zealand's total GDP in 2017
- New Zealand Steel was estimated to contribute $629 million to the total to New Zealand economy in 2017[15]
- New Zealand Aluminium Smelter was estimated to contribute $525 million to Southland's GDP, 10.5 percent of the total region [16]
- Fonterra's EITE products are only a relatively small proportion of their total production, however, total dairy processing contributes approximately $1.88 billion to New Zealand's GDP, 0.84 percent of total.[17] Whey, ethanol, and lactose comprise 8.9 percent of Fonterra's total dairy sector exports
- Refining NZ, based at Marsden Point in Northland, contributes approximately $594 million to the Northland GDP, approximately 10 percent. [18]

These are just five examples from 82 businesses that are all responsible for contributing to New Zealand's GDP and overall economy.

[15] Economic Contribution of New Zealand Steel, September 2017, Deloitte Access Economics
[16] NZAS 2017-2018 Development Report
[17] Dairy trade's economic contribution to New Zealand, NZIER, February 2017
[18] Crude shipping project – Economic assessment of channel deepening at the Marsden Point Refinery – NZIER report, August, 2017

The regional contribution of publicly listed EITE business is shown in Figure 2.4 below (approximately one third of all EITE business are listed). The total revenue from these EITE businesses 2017 sales across New Zealand reached $9.16 billion. Figure 2.3 breaks this figure down by region.

Figure 2.4: Businesses Annual Revenue by Region in 2017 Financial Year



EITE businesses support the type of employment that provides New Zealand with critical adaptive capacity for future development

The skills and capabilities that EITE businesses support are all critically important for New Zealand. Industrial jobs promote and retain important technical skills that in many cases would not be in New Zealand but for these heavy industrial processes and industries. Many of the EITE industries in New Zealand have long histories of innovation and adaptation through engineering, research and development, and innovation. An example of this is New Zealand Steel, which made New Zealand the first country in the world to make steel from sand in 1969. Nowadays, innovative and critical skills in areas such as health and safety in heavy industrial environments are developed in these businesses and become available within the New Zealand workforce as a result.

Ensuring that industries in which these practical and innovative skills continue to be developed is crucial for New Zealand in the long-term to deal with the new technologies and future changes that climate change will require.

2.3 How do EITE businesses interact with international markets?

New Zealand is one of the most free-market based economies in the OECD and is highly dependent on free-trade. Approximately 60 percent of our economic activity is made up of international trade.[19]

Supporting free trade is important so that our exports are supported internationally, and we can enjoy reasonably priced imports. However, the lack of tariffs on imported goods can make domestic competition for local suppliers challenging, especially when we have international competitors who produce on a much larger scale.

EITE businesses vary significantly in the proportion of product that is exported versus sold domestically

The dynamics of international trade are complex and frequently changing. An increase in costs can put businesses under pressure, either because they are competing with other foreign products on an international market or, if they are selling domestically, competing with cheaper foreign imports.

Table 2.2 provides a summary of the large EITE sectors and the percent of their product that is exported, the percent of domestic use of the product that is made up from domestic production (e.g. 90 percent of aluminium use in New Zealand comes from the New Zealand Aluminium Smelter production), their largest export markets, and the other largest global producers of the products.

Such significant differences in the trading nature of EITE industries, ranging from industries that export 95 percent of their product to those that export 10 percent, highlights how important it is not to consider them as one homogenous group.

Awareness of the specific industry conditions for each EITE business and their potential competitor emissions pricing policy is important for each individual market. This is necessary to understand how the effective price of GHG emissions will affect each business, and the potential impact that it could have on the New Zealand economy and employment.

[19] NZ trade policy, Ministry for Foreign Affairs and Trade

Table 2.2: Overview of Key EITE Sector Trade

Industry	Volume Exported	Percent of Domestic Use from domestic production	Predominant Export-Receiving Countries	Largest Other International Producers
Aluminium	90% ▪ 2.2% of total NZ exports[20]	90%[21]	Japan, Brazil, China, the UK, South Africa, and the USA.	China (by nearly 10 times more than the next highest), Russia, Canada, India, the United Arab Emirates, Australia, Norway, Bahrain, Saudi Arabia, and the USA
Steel	30% ▪ 1.4% of total NZ exports	50% [22]	USA, Australia, Pacific Islands	China, Japan, India, the USA, Russia, South Korea, Germany, Turkey, Brazil, Italy
Pulp and Paper	85% ▪ 2.4% of total NZ exports[23]	45% (paper and Paperboard) 95% (wood Pulp)[24]	China, Australia, South Korea, Japan, India, USA, Indonesia, Thailand	China, USA, Japan, Germany, Canada, South Korea, Finland, Sweden, Brazil, Indonesia
Cement	10%	85% (ready-mix)	Pacific Islands	China, India, USA, Iran, Turkey, Brazil, Russia, Saudi Arabia, Indonesia, Vietnam

[20] Exports of Main Commodities Statistics NZ 12 months ended August 18
[21] Imports and exports Statistics New Zealand, and NZAS Production
[22] Deloitte: Economic contribution of New Zealand Steel
[23] Wood pulp and waste paper + Paper and paperboard, and articles
[24] Ministry for Primary Industry figures. https://www.teururakau.govt.nz/news-and-resources/open-data-and-forecasting/forestry/wood-processing/

Methanol	95%	>95%	China, Japan, Korea	China, Russia, USA, Saudi Arabia, Trinidad and Tobago, Iran, Germany, Venezuela, Oman
Refined Oil/ Fuel	0%	70% of annual NZ fuel demand	Not exported	Singapore, Middle East, Korea
Ethanol (dairy based)	6 million litres 50%	>95%	Malaysia, Korea, Taiwan	USA 60 Billion litres (made from corn), Brazil 28 Billion litres (made from sugar cane)
Lactose	25,000 MT 25%	N/A	Most Asian countries	EU (2.5M MT), and USA (0.5M MT)
Whey Powder	14,000MT	N/A	South East Asia	EU (2.5M MT), and USA (0.5M MT)

3 Emissions Intensity of EITE Businesses Has Improved

EITE businesses often engage in major industrial production processes, which is why they can produce products that have significant benefits to New Zealanders' living standards. But, by definition, there are negative environmental externalities of GHG emissions. Any emissions reductions policy must consider the effect that it will be able to have on reducing the emissions of EITE sectors both within New Zealand and globally.

In this Section, we describe:

- The current emissions output of EITE businesses;
- The possibilities and challenges for EITE businesses to reduce emissions further;

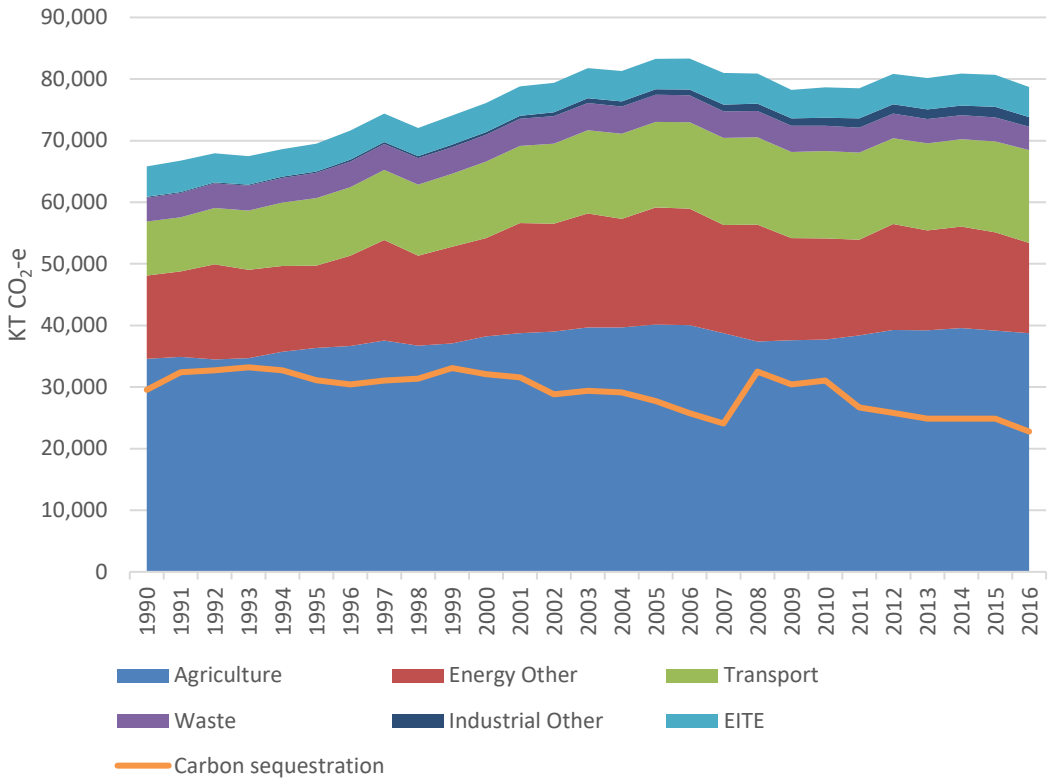
3.1 What is the emissions output of EITE businesses?

Most EITE businesses are responsible for emissions because of their high level of energy use. This can be made up from sources including electricity, coal, natural gas, and biofuel. Less than 15 businesses produce emissions through specific emitting activities, such as the chemical reactions that take place for a product to be created.

The top five EITE industries in terms of unit allocations (steel, aluminium, methanol, cementitious products, and market pulp), plus oil refining, were responsible for approximately 6.2 percent of total New Zealand CO_2-e emissions in 2016.[25] Figure 3.1 shows the entire New Zealand emissions by sector, going back to 1990.

[25] New Zealand's Greenhouse Gas Inventory 1990-2016 – Sum of pulp paper and print, iron and steel, aluminium and petroleum refining from energy; cement & lime, hydrogen, methanol, iron and steel, and aluminium production from industrial processes

Figure 3.1: New Zealand Total Overall Gross Emissions by Sector

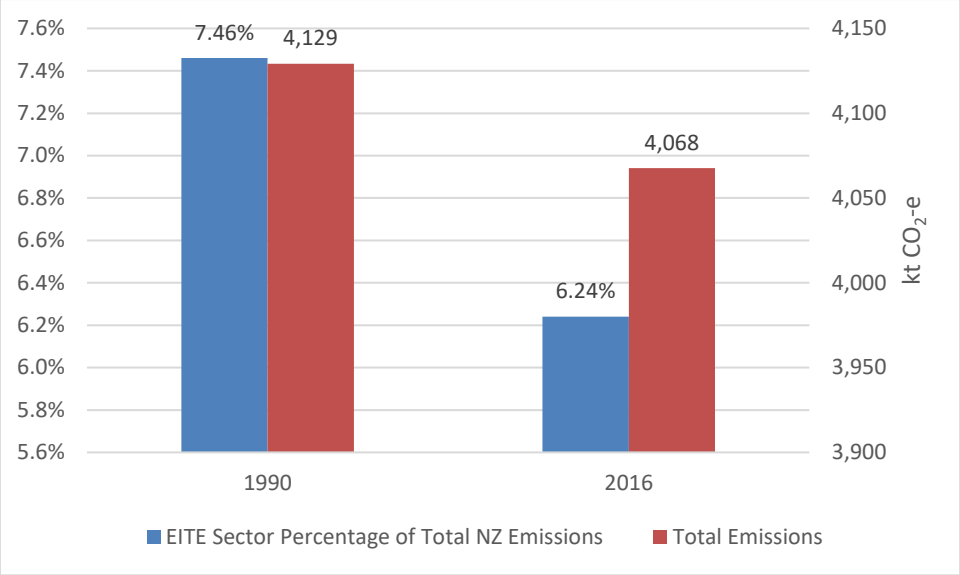


During this time, energy, predominantly due to road transportation, has seen one of the largest increases in emissions, increasing 82 percent since 1990 and now accounting for 17 percent of total emissions. Agriculture is still by far the sector responsible for the largest proportion of emissions at 49 percent, and is not included in the NZ ETS.

Carbon sequestration through procedures such as afforestation is an extremely important factor in offsetting New Zealand emissions. Sequestration offsets 30 percent of emissions and consequently net emissions for 2016 were 55,887 kilotonnes CO_2-e compared to gross emissions of 78,727 kilotonnes CO_2-e.

The total emissions that EITE businesses emit, as well as the proportion that contribute to total New Zealand emissions has declined, as can be seen in Figure 3.2.

Figure 3.2: EITE Sector Percentage of Total New Zealand Emissions



The reduction of 1.5 percent in overall emissions occurred despite a significant increase in total tonnes of production. Between 2011 and 2017 high emissions businesses including New Zealand Steel, New Zealand's Aluminium Smelter, Methanex, Pan Pac, and Golden Bay Cement, had a combined increase of 49 percent in tonnes of total product, despite emissions in these industries remaining constant. This shows a significant improvement in the given amount of CO_2-e emissions per tonne of product produced.

Many EITE businesses have been finding ways to improve the efficiency of their manufacturing plants, as well as seeking out new and innovative ways to produce energy

Despite EITE businesses receiving industrial allocations within the ETS, the businesses all face significant other incentives to reduce their emissions through reduced energy usage, efficiency and technological innovation.

Methanex, the world's largest producer of methanol, with a manufacturing plant in Taranaki, is making use of multiple methods to reduce emissions. Since 1994, Methanex has seen a decrease of 34 percent in CO_2 emission intensity globally[26]. This has been achieved through adopting new technology and improving the reliability and efficiency of plants. They also reduced the CO_2 emission intensity from their marine transportation fleet by twenty percent since 2002. Approximately half of the methanol market is driven by the desire for a less emissions intensive source of energy and fuel.

Fonterra have achieved a 19 percent reduction in energy intensity since 2003. They are seeking out alternative lower emission energy sources, such as wood biomass and increased electricity use. They have converted a boiler at their Brightwater site to a co-fire wood biomass with coal, which is expected to reduce factory emissions by approximately 2,400 tonnes of CO_2-e per annum.

New Zealand Steel reduces their net energy usage, with the offset emissions through an electricity cogeneration plant, which recycles off-gases gas from the iron-making kilns to produce 60 percent of their Glenbrook site electricity needs.

[26] www.methanex.com/responsible-care/responsible-care-sustinability-reports

Golden Bay Cement has been steadily reducing its reliance on fossil fuels since 2004 by replacing its use with waste-wood biofuels. The use of wood as a biofuel was largely unknown in New Zealand at the time, but involved the process of taking readily available and locally sourced by-products from other industries, that would have otherwise ended up as waste, and using it as a substitute fuel. Because the wood products come from commercially grown forests, it is a carbon neutral fuel.

New Zealand Aluminium Smelter has also been constantly finding ways to reduce their on-site emissions through a variety of projects. Their emissions have reduced by 55 percent since 1990, with efficiency improving from ~4.5 tCO_2-e/t Aluminium to ~2 tCO_2-e/t Aluminium.

3.2 What potential do EITE businesses have to reduce their emissions?

EITE businesses are all fundamentally different in their potential ability and methods available to reduce emissions. Despite many EITE businesses making significant efforts to reduce emissions, there are some essential industrial processes that currently have no viable alternative to releasing carbon when they are produced. This means that once energy use for heating furnaces has been reduced or changed to more sustainable sources, the process of reducing emissions becomes increasingly more challenging.

Some examples of processes that currently have no alternative to producing emissions include:

- The majority of the CO_2 generated by the steel industry comes from the direct chemical interaction that is needed between coal and iron sand in the furnace, known as iron reduction, in which molten iron is created.
- The production of cement also releases carbon through the chemical process that occurs when limestone, which is made of calcium carbonate, is heated up and breaks down into calcium oxide and CO_2.
- Aluminium production requires the release of CO_2 when carbon is combined with alumina to uncouple oxygen atoms.

Production processes that involve no alternative to releasing emissions means that, from a global emissions perspective, the optimal outcome is that the production occurs in the most efficient location possible. In the long run, technological innovation may mean that alternatives are created that either discover alternative production methods, or alternative products that fulfil the same use. In the short term, there are limits to what is possible. The investment of capital to fulfil these industrial processes is significant and long lived. A situation to avoid is the stranding of capital that has been deployed before alternative technological options are available.

Box 3.1: Encouraging the Best Technologies in Aluminium Smelting

Aluminium production is responsible for around 1 percent of all CO_2 emissions globally. The chemical reaction process that takes place in order to convert alumina to aluminium releases carbon, and the smelting process required to cast molten metals is extremely energy intensive.

New Zealand's Aluminium Smelter (NZAS) in Southland is always working to improve their energy efficiency. In 2017 they were involved in several different projects to reduce energy usage, such as trialling a new long-life low energy cell in the reduction lines. This is despite already having one of the most emissions friendly aluminium smelters in the world, due to its power being sourced by renewable energy through Manapouri hydro dam.

Internationally, the average GHGs caused by aluminium production are comprised of 55 percent from the indirect energy requirements for heating the smelter, whilst the direct smelting electrolysis process itself is responsible for approximately 17 percent[27]. This is compared to New Zealand where the energy requirements only accounts for approximately 10 percent of all emissions compared to the direct electrolysis process. This means that the NZAS uses up to 10 times less carbon than the product made in a country using mainly coal for their smelter.

EITE businesses are determined to ensure that they keep up-to-date with research and development, technologies, and new processes as they become available globally. For example, Methanex has invested in the world's first renewable methanol plant in Iceland, which produces renewable methanol from renewable energy and recycled CO_2 emissions.

Efficient production and discovery of new and renewable methods of production is of key importance for New Zealand EITE businesses.

4 The Role of EITE Businesses in New Zealand Emissions Reduction Policy

EITE businesses are constantly striving to achieve innovations that reduce energy use and emissions and believe that this is a critical component of achieving New Zealand's goals. EITE business recognise their contribution to New Zealand's emissions, and therefore the important role they play in helping New Zealand to become a low emissions economy. They support the Government in targeting emissions reductions and agree that for some activities, emissions pricing can be an effective tool.

In this Section, we discuss:

- The type of emissions reduction policies that EITE businesses support
- A framework that can be used to discuss EITE businesses emissions reduction targets and projects, and the policies that can be used to support them
- The importance of an open dialogue between EITE businesses and the Government to understand the technological limitations and international trading environments for each of the unique industries that EITE businesses operate in.

[27] Mitigating Emissions from Aluminium – The Global Network for Climate Solutions

4.1 EITE businesses support policy that reduces GHG emissions globally and avoids unnecessary economic trade-offs

EITE businesses support policies that will:

- reduce emissions of GHGs globally;
- avoid inefficient, or unnecessary, trade-offs to the economy; and
- provide stability to promote long-term investment.

EITE businesses support an effective[28] price of carbon that is no higher than their industry's trading partners

Increasing the price of GHG emissions is an important policy tool that influences the relative demand for goods and services across the economy and internationally. EITE businesses support policies that recognise that all methods to reduce domestic emissions must also seek to reduce GHG emissions globally. Unilateral action to reduce the GHG emissions for trade-exposed industries must be very carefully considered.

Industries face incentives to reduce their emissions, but because of the international nature of trade in EITE products, it must be strictly considered against the incentives faced by EITE industries in other countries. This will lead to the right outcomes: all industries supplying the same global product will face the same incentives to reduce their emissions, and those that are the most efficient at it will rightly prevail.

EITE businesses support policies that avoid unnecessary impacts on the economy and employment

EITE businesses wish to ensure that all the potential impacts on the economy are known and minimised where possible. This can help to avoid the wasteful stranding of capital and significant unemployment and the flow-on social impacts in the regions that they operate in.

All policies involve trade-offs: efficient climate change policy will reduce emissions, but it could do so at the expense of domestic economic growth. This is a trade-off, but is not necessarily inefficient: if businesses become more efficient at the global level, and emissions reduce at the global level, then it is an efficient trade-off (even where individual countries might experience more of the global economic losses).

Predictable policy provides the long-term certainty that the industry needs to make the necessary investment decisions over the long term

Low emissions-intensive production processes often require a significant investment in new equipment. Policy uncertainty creates a new cost that all businesses face when investing. Policy certainty promotes investment because it reduces sovereign risk, or the risk that a government will change the policy settings that were crucial to an investment being worthwhile over the investment period. Sovereign risk can lead to wasteful investments, or a lack of confidence to invest at all.

4.2 A framework for describing the role of EITE businesses in meeting GHG emission reduction targets

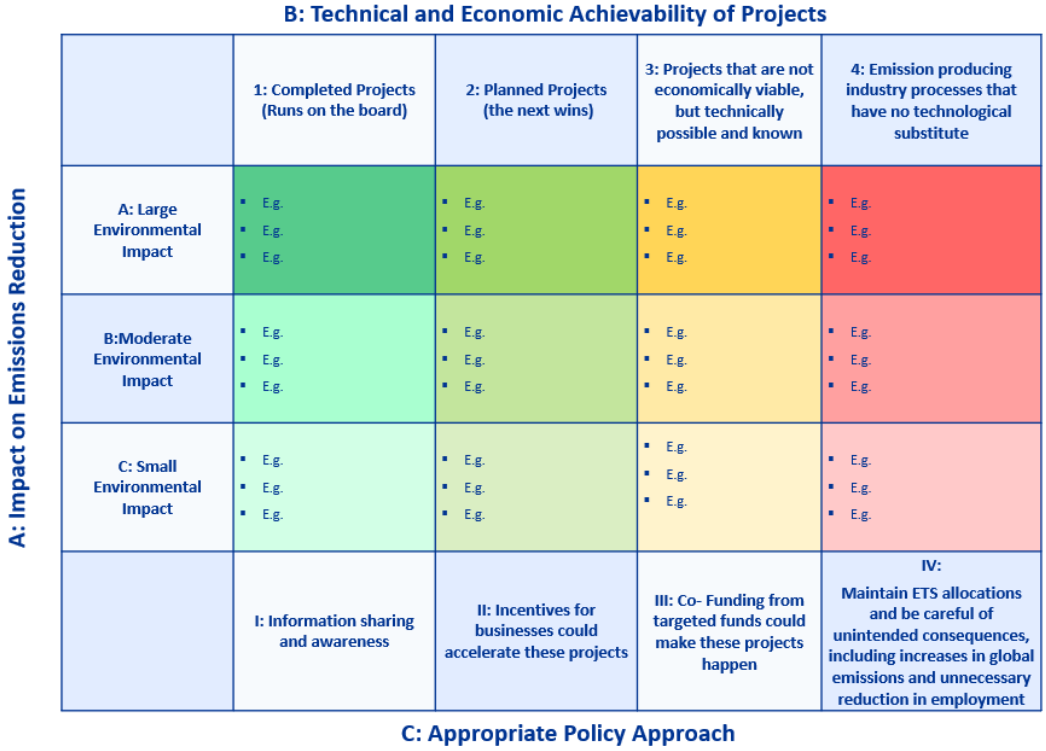
There are many projects already undertaken, underway, or planned, that will reduce emissions generated within EITE businesses. These projects can be thought of in terms of their economic viability on the one hand, and their environmental impact on the other.

[28] An effective price of carbon, is distinguished from the general price of carbon for EITE businesses in New Zealand through the use of free unit allocations within the ETS

We can also think about industrial processes that are currently unable to reduce emissions due to a lack of technological options to change the process or a lack of substitutable products.

The following framework uses these elements of EITE businesses' emissions reduction projects to position specific projects and processes. This can help EITE businesses work with government and continue to reduce their emissions, by developing realistic and achievable goals, and ensure appropriate policy responses. Figure 4.1 provides an overview of the structure of the EITE businesses emissions reducing projects framework.

Figure 4.1: Emissions Reduction Projects Framework



Axis 'A' describes the potential size of the impact that the project has to reduce emissions

Large projects receive the most attention, but projects of all sizes are important because of the cumulative effect they have to reduce the overall emissions of New Zealand. This framework breaks down projects into three levels of impact:

A. **Large impact:** projects that will create an impact at the national level
B. **Moderate impact:** projects that will create an impact at the business level
C. **Small impact:** projects that have a small but measurable impact on emissions

Axis 'B' describes emissions reduction projects for EITE businesses or industries in terms of how achievable they are

The axis has four sections:

1. **Completed projects:** these describe the efforts and achievements that EITE businesses have already made in reducing their emissions. These are achievable projects that these businesses can complete, and that they are already making efforts to reduce, even whilst they are receiving industrial allocations. These

projects may be economically viable in their own right through energy cost reductions. Or, they may have been undertaken purely for environmental reasons.

2. **Planned projects:** these are projects that EITE businesses have in the pipeline, and we can expect further emissions reductions from these businesses. These are projects that the businesses are actively seeking out and motivated to complete already.
3. **Potential projects with economic challenges:** these are projects that have the potential to reduce business emissions, but would require large and presently unfeasible investments in order to implement. These could potentially involve technologies that are being developed internationally or investments that are not feasible for the size of the business.
4. **Projects that target processes that do not presently have technological alternatives to reduce emissions:** this describes processes that currently have no alternative to producing emissions. These businesses could not exist and produce their products if they were not able to generate emissions.

'C' describes the appropriate policy support that aligns with the categories of emissions reductions projects

It is the view of EITE businesses that the policy response needs to be different for each category of project.

I. When projects have been successfully implemented, making others aware through sharing information about economic and environmental outcomes can be beneficial both for the businesses and the Government. Businesses would receive positive publicity, and other businesses may become motivated and learn how to also implement innovative emissions reducing projects, helping to achieve national emissions reduction targets.

II. When EITE businesses have emissions reduction projects planned, incentivising businesses could change the priorities that businesses have, help to bring projects forward, and stimulate the development of plans by others to do similar activities.

III. Emissions reduction projects that are not economically viable are currently unlikely to be executed by the EITE business alone. Projects may become viable if financial incentives change, or they receive additional investment through funds established for emissions reduction support, such as the Government's recently announced Green Investment Fund. Commitments by the businesses and co-investment is necessary to bring these projects forward and into plans.

IV. Some industrial processes that are performed by EITE businesses that do not have a technological substitute and therefore cannot reduce emissions. When setting emissions reduction policies, it is important to consider the ability and mechanisms available to these businesses to actually reduce their emissions from those processes. Emissions trading is a useful tool, however when there is no possible further way to reduce emissions, charging for emissions production has no possible effect except harming businesses, potentially causing them to shut, and moving emissions production offshore. Maintaining industrial allocations to support these businesses within the ETS scheme is crucial.

The following matrix shows an example of projects from EITE businesses to show how the framework can be used in discussions and planning.

Figure 4.2: Emissions Reduction Projects Framework Examples

	1: Completed Projects (Runs on the board)	2: Planned Projects (the next wins)	3: Projects that are not economically viable, but technically possible and known	4: Emission producing industry processes that have no technological substitute
A: Large Environmental Impact	**New Zealand Steel - Electricity co-generation** Electricity is generated at the New Zealand Steel Glenbrook site using off-gases and heat from the iron making process. The cogeneration facility produces an average of 550GWh of electricity each year (equivalent to 69,000 houses) with peak output of 90MW. This provides enough electricity for approximately 60% of site requirements.	**Methanex - Methanol as a marine fuel** In New Zealand, methanol could be used as an economically viable marine fuel. Methanol is an ultra-clean burning fuel that reduces sulphur oxides by 99%, nitrogen by 60%, particulate matter by 95% while lowering carbon emissions. In 2016, Methanex converted the first of its shipping fleet to run on methanol. It has invested approximately $500 million and has ordered eleven methanol fuelled chemical tankers that significantly reduce shipping emissions.	**Golden Bay Cement (GBC) - Waste tyre fuel** The Government is helping to fund 75 percent of an $18.1m project working with GBC to use old shredded tyres as a source of fuel. The new technology will help deal with the significant issue of increasing waste caused by old tyres, by replacing the use of coal with burning the tyres. The substitution is expected to result in a reduction of 13,000 tCO2/ pa. **Methanex – Carbon Recycling** Methanex has invested in Carbon Recycling International in Iceland to create carbon neutral methanol. To replicate this in NZ would require cheap renewable electricity and supportive policies for carbon neutral fuels.	**New Zealand Steel - Steel production without coal** Steel makers worldwide continue to seek out an alternative to coal which is an essential raw material source of carbon for the iron making process. New Zealand Steel is actively engaged through its parent BlueScope in Australia. In NZ possibilities that arise are investigated, and the iron making processes are fine-tuned with the objective of reducing carbon emissions by 20,000 tonnes per annum.
B: Moderate Environmental Impact	**Fonterra - Biomass co-firing** To reduce steam requirements of the processing plant, existing coal boilers can be converted to co-fire with wood biomass to further reduce emissions. After a successful trial at Fonterra's Brightwater plant which resulted in a 2,400 tonnes CO2-e/pa reduction, commitments have been made to install dual-fuel boilers at the proposed Studholme plant expansion.	**Pan Pac - Heat Recovery** Heat recovery is important to reduce energy consumption. Pan Pac has projects planned that allow for additional heat recovery, such as boiler flue gas to dry incoming fuel thereby increasing cogeneration output, and additional heat recovery from secondary refiners to reduce drying energy requirements.	**Fonterra - Integration of heat pumps** Integrating heat pumps into processes to generate hot water can help to meet thermal energy needs at the Fonterra factories, rather than utilising steam from fossil fuels. Installation costs are significant, ranging up to $6M, but allowing for a reduction of 18,000 CO_2-e per annum.	**Methanex - Renewable electrification of gas-fuelled methanol plants** Renewable energy electrification of gas-fuelled methanol production plants would require low cost, 100 percent renewable electricity, gas as a feedstock and significant capital to replace existing infrastructure given a 25+ year investment horizon
C: Small Environmental Impact	**New Zealand Aluminium Smelter - Energy efficiency around the plant** In 2017-18 NZAS carried out a cluster of projects to reduce energy all around the plant including: ▪ The installation of sensor and LED lights in the casthouse ▪ Improved synchronisation of site air compressors ▪ Installation of additional gas heating to changehouse Electricity efficiency has continued to improve every year for the least 5 years.	**Refining NZ - Improved hydrogen consumption** Refining NZ have made many significant investments to reduce their emissions profile, including their new $365m petrol making process unit Te Mahi Hou, which has reduced emissions by approximately 120,000 tCO_2 per annum. However, they have also concentrated on many smaller projects, and one in the pipeline is their project improving hydrogen consumption on a process unit (BRU), which is expected to cost approximately $1.8 million and result in a 700 tCO2 /pa reduction.	**Pan Pac - Use of forest wood-waste** Increased mechanisation in forestry has meant that much wood-waste (e.g. bark) no longer comes in attached to logs, and is left in place to rot. If wood-waste was able to be brought in from forests, it could be used as a potential fuel source in wood-waste boilers.	**Pan Pac - Efficient log transportation** Currently transportation of whole logs to the overseas market can be very inefficient due to logs being 55% water and round shape. Dried pulp would be significantly more efficient, at just 13% water and compressed, but is entirely subject to customer demand. New Zealand being an isolated country means there is no alternative to long distance transport of products overseas.
	I: Information sharing and awareness	**II: Incentives for businesses could accelerate these projects**	**III: Co- Funding from targeted funds could make these projects happen**	**IV: Maintain appropriate EITE allocations, avoid increases in global emissions and unnecessary reduction in employment**

4.3 EITE businesses seek an ongoing dialogue with the Government specific to each industry

EITE businesses welcome regular dialogue with government on effective emissions reduction policies that consider the unique nature of each EITE industry. The trading partner environment and global price of emissions for their specific market situation and the specific processes that generate emissions within each business are complex. Effective policy that meets the objectives needs to have sensitive and detailed understanding of this dynamic environment and this information is held within each business.

The ability that different businesses within the EITE sector have to help achieve emissions reduction varies significantly

EITE businesses range from diverse industries such as growing fresh tomatoes to aluminium smelting. Each industry also has unique and complex relationships with their trading partners, the emissions pricing they face, and the technological innovation in their particular industry.

EITE businesses have a unique and critical perspective on the nature of their industries, how they differ, and what can be efficiently achieved to reduce emissions. EITE businesses want to approach a regular dialogue proactively, meaning working with government to find genuinely effective policy solutions that meet the policy principles for each unique business and its associated marketplace.

EITE businesses understand their global industries more than anyone else, including who their biggest competitors are, the regulatory environments in other jurisdictions, and the greatest opportunities and challenges to moving towards greater emissions reductions. EITE businesses wish to ensure that the Government is fully informed of the specific nature of each marketplace that they operate in to ensure that the objectives of climate change policy is achieved.

The emissions reduction projects framework can assist in the ongoing dialogue between EITE businesses and the Government

The framework to specifically view businesses' emissions reduction potential, as seen through potential projects and their impact and achievability, can be used to help in discussion between the Government and individual businesses and industries. This can help the government provide appropriate signals that will support both businesses and the Government to reach their overall emissions reduction goals.

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