Managing Scarcity and Ambition in the NZ ETS

Catherine Leining and Suzi Kerr

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Author contact details

Catherine Leining

Motu Economic and Public Policy Research

catherine.leining@motu.org.nz

Suzi Kerr

Motu Economic and Public Policy Research and Environmental Defense Fund

skerr@edf.org

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Motu Economic and Public Policy Research

PO Box 24390 info@motu.org.nz +64 4 9394250

Wellington www.motu.org.nz

New Zealand

Abstract

The fundamental purpose of an emissions trading system (ETS) is to constrain emissions and enable the market to set an emissions price path that facilitates an effective transition to a low-emissions economy. In a conventional ETS, the emissions constraint is defined by a cap (a fixed limit) on tradable, government-issued emission units together with a quantity limit on any external units allowed in the system (e.g. via an offsets mechanism). Essentially, an ETS cap underpins the ambition, cost-effectiveness, distributional implications, and credibility of a jurisdiction's approach to decarbonisation. From 2008 to mid-2015, the New Zealand Emissions Trading Scheme (NZ ETS) broke from convention by linking to the global Kyoto cap without its own limit on domestic emissions. NZ ETS participants met compliance obligations using unlimited overseas units at low prices and faced little incentive to reduce their own emissions. The NZ ETS delinked from the Kyoto market in mid-2015, creating uncertainty over the future of domestic unit supply and an efficient price path for domestic decarbonisation. This working paper, which evolved under Motu's ETS Dialogue process from 2016 to 2018, explores key considerations for ETS cap setting and proposes the design for a cap on units auctioned and freely allocated in the NZ ETS. The recommendations focus on issues of cap architecture rather than ambition. The proposed cap is defined in tonnes of emissions per year, fixed for five years in advance, extended by one year each year, and guided by an indicative ten-year cap trajectory. The fixed cap and cap trajectory need to reflect consideration of New Zealand's domestic decarbonisation objectives, international targets, mitigation potential and costs in both ETS and non-ETS sectors, and prospects for cost-effective investment in overseas emission reductions. Two companion working papers address how the choice of cap will interact with decisions on ETS price management mechanisms and linking to overseas markets. The three working papers elaborate on an integrated proposal for managing unit supply, prices, and linking in the NZ ETS that was presented in Kerr et al. (2017).

JEL codes

Keywords

Emissions trading, New Zealand Emissions Trading Scheme, cap, greenhouse gas, climate change mitigation

Summary haiku

Supply certainty
means an ETS can set
an efficient price

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1 Introduction

Emissions trading systems (ETSs) are an effective mechanism to assist jurisdictions to reduce their greenhouse gas (GHG) emissions and combat climate change. As of 2019, 27 jurisdictions, which account for 37% of global GDP, were implementing 20 ETSs covering about 8% of global emissions. Six further jurisdictions have an ETS under development (International Carbon Action Partnership, 2019). These systems all differ in their level of emission reduction and price ambition, the sectors and gases they cover, the activities that are covered within each sector, how emission units are allocated, and how they link with other sources of emission units.

Reflecting its national context, the New Zealand Emissions Trading Scheme (NZ ETS) was launched in 2008 with a number of innovative design features that differ markedly from many other ETSs under operation or consideration. Having evolved for a decade under the global carbon market framework and domestic mitigation objectives established pursuant to the 1997 Kyoto Protocol, the NZ ETS now requires reforms to operate in the new context created by the 2015 Paris Agreement.

This paper was developed over the course of Motu's 2016–18 ETS Dialogue, which brought together a group of cross-sector experts to discuss options for managing unit supply and prices under the NZ ETS. The focus of this paper is on ETS design to reduce and manage emission price instability, which can derail low-emission investment. First, the paper outlines a working model for unit supply in the NZ ETS to enable discussion of price management in a concrete and focused way. We then consider the New Zealand-specific sources of emission price instability within this model. We move on to discuss solutions for reducing emission price instability at their source as well as ETS design features for mitigating their remaining impacts. We conclude with specific recommendations for reform to price management in the NZ ETS.

The operation of ETS price management mechanisms is interdependent on other design features affecting unit supply. Two companion working papers (Leining and Kerr ,2019; Kerr and Leining, 2019) address management of domestic unit supply under an ETS cap and linking to overseas markets. The three papers elaborate on the summary proposal for managing unit supply, prices, and linking in the NZ ETS that was presented in Kerr et al. (2017).

2 Cap Setting in an ETS

2.1 What Is an ETS Cap?

In an ETS, participants are required to surrender emission units against the emissions for which they are liable. Units may be issued by the government or sourced from approved mechanisms that are external to the ETS (either domestic or international). Each unit enables the holder to emit one tonne of greenhouse gas (GHG) emissions. By limiting the supply of units and creating a trading market, the system ensures a specified emission outcome and generates a price on emissions that incentivises efficient behaviour change across the supply chain. Unit scarcity is required to generate a positive price on emissions; the greater the scarcity, the higher the price.

In this paper, an ETS cap refers to the maximum number of emission units issued by the government for auctioning and free allocation over a given period of time. The cap limits how much the sectors that are covered will contribute to global emissions. However, it does not necessarily limit local emissions by the covered sectors. In practice, the cap interacts with other design features affecting unit supply in the market – such as crediting of forestry or other removal activities under the ETS, banking, borrowing, linking with other ETSs, access to external offset credits (domestic or international) and/or separate price management mechanisms – to determine the local emission constraint on the covered sectors and influence the emission price. As a result, local emissions by the covered sectors may fall above or below the cap in a given period, but the system should continue to limit the net global emissions impact from the covered sectors over time.

Internationally, ETS caps have been structured either on an absolute basis – defined *ex ante* as a fixed number of tonnes of emissions per year or period – or on an intensity basis – defined *ex post* where the number of units varies as a function of actual output (e.g. levels of commodity production or GDP) (Partnership for Market Readiness and International Carbon Action Partnership, 2016). This paper only considers the setting of an absolute cap, as this approach aligns with the absolute nature of New Zealand's (and global) emission reduction targets.

The definition of an ETS cap can have far-reaching implications for the environmental, economic, and social impacts of the system. The cap determines how much and how quickly the covered sectors will contribute towards meeting a jurisdiction's emission reduction targets and global mitigation objectives. The interaction between unit supply constraints and participant demand sets the market price on emissions and determines what costs the system will impose on ETS participants as well as producers and consumers across the economy. The choice of cap has distributional implications for the relative emission reduction responsibility and cost allocated to ETS versus non-ETS sectors and government (hence taxpayers) in order to achieve a given target. The choice of cap determines how much money may accrue to government through auctioning of emission units or be transferred offshore for the purchase of international emission reductions by government or ETS participants to meet their respective obligations. The choice of cap can also shape domestic and international perceptions regarding the ambition and integrity of an ETS and the jurisdiction's overall contribution to global mitigation. This in turn affects political and trade relationships for both government and business. Essentially, an ETS cap underpins the ambition, cost-effectiveness, distributional implications, and credibility of a jurisdiction's approach to decarbonisation.

2.2 Policy Considerations for Setting Cap Ambition

When defining the stringency of an ETS cap, the government should consider factors such as:

1. The jurisdiction's committed **contribution to global mitigation**. Emission reductions benefit the atmosphere regardless of where they are generated, so a jurisdiction can make a valid contribution to global mitigation by reducing its own emissions and/or by investing in emission reductions by other jurisdictions. However, under the 2015 Paris Agreement, all countries have agreed to transition to net zero global emissions by the end of the century.
2. The desired rate of **domestic decarbonisation**. This refers to how much and how quickly the jurisdiction wishes to reduce its own emissions as part of its contribution to global mitigation and local economic transformation. The priority given to local mitigation effort can have local environmental, economic and social implications, both positive and negative. Decisions on domestic decarbonisation will influence the extent to which ETS participants or the government more broadly can meet their obligation using units sourced outside the cap.
3. Access to **international emission reductions** that are credible and cost-effective. The jurisdiction needs to evaluate the feasibility, costs, and benefits of meeting part of their emission reduction commitments by purchasing international emission reductions. Sourcing lower-cost units from other jurisdictions can help to reduce compliance costs but transfers investment and mitigation co-benefits offshore.
4. Efficient **burden sharing** for achieving the jurisdiction's broader targets across ETS and non-ETS sectors and the government/taxpayers. Key considerations include the sectors' relative technical and economic mitigation potential as well as the balance of environmental, economic, fiscal, and equity implications across sectors. Decisions on burden sharing should be informed by credible and transparent information, including economic modelling of the system impacts.
5. **Policy interactions** between the ETS cap and other policies impacting on the covered sectors. Other policies can drive changes in levels of emission-generating activity as well as emission factors[1] in ways that can enhance, duplicate, or negate the impact of an ETS. Such policies may still generate valuable longer-term mitigation or other benefits, for example, if they are forcing desired technological or structural change or other environmental co-benefits that would not occur as soon under an ETS with a politically acceptable price. When complementary measures improve responsiveness to emission

[1] Emission factors are emissions per unit of output.

pricing under an ETS, they can facilitate mitigation by capped participants, lower overall compliance costs, and/or reduce reliance on external units from offsets or linking (Partnership for Market Readiness and International Carbon Action Partnership, 2016).

6. **Prospects for linking**. Once an ETS links to another system, the ambition of its own cap becomes less material than the ambition of the linked system, particularly if the linking partner has a larger market or different marginal abatement costs. Choices made by a jurisdiction on its own cap ambition will affect its attractiveness to linking partners. In a linked system, it could also impact on the distribution of costs to the ETS participants from that jurisdiction, depending on how those units are allocated to participants. Any price containment mechanisms would require harmonisation across linked ETS.
7. Maintaining the **political and social acceptability** of emission levels, emission prices, and system costs to both domestic and international stakeholders. The package of government decisions on the factors listed above must be sufficient to sustain political and social consensus on operation of the ETS.

2.3 Price Considerations for Setting Cap Ambition

The political durability of an ETS depends on perceptions of its economic impact and fairness as well as its environmental effectiveness. By convention, an ETS defines a desired emission outcome and enables the market to discover and apply the corresponding emission price. In a world with perfect information, the government could set a cap trajectory to produce an efficient price pathway to a low-emission economy – or could define the price pathway that would efficiently deliver a desired emission outcome. In the real world, no one knows the best price or the best cap, and political factors unrelated to efficient transition paths will also play a role in current and future cap setting.

The government's decisions on the ETS cap will underpin the market price. Policy-driven emission price risk is a very real concern to both regulators and ETS participants. The tools for managing emission price risk are: (1) effective cap setting supported by sound information, predictable processes, and policy coordination, and (2) mechanisms that can adjust, override, or otherwise compensate for unit supply under the cap. Mechanisms for managing price risk are the focus of Kerr and Leining (2019b). Here, we consider how the government might determine an acceptable target price range for setting the cap. The following section focuses on reference points for determining the target price range for an ETS. The second section then considers factors beyond the cap that can influence ETS prices.

2.3.1 Reference Points for Targeting ETS Prices

The fundamental purpose of an ETS is to facilitate a gradual, cost-effective transition to a low-emissions economy. This is a long-term objective, and the investments and behavioural changes that will drive the transition are similarly long term. Therefore, the cap trajectory (a series of caps over time) and the corresponding emission price trajectory have to be thought of over a long period, not just in terms of current issues.

To decide on an appropriate ETS emission price, a jurisdiction needs to think about what price is required to meet its goals for both reaching net zero domestic emissions in the long term and managing the path and speed of reduction. Answering this analytically would require predicting economic activity, technological change and uptake, responsiveness to emission prices, and the effects of non-price policies. The price required also depends on how the jurisdiction might contribute to mitigation in other jurisdictions and take credit for that, allowing temporarily higher local emissions. Estimating an appropriate emission price is thus complex and ultimately a question of political judgement informed by modelling. There is no "right" price in an ETS that will objectively satisfy competing environmental, economic, and social objectives. However, three points of reference can be useful when making this determination: the social cost of carbon, target-consistent emission prices, and emission prices in other jurisdictions. A further concept included in the 2015 Paris Agreement is the social value of mitigation action.

Social Cost of Carbon

The social cost of carbon for a given year is an estimate of the present discounted value in dollars of future net global climate change damages from each tonne of CO_2 – or conversely, the benefit to society of avoiding a tonne of CO_2 emissions (National Academies of Sciences, Engineering, and Medicine, 2017).[2] The global benefits of reducing emissions are expected to outweigh the costs up to the social cost of carbon. Methodologies for determining the social cost of carbon are complex and contentious. Key considerations include climate sensitivity to rising emissions, the assessment of climate damages, socioeconomic projections, and the appropriate discount rate applied to determine the present value of future costs and benefits.[3] Beyond the technical challenges, applying the social cost of carbon can be politically challenging because:

- mitigation costs are borne locally at the time of action, whereas mitigation benefits accrue globally over time
- the cost of future climate damages depends on the cumulative mitigation responses by other jurisdictions over time
- the social cost of carbon is typically higher than the effective emission prices applied in current policies internationally, so its use can raise competitiveness concerns for trade-exposed sectors.

[2] In addition to the social cost of carbon, which refers to CO_2, it is also possible to calculate the social cost of CO_2 equivalent emissions, and the social cost of other gases (e.g. methane and nitrous oxide) individually.
[3] A user-friendly discussion of these considerations is provided by Evans, Pidcock, and Yeo (2017).

Nevertheless, the social cost of carbon can be a useful consideration for assessing policy costs and benefits. As an example, under the Obama administration, US government agencies were required to factor the social cost of carbon into cost-benefit analyses of regulatory actions. In the US case, different recommendations applied for the choice of discount rate depending on the time frame relevant to the policy.[4] Internationally, research is ongoing on options for improving calculation of the social cost of carbon (for example, see National Academies of Sciences, Engineering, and Medicine, 2017; Resources for the Future, 2017). A 2017 survey of studies on the social cost of carbon concluded, "For these reasons [detailed in the paper], many past modeling exercises to calculate the global social costs of carbon have produced numbers that *probably underestimate these costs by very large margins*" (High-Level Commission on Carbon Prices, 2017).

Target-consistent Emission Prices

Target-consistent emission prices are an alternative benchmark for determining appropriate ETS prices. They reflect the marginal abatement costs required to place a jurisdiction onto a pathway consistent with meeting its already-defined emission reduction objectives (e.g. a quantified target or an agreed temperature goal). Although this approach avoids some of the complexities of calculating the social cost of carbon, it still involves managing uncertainties about the future means and marginal costs of abatement as well as socioeconomic projections.

Target-consistent emission prices can be set on a sectoral, national or international basis. For example, the UK government selected this approach as preferable to the social cost of carbon for evaluating policy options once targets were in place. The government assigned different target emission prices for sectors inside and outside of the EU ETS in the near term because they faced different targets. For ETS sectors, the near-term price reflected policy settings in the EU ETS. For non-ETS sectors, the government determined a near-term country-specific emission price. For policies affecting the post-2030 period, they assigned a single target-consistent emission price under the expectation that a global trading regime would be in place by then. The post-2030 price was based on international modelling of emission prices consistent with the global temperature goal.[5] The UK government indicated it would still consider the social cost of carbon in setting future targets (UK Department of Energy and Climate Change, 2009). Multiple

[4] Assuming a discount rate of 3%, a central value of US$36 applied for 2015, rising to US$42 in 2020, US$50 in 2030 and US$69 in 2050 (based on 2007 dollars). Under a high-impact scenario (95th percentile), assuming the same discount rate, the price rose from US$105 in 2015 to US$123 in 2020, US$152 in 2030, and US$212 in 2050 (Interagency Working Group on Social Cost of Greenhouse Gases, 2016). US government guidance was to apply a discount rate of both 3% and 7% for valuing costs and benefits for a single generation, and a lower discount rate for rules with important intergenerational costs and benefits (US Office of Management and Budget, 2003).

[5] The UK policy recommendation was to apply a short-term traded emission price with a central value of £25 per tonne of CO_2eq in 2020 (ranging from £14 to £31), a short-term non-traded emission price with a central value of £60 per tonne CO_2eq in 2020, (ranging from £30 to £90), and a long-term traded emission price with a central value of £70 per tonne of CO_2eq in 2030 (ranging from £35 to £105), and £200 per tonne in 2050 (ranging from £100 to £300) (UK Department of Energy and Climate Change, 2009).

modelling studies have also assessed global emission prices that would be consistent with achieving the global goal of limiting temperature rises below two degrees Celsius.[6]

Two recent initiatives have emerged to address the need for better information about emission prices that are consistent with the long-term goals of the 2015 Paris Agreement. One is the High-Level Commission on Carbon Prices, an initiative of the Carbon Pricing Leadership Coalition with support from the World Bank Group. In mid-2017, the Commission issued the following conclusion:

> Based on evidence from industry, policy experience, and relevant literature, and taking into account the strengths and limitations of the respective information sources, this Commission concludes that, in a supportive policy environment, the explicit carbon-price level consistent with the Paris temperature target is at least US$40–80/t$CO_2$ by 2020 and US$50–100/t$CO_2$ by 2030. The implementation of carbon pricing would also need to duly consider the non-climate benefits of carbon pricing (for instance, the generation of additional government revenue), the local context, and the political economy (including the policy environment, the adjustment costs, the distributional impacts, and the political and social acceptability of the carbon price).[7]

The second initiative is the Carbon Pricing Corridors Initiative launched by the Carbon Disclosure Project and We Mean Business coalition. This focuses on defining emission pricing corridors for internal use by businesses and investors concerned about pricing the "transition risk" associated with global mitigation objectives. The first report issued in 2017 focused on the power sector, and defined a "majority corridor" ranging from US$30–100 per tonne CO_2eq by 2030 (Carbon Disclosure Project and We Mean Business, 2017).

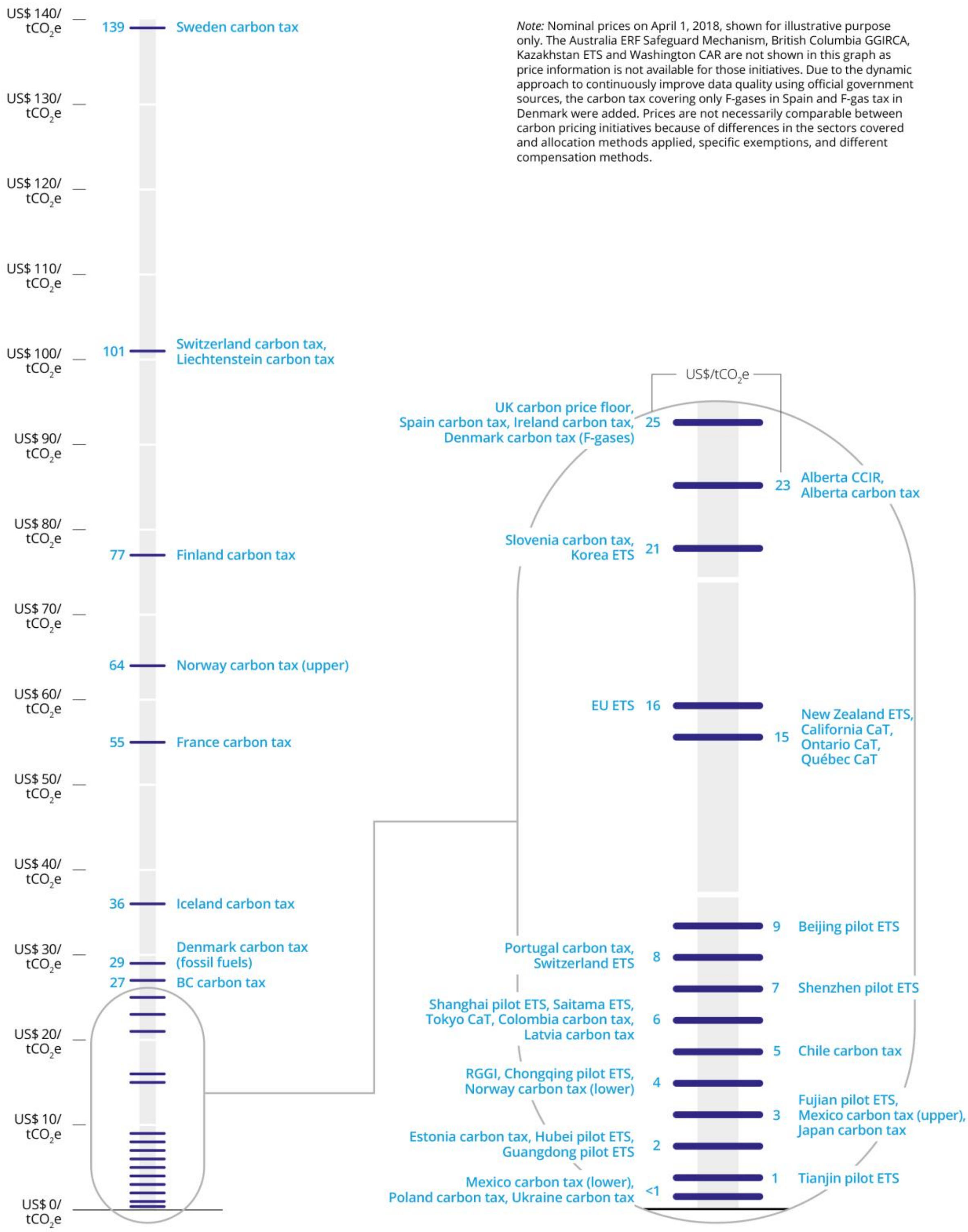
ETS and Carbon Tax Prices in Other Jurisdictions

Emission prices in other jurisdictions with an ETS or carbon tax could also provide reference points for setting an ETS cap. However, systems are far from convergence on an efficient global emission price consistent with the global temperature goal. As of 2018, emission prices under these mechanisms ranged from less than US$1 to US$139 per tonne of CO_2eq (see Figure 1). Note that emission prices and compliance costs may not be directly comparable across systems due to differences in sectoral coverage, exemptions, allocation, and compensatory mechanisms (World Bank and Ecofys, 2018).

[6] For example, a 2017 study by the International Energy Agency assessed the emission prices required for a global energy-sector transition consistent with a 66 per cent chance of achieving the two-degree temperature goal. It concluded that a price of US$190 per tonne of CO_2 would be required by 2050 in OECD countries, US$170 in major emerging economies and US$80 in other regions. However, emission prices at these levels would still not be sufficient on their own to achieve the global temperature goal (International Energy Agency, 2017).

[7] To justify the choice of a minimum price of US$40 by 2020, the Commission writes, "While governments do have some flexibility in the use of instruments at the country level, the Commission believes that decarbonizing the economy with very low carbon prices, and a relatively large focus on other instruments could be unnecessarily inefficient due to the potential misallocation of efforts across sectors. In addition, a high short-term price gives a clear signal on the transition to investors and consumers, helps raise awareness of and attract attention to emission reduction opportunities, and may help tackle cognitive and behavioral biases" (High-Level Commission on Carbon Prices, 2017).

Figure 1: Prices in implemented carbon pricing initiatives



Source: World Bank and Ecofys (2018)

Social Value of Mitigation Action

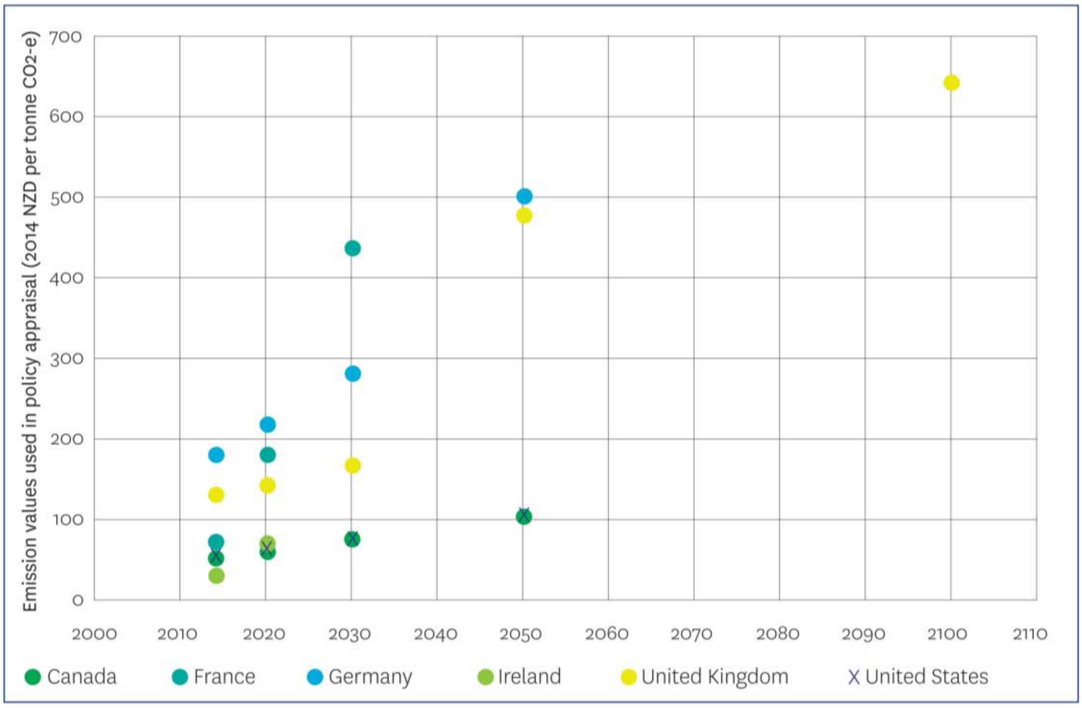
In paragraph 108 of the decision to adopt the Paris Agreement (UNFCCC, 2015), the Conference of the Parties "*Recognizes* the social, economic and environmental value of voluntary mitigation actions and their co-benefits for adaptation, health and sustainable development." Some researchers are considering how a "social value of mitigation action," which takes into account the co-benefits of mitigation actions that align with the Sustainable Development Goals, could be a useful complement to assessing the social cost of carbon (which could be considered the "social cost of climate change"). Examples of co-benefits include improvements in air quality and energy security, accelerated technological change with development benefits, redirection of financial flows to more productive investments, and poverty alleviation (Espagne et al., 2017).

Applying Differential Emission Prices across the Economy

Governments can choose different emission price pathways for ETS sectors, non-ETS sectors, and government agencies. Aligning prices across the economy supports a least-cost transition, while differentiating prices can create politically desirable opportunities for progress at different speeds in different sectors. For example, a government could concurrently apply a shadow social cost of carbon when making its own decisions on investment in long-lived infrastructure, and lower emission prices in its ETS and non-ETS sectors because of near-term trade competitiveness and transitional adjustment concerns. A government could apply separate prices to ETS and non-ETS sectors because of differences in abatement opportunities, capacity to pay, trade exposure, or political considerations. Such decisions can have important economic, fiscal, equity, and political implications.

Figure 2 from Vivid Economics (2017) illustrates the emission values used in policy appraisal in a selection of developed countries. Whether applying the social cost of carbon or target-consistent emission prices, all of them show a rising price pathway over time. Note that values in 2030 are considerably above the global price of NZ$50 per tonne CO_2eq assumed in modelling of New Zealand's 2030 target by Infometrics (2015).

Figure 2: Emission values used in policy appraisal for 2050



Note: The exchange rate used for US$ to NZ$ is 1.38. Some countries only apply these emission pricing policy values to carbon dioxide emissions; other countries, including the UK and US currently apply them to all greenhouse gases covered by the Kyoto Protocol.
Source: Smith and Braathen (2015) and Vivid Economics

Source: Vivid Economics (2017)

2.3.2 Non-cap Policy Drivers of ETS Prices

As noted above, the ETS cap interacts with other ETS design features to determine emission prices and system costs. Enabling units to be banked across time is an important design feature for managing prices. Banking brings forward emission reductions, improves liquidity, reduces price volatility, and creates a long-term constituency for a strong ETS. If units are bankable (and there is a positive balance, as there is in New Zealand), then price is determined by long-term supply, not short-term. For a cost-effective transition, emission units should be fully bankable with no risk of confiscation. Allowing units to be imported from or exported to external mechanisms can alter ETS unit supply and hence emission prices. Government decisions on unit allocation or other compensation can alter the distribution of costs across participants and government.[8] For more discussion on these issues, see Partnership for Market Readiness and International Carbon Action Partnership (2016).

The price impacts of an ETS will also depend on how the cap interacts with other policies affecting emissions in the covered sectors. If regulations with a higher effective price are applied to a subset of ETS participants after the cap is fixed, then emission prices will fall for non-

[8] Free allocation shifts emission costs from ETS participants to the government. Output-based free allocation, in contrast to grandparenting, reduces participants' exposure to emission prices at the margin and effectively serves as an output subsidy which can increase emission prices under the cap.

regulated ETS participants.[9] This approach may not produce a least-cost outcome across the economy but may offer other strategic benefits. Conversely, an ETS may help with achieving other government policy objectives (e.g. for air quality, energy efficiency, renewable energy, energy security, land-use change, technology innovation, etc.), generating broader economic and fiscal benefits. Policies that reduce non-price barriers to mitigation and improve market function may improve the market's responsiveness to price signals and lower transaction costs (Partnership for Market Readiness and International Carbon Action Partnership, 2016). Commodity price volatility and investment risk driven by other aspects of government policy or market operation may change the effectiveness of ETS price signals.

3 The History of Unit Supply in the NZ ETS

The NZ ETS is the only ETS in the world that was designed without its own cap on domestic units or its own constraint on domestic emissions. Instead, it was designed to operate nested within the Kyoto Protocol cap with full buy-and-sell linkages, enabling the Kyoto market to serve as the largest source of units and set the price in the domestic market. At the time the system was designed, New Zealand projected a substantial emission unit deficit relative to its target in the first Kyoto commitment period (2008–2012) and anticipated further emission increases in the longer term, with continued population and economic growth and forest harvesting cycles. Through this nested cap arrangement, New Zealand's domestic emissions could continue to increase in the covered sectors if that was the economically efficient outcome under the international price of emissions. At the same time, the covered sectors contributed to global mitigation and assisted with meeting New Zealand's Kyoto target by purchasing overseas units (Leining and Kerr, 2016).

3.1 2008 Legislation

The Climate Change Response (Emissions Trading Amendment) Act 2008 gave the Minister the power to issue NZUs, and provided specific directions regarding unit issuance for free allocation and eligible removals in the forestry and industrial sectors. The quantity of free allocation to all sectors was essentially capped in the 2008 Act, but this did not constitute a true ETS cap because the Act did not constrain unit allocation through other means. Free allocation was to have been phased out by 2030.

The original draft of the Bill had included an explicit power for the government to sell NZUs by public tender, but this was removed by recommendation of the Finance and Expenditure Committee. Some submitters had raised concerns about whether the government could abuse this power. The Committee concluded that it was not necessary for the Act to

[9] The use of a price floor mechanism, such as a reserve price at auction, can help to limit this impact.

specify the terms of the sale process; the Minister of Finance already had broad powers under section 6 to sell units by tender, auction or other methods; and other provisions governing unit issuance and government appropriations would guard against the improper sale of units by the government. Government auction of NZUs was not discussed as a central means of allocating NZUs into the market, at least in the early stages of NZ ETS implementation. While the government faced a Kyoto deficit, it would have needed to purchase Kyoto units to back the sale of NZUs into the market. However, officials considered it was important for the Minister to have the power to sell NZUs in order to respond to market conditions, such as an international registry failure.

Many submitters had sought a price cap or "safety valve" in the system. The Committee did not support the introduction of a price cap on multiple grounds. Such a mechanism would have shifted more mitigation responsibility from NZ ETS participants to government to meet New Zealand's target. Instead, the intention was to rely on unlimited importation of international units to guard against unacceptably high unit prices.

The 2008 Act prescribed several requirements for the issuance of NZUs by the Minister to safeguard their environmental integrity and the proper functioning of the market. Under section 68, prior to issuing NZUs, the responsible Minister was required to consult with the Minister of Finance and have regard to the following matters:

i. *the number of units that New Zealand has received, or that the Minister expects New Zealand to receive, under any international agreement; and*
ii. *New Zealand's international obligations, including any obligation to retire units equal to the number of tonnes of emissions that are emitted in New Zealand; and*
iii. *the proper functioning of the greenhouse gas emissions trading scheme established under this Act; and*
iv. *any other matters that the Minister considers relevant.*

In addition, if there was no subsequent commitment period under the Kyoto Protocol or no successor international agreement, then the Minister was required to have regard to the following matters:

i. *New Zealand's annual emissions for the 5 years (on record) prior to the year of the direction under consideration; and*
ii. *the report of the most recent review completed under section 160(1); and*
iii. *New Zealand's obligations under the Convention (if any); and*
iv. *New Zealand's anticipated future international obligations.*

Under section 86, the 2008 Act required each NZU issued by the Crown to be backed by a Kyoto unit held in a Crown holding or surrender or retirement account by the end of the true-up for the first Kyoto commitment period (ultimately May 2015). This was to provide full alignment between NZUs and Kyoto units, improving market certainty by constraining the Crown from issuing and selling an unlimited number of units, and safeguarding the environmental integrity of NZUs. The flexibility in timing for the backing requirement enabled the Crown to go into temporary unit deficit periods.

3.2 2009 Legislation

The Climate Change Response (Moderated Emissions Trading) Amendment Act 2009 reduced the core unit surrender obligation to one unit per two tonnes of emissions in non-forestry sectors. It replaced the capped pools of free allocation in the industrial and agriculture sectors with unconstrained output-based free allocation, and slowed the phase-out to 1.3% per year from the previous year's amount. It also introduced a NZ$25 price cap mechanism to apply through to 31 December 2012; upon payment of $25 by the participant to the Crown, the Registrar was required to issue an NZU that had to be transferred immediately to a surrender account. This mechanism was designed to operate independently of the unit issuance requirements under section 68, but was subject to the unit backing requirement in section 86.

3.3 2012 Legislation

The Climate Change Response (Emissions Trading and Other Matters) Amendment Act 2012 extended output-based free allocation for the industrial and agriculture sectors, deferred the phase-out of that free allocation as long as the one-for-two unit obligation remained in place, and extended the $25 price cap indefinitely. The 2012 Act made two significant changes with regard to cap setting: it introduced the option for auctioning under an overall limit and removed the requirement to back NZUs with Kyoto units.

Section 6A established the power for the government to introduce future auctioning by regulation. Under section 30G(1)(p), by regulation the government must specify the commencement date for auctioning, provide for a pilot auction, prescribe who could participate and what penalties would apply to breaches, and prescribe an overall limit. Under section 30GA, by regulation the government must prescribe a limit on the total number of units auctioned, freely allocated, or issued under Negotiated Greenhouse Agreements (NGAs)[10] in any year over a period of five years. The limit is to be updated by one year each year. When establishing the limit on auctioned units, the Minister must have regard to:

a) *the matters set out in section 68(2)(b)(i) to (iii) (with any necessary modifications);*[11] *and*

[10] NGAs were initiated under the 2002 Climate Change Policy Package. These were to provide exemptions from the proposed carbon tax for emissions-intensive, trade-exposed industrial producers in return for achievement of a negotiated emission reduction pathway. Only two NGAs were agreed with the Crown before the carbon tax was abandoned.

[11] These sections address the matters to which the Minister must have regard when issuing NZUs.

b) New Zealand's projected emission trends; and

c) any domestic target to reduce emissions; and

d) the number of New Zealand units that are expected to be allocated; and

e) the emissions to which the greenhouse gas emissions trading scheme applies; and

f) the arrangements that govern the operation of the greenhouse gas emissions trading scheme; and

g) the limit, if any, on the number of units that are not New Zealand units that a participant may surrender; and

h) any other matters that the Minister considers relevant.

The overall limit does not establish how many NZUs will actually be auctioned; it sets a ceiling. Importantly, NZUs cannot be auctioned once the limit has been exceeded, but the limit does not bind free allocation, the issuance of units under NGAs, the issuance of removal units, or the issuance of units under the $25 price cap.

In setting its position for the introduction of amending legislation, Cabinet expressly chose not to cap output-based free allocation. It also expressly chose not to impose a quantity limit on imported units to ensure that the domestic market continued to reflect international emission prices regardless of whether auctioning was introduced. The government's policy goal for auctioning was not to manipulate prices, but to "address the problems of excessive purchasing of international units and international market uncertainty." Cabinet made a decision to consult on the detailed design of an auction mechanism in 2012, but this did not eventuate (CAB Min (12) 23/10 and accompanying Cabinet paper).

In the 2012 Act, the government repealed section 86, which had imposed the requirement to back NZUs with Kyoto units. This change applied retrospectively as of 2008. Cabinet provided three supporting arguments. First, New Zealand was expected to meet its Kyoto commitment for 2008 to 2012, guaranteeing the environmental integrity of the NZUs issued in that period. Second, by introducing auctioning within a limit, New Zealand could offer its own cap for ensuring the environmental integrity of NZUs. Third, removing this requirement would "avoid the currently unbudgeted fiscal costs of $140 million at a $6 carbon price in the period 2012/13 to 2015/16, covering the NZUs allocated in excess of the AAUs and RMUs received in CP1, should the requirement to 'back' NZUs for the first commitment period be maintained" (CAB Min (12) 23/10 and accompany Cabinet paper). This decision enabled the NZ ETS to continue to operate once New Zealand chose not to take its emission reduction commitment under the Kyoto Protocol for the period 2013 to 2020, a decision that was announced the day after the amending legislation was passed and resulted in New Zealand losing access to the Kyoto market in mid-2015.

3.4 NZ ETS under Review: 2015–2018

The New Zealand Government initiated a two-stage review of the NZ ETS in 2015 (Ministry for the Environment, 2015a). The first stage focused on whether to move to one-for-one unit surrender obligations in non-forestry sectors and resulted in a decision in May 2016 to phase in a full obligation over the period from 2017 to 2019 (Bennett, 2016). The second stage focused on what design settings were needed to help New Zealand meet its future targets. In July 2017, the New Zealand Government announced its intention to introduce auctioning under an overall limit no later than 2021. Accompanying this were decisions that included placing a quantity limit on international units purchased by NZ ETS participants (which could become an option in the future but is not enabled now), implementing an alternative price ceiling, and coordinating future decisions on unit supply, the price ceiling, and linking (Bennett, 2017).

Following an election in September 2017, the new government conducted public consultation on the NZ ETS (Ministry for the Environment, 2018a). In December 2018, the government announced that it would:

- introduce auctioning under a cap in 2020 in alignment with New Zealand's emission reduction targets
- replace the fixed-price option with a cost-containment reserve bound by the cap, managed through the auction mechanism, and backed by removals
- place a quantity limit on international emission units if the system reopens to such units in the future
- coordinate future decisions on unit supply and price management, with decisions to be made over a five-year rolling period (Genter, 2018; Ministry for the Environment, 2018c).

These decisions create the mechanisms for the government to manage domestic unit supply – and domestic emissions – but do not signal the intended ambition of future ETS policy settings.

3.5 Outcomes from Unlimited NZ ETS Unit Supply over 2008 to 2015

When NZU trading began in 2009, the domestic price started around NZ$20, which was below the international price of secondary-market CERs, and it stayed around that level until mid-2011. At that point, an oversupply in the Kyoto market compounded by the Global Financial Crisis caused a decline in the price of overseas Kyoto units. NZ ETS participants took advantage of unlimited access to low-cost overseas units, and domestic prices fell in tandem with international prices. In late 2012, the New Zealand government elected to take its 2013–2020 emission reduction commitment under the UNFCCC rather than the Kyoto Protocol, raising the prospect of future delinking. NZUs hit a low value of NZ$1.45 in February 2013. From this point, NZUs commanded a price premium relative to overseas Kyoto units as they were perceived to have higher utility and value in the longer term. Participants preferentially banked NZUs and met their obligations with overseas Kyoto units instead (Leining, Ormsby, and Kerr, 2017; Ormsby and Kerr, 2016). By the time of delinking in mid-2015, the participant-held bank of NZUs was equivalent to five times the annual surrender volume (Ministry for the Environment, 2015a). Despite the size of the NZU bank, under market expectations of long-term supply constraints, NZU prices continued to rise from mid-2015 until they hit the price ceiling (NZ$25) in late November 2018.

Figure 3: Emission price history in the NZ ETS: 2010–2018

Source: Data from OM Financial Ltd

Ultimately New Zealand could have met its 2008–2012 target under the Kyoto Protocol without purchasing any international units (UNFCCC Secretariat, 2016). This was primarily the result of economic downturn following the Global Financial Crisis and forestry removals rather than the NZ ETS. In its 2016 evaluation of the NZ ETS, the government reported that because of low prices, the system had not significantly impacted domestic emissions or business decisions (Ministry for the Environment, 2016). Because of unlimited NZ ETS linkage to an oversupplied Kyoto market, the government ended up with a large surplus of Kyoto units and NZ ETS participants with a large bank of NZUs. The government intends to apply some of its Kyoto surplus to help meet its 2013–2020 target (Ministry for the Environment, 2018b). The banked NZUs constitute an emissions liability to the government under its 2030 target and a cost to taxpayers (Leining, Ormsby, and Kerr, 2017).

With no prescribed limits on near-term unit supply and no policy certainty on long-term unit supply, the NZ ETS to date has not shifted New Zealand's economy onto a pathway towards domestic decarbonisation.

4 Introducing a Cap in the NZ ETS

4.1 New Zealand's Domestic Mitigation Challenge

New Zealand's emissions profile differs from that of many countries. In 2016, biological emissions from agriculture accounted for 49 per cent of gross emissions (excluding forestry), compared to energy emissions at 40 per cent, industrial process emissions at 6%, and waste at 5%. Forestry produced net removals equivalent to 29% of gross emissions. Over the period 1990 to 2016, New Zealand's gross emissions (excluding forestry) increased by 19.6%, and its net emissions by 54.2%. Its net forestry removals declined by 23% (Ministry for the Environment, 2018e).

Under the Paris Agreement, New Zealand has taken a 2030 nationally determined contribution (NDC) to reduce its net emissions (including forestry) to 30% below 2005 gross emission levels (excluding forestry) (New Zealand Government, 2016). This is equivalent to a reduction of 11% below 1990 gross emission levels (Ministry for the Environment, 2018e).

Both New Zealand's gross and net emissions currently remain on a growth trajectory. The government's 2030 target corresponds to a provisional emission budget for the 2021–2030 period of 601 Mt CO_2eq. As of 2018, the government projected a target gap of 203 Mt CO_2eq. This assumes projected gross ETS emissions of 390 Mt CO_2eq, gross agriculture emissions of 380 Mt CO_2eq, and gross emissions from other sectors of 34 Mt CO_2eq (see Figure 4). New Zealand's target gap can be met through a combination of domestic emission reductions, net forestry removals, and the purchase of international emission reductions (Ministry for the Environment, 2018d).

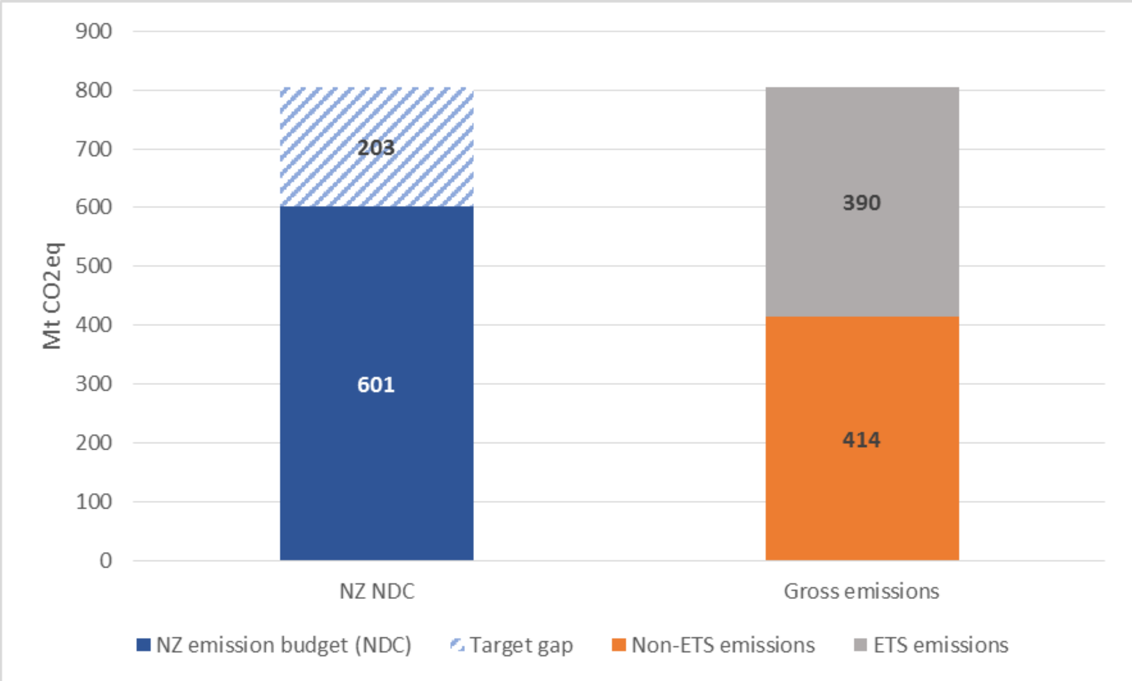
New Zealand's forestry sector, currently a net sink, could reduce its offsetting potential and even become a net emission source under harvesting anticipated in coming decades if full carbon stock accounting is applied (Ministry for the Environment, 2015b).[12] However, forestry accounting rules applied to New Zealand's NDC, which apply averaging[13] to post-1989 forests and account for carbon stored in harvested wood products, could change how this trend affects New Zealand's compliance with the Paris Agreement (New Zealand Government, 2015). As of early 2019, the government is considering whether to introduce averaging for post-1989 forests

[12] Full carbon stock accounting is the approach applied in national GHG inventories, using the methodology prescribed by the Intergovernmental Panel on Climate Change for reporting under the UN Framework Convention on Climate Change.

[13] Under an "averaging" approach to forest carbon accounting, carbon sequestration from afforestation is credited up to the level of the long-term average carbon stock, and there is no liability for emissions from future harvesting provided the forest is replanted (i.e. no deforestation occurs).

included in the NZ ETS (Ministry for Primary Industries, 2018). According to government calculations, net forest carbon sequestration under NDC accounting could reduce the mitigation gap by 28–48 Mt CO_2eq over the 2021–2030 period (Shaw, 2017).

Figure 4: New Zealand's projected target gap: 2021–2030



Source: Ministry for the Environment (2018d)

Further assessment is needed in regard to the cost-effectiveness of New Zealand's mitigation options. Modelling suggests that bridging the 2030 target gap through only domestic emission reductions would come at a relatively high cost compared with possible global prices over that period. For example, Infometrics (2015) found that even at a price of NZ$300 per tonne, New Zealand would be unable to achieve its 2030 target without international purchasing and would struggle even more with greater longer-term cuts. Infometrics also found that at a global price of NZ$50 per tonne, New Zealand might need to achieve 80% of the required abatement over 2021 to 2030 through international purchasing. However, this modelling did have some transparent limitations: it assumed no technology transformation, no mitigation beyond business-as-usual in the forestry and agriculture sectors, the continuation of current elasticities for the economy's response to a rising price on emissions, and a global emission price in 2030 that is well below international price pathways consistent with the global temperature goal.

In 2018, the Productivity Commission's report on a *Low Emissions Economy* included modelling of mitigation scenarios that could produce domestic net emissions of 25 Mt CO_2eq and 0 Mt CO_2eq by 2050. This modelling applied assumptions that emission prices set by the government in 2030, by managing unit supply in the NZ ETS, could range from $30–55 for the lower ambition scenarios and $55–80 for the higher ambition scenarios. Post-2030 emission prices generated by the model rose to $75–152 in 2050 for the lower ambition scenarios, and $157–250 for the higher ambition scenarios (New Zealand Productivity Commission, 2018).

4.2 The New International Context for Managing Supply and Prices in the NZ ETS

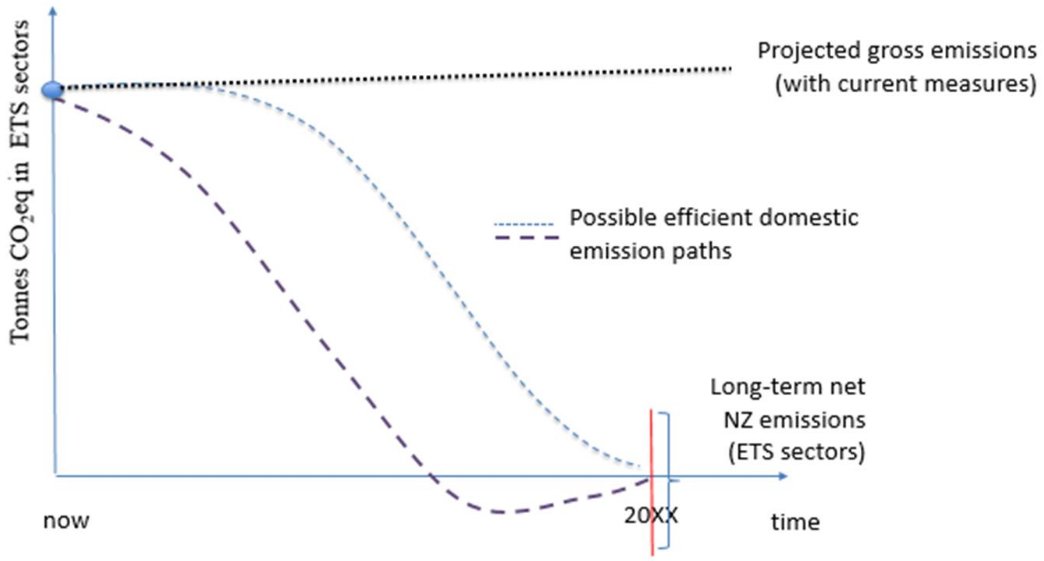
The Paris Agreement has created a new context for managing unit supply and prices in the NZ ETS. From 2008 to mid-2015, NZ ETS participants relied on the Kyoto market, governed by internationally agreed rules, to satisfy unit demand and set the domestic price. Although the Paris Agreement enables "internationally transferred mitigation outcomes" between Parties through voluntary and mutually agreed arrangements, there will be no integrated top-down global carbon market governed by Party decisions. The Paris Agreement establishes a new central UN market mechanism that could potentially be used by both public and private entities, but this will take years to develop and even longer to produce a stream of tradable emission reductions. To safeguard environmental integrity and avoid double counting, any mitigation outcomes that are transferred from one Party to another will need to be additional to the seller's NDC and agreed by both the seller and buyer governments. Under a diversity of NDCs and policy responses, there is no convergence toward an international price of emissions of any description, let alone one that could be relied upon to produce an efficient price pathway for New Zealand's domestic decarbonisation.

In this context, it is now essential for New Zealand to chart its own strategic emission and emission price pathway towards domestic decarbonisation as part of its global contribution. The government can be guided by international ambitions for emission reductions and emission prices, but in the future it will need to make its own determinations as an active price maker, not a passive price taker.

4.3 Implications for Mitigation Ambition in the NZ ETS

By later this century, New Zealand will need to join all countries in achieving net zero domestic emissions – and in fact could aspire to net negative emissions. As is illustrated conceptually in the figure below, emissions in ETS sectors could follow any number of pathways to net zero. Some will be more or less ambitious and more or less economically efficient than others. It is impossible for us to predict now what a single optimal pathway might be through to 2050 and beyond.

Figure 5: What is an efficient emission path for NZ ETS sectors?



Note: Not drawn to scale.

Government decision making on NZ ETS ambition will need to be adaptive, responding to evolving mitigation opportunities, market conditions, international agreements, and social pressures. New Zealand's approach to setting an ETS cap will need to achieve the dual objectives of (1) environmental effectiveness in supporting New Zealand's progression towards net zero domestic emissions and its broader contribution to international mitigation, and (2) predictable flexibility that enables an economically efficient transition under changing circumstances. It will also need to be supported by further research and modelling on New Zealand's mitigation opportunities and costs in both ETS and non-ETS sectors, as well as the potential supply, cost, and accessibility of international emission reductions.

4.4 Proposed Architecture for a Cap in the NZ ETS

Drawing from this analysis, we recommend introducing into the NZ ETS a cap structure that would enable the government to make decisions about the pace of domestic decarbonisation and the allocation of mitigation responsibility and cost across ETS and non-ETS sectors and taxpayers. The proposed cap structure has five characteristics as follows.

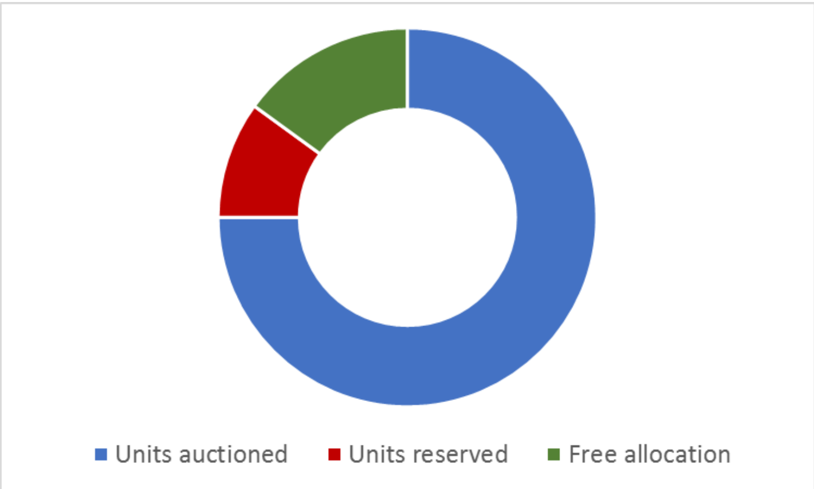
4.4.1 Using NZUs as the Primary Unit of Trade in the Domestic Market

NZUs would enter the market through auctioning, free allocation, removals, and banking. From a government target accounting perspective, NZUs may be backed by any combination of the government's NDC budget and purchased international emission reductions that meet stringent quality criteria. We recommend that the government supply only NZUs to NZ ETS participants, instead of directly reselling international emission reductions. We consider that taxpayers should get the benefit from any international emission reductions acquired by the government at prices below those in the NZ ETS. If international rules make it possible for NZ ETS participants to purchase international units in the future, then such units should meet stringent quality criteria, be limited in quantity, and displace other unit supply under the cap.

4.4.2 Placing a Fixed Limit on NZUs Auctioned and Freely Allocated

The cap would represent the maximum number of NZUs that could enter the market through auctioning and free allocation. It would not bind NZUs generated by forestry or industrial removal activities. NZUs that have been banked in the past would be honoured and future banking would not be constrained. The cap would be expressed in tonnes of emissions per year, fixed for five years in advance, and extended by one year each year. An increase or decrease in free allocation (e.g. because of changes in output or market entry or exit by participants) would produce a corresponding decrease or increase in auctioning, so that the capped supply to the market would remain the same. The figure below illustrates the basic design of the cap.

Figure 6: Model for an NZ ETS cap



Note: Not drawn to scale.

Setting a fixed five-year cap would give the market short-term certainty on the unit supply from auctioning and free allocation. This differs from the auction model in the Climate Change Response Act 2002, under which the government announces the overall limit five years in advance but only years 1 and 2 are truly fixed, leaving years 3–5 open to adjustment with advance notice. In our model, each year 6 extension would be expected to have an immediate price impact across the preceding cap period because it would alter expectations of future supply, so there is no need to adjust cap volumes for years 1–5. Extending the cap by one year each year can be expected to make cap setting more incremental and routine relative to setting caps for long periods.

4.4.3 Incorporating a Unit Reserve for Price Management

The cap would operate with a unit reserve that could adjust the auction volume upwards or downwards as a safeguard against both upside and downside price risk, respectively. A price floor and price ceiling, together constituting a price band, would be defined as the triggers for using the unit reserve. The price floor would be implemented as an auction reserve price, and unsold units would be returned to the reserve. When the price ceiling was reached at auction, additional units would become available until the reserve was exhausted. The price ceiling would operate using a tiered approach as follows:

a. If the auction price rose to hit a first trigger price, units would be released from the reserve for auctioning. The auction would continue to set the price.

b. If the auction price continued to rise and hit a second trigger price, the government would initiate a review of the settings for unit supply and price management and their interactions with other non-ETS policies. This review could either be conducted by, or informed by, independent advice from the New Zealand Climate Change Commission to be established under the government's Zero Carbon Bill (Shaw, 2018).

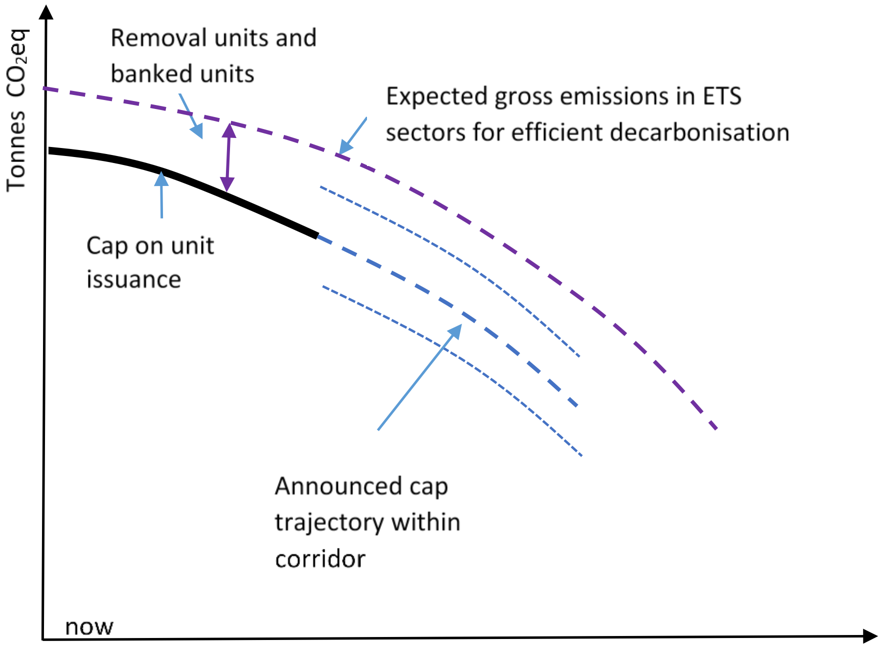
c. If the reserve volume was exhausted before new unit supply settings were in place, then the government would offer an unlimited number of fixed-price units for purchase and immediate surrender by participants. Fixed-price units could not be traded or banked.

The operation of a price band implemented via a capped unit reserve would replace the fixed-price option currently operating in the NZ ETS, as the former offers a more predictable mechanism for balancing the economic and fiscal risks from cap setting. Price management mechanisms are discussed in more detail in Kerr and Leining (2019b).

4.4.4 Adding an Indicative Ten-year Trajectory for Emissions and Emission Prices

Future cap setting would be guided by an indicative ten-year trajectory, or corridor, for emissions, which reflects the government's intended path towards domestic decarbonisation. Like the cap, the cap trajectory would be extended by one year each year. This would impose the discipline on government of developing a 15-year forecast for emissions under the NZ ETS and would give businesses a 15-year horizon to guide future planning and investment decisions. The figure below illustrates the operation of the cap and the cap trajectory. Alongside the cap trajectory, we recommend implementing a price band trajectory to guide future setting of the price floor and price ceiling. See Kerr and Leining (2019b) for further explanation of the price band trajectory.

Figure 7: Model for managing unit supply with a cap and cap trajectory



Note: Not drawn to scale.

4.4.5 *Enlisting Independent Advice and Review*

An independent body, such as the Climate Change Commission, would provide advice to government on managing future unit supply and prices under the NZ ETS. Because decisions on ETS supply and prices are ultimately political in nature, they should be made by government with transparency and public accountability and not delegated to an appointed body. The cap would be subject to review with each sixth-year extension and following specified *force majeure* events that could exceed the capacity of the system's automatic price safeguards.

4.4.6 *Elaboration on International Purchasing*

For the cap architecture to send a clear price signal for domestic decarbonisation, it would need to be accompanied by limits on both the quantity and quality of international emission reductions that could affect unit supply in the NZ ETS market. Given the slow development of rule making under Article 6 of the Paris Agreement, which guides carbon market development, for the foreseeable future any purchasing of international emission reductions by New Zealand will need to be conducted through government-to-government agreements. There currently is no mechanism enabling NZ ETS market participants to purchase international emission reductions for compliance under the NZ ETS, as they did in the past.

Should the NZ ETS reopen to international carbon markets in the future, a volumetric limit would help prevent diversion from New Zealand's intended pathway for domestic decarbonisation. In 2018, the New Zealand Government signalled its intention to limit the quality and quantity of any future international purchasing by NZ ETS participants in a way that maintains environmental integrity as well as incentives for domestic abatement (Genter, 2018; Ministry for the Environment ,2018c). One option for doing this would be to stipulate that any future participant purchasing would displace other unit supply under the cap, thereby enabling the cap to drive market expectations for unit supply and prices, regardless of uncertain and variable levels of international purchasing over time. More detail on how international purchasing could operate under the NZ ETS is provided in Kerr and Leining (2019a).

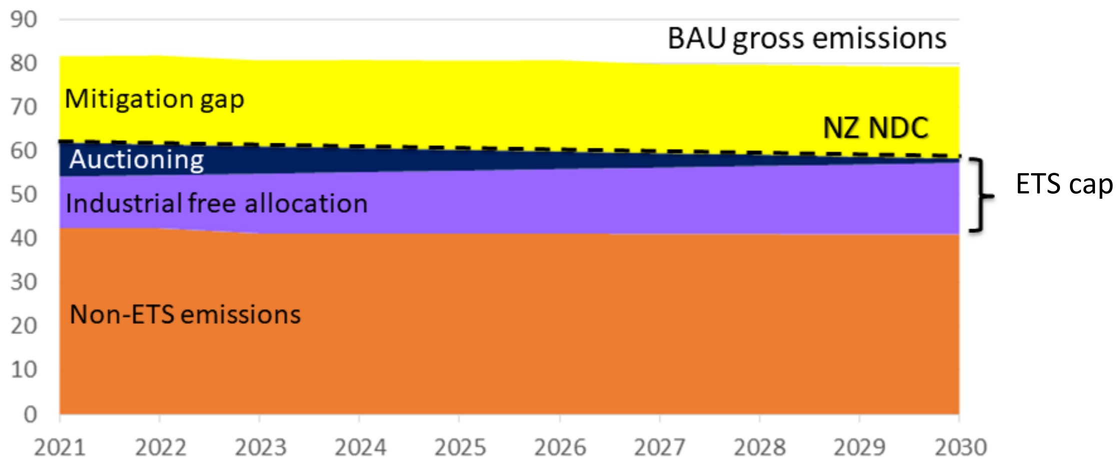
To further support clear price signals to market participants, we recommend that government decisions on cap setting – and associated independent advice – be coordinated with other decisions and advice affecting unit supply and price management, including international purchasing, free allocation, and the settings for any cost-containment mechanisms (i.e. price ceiling and floor). This concept is supported in the New Zealand Government's policy intentions announced in 2017 and 2018 (Bennett, 2017; Genter, 2018).

4.5 Alignment of the NZ ETS Cap with New Zealand's Targets

To effectively align the NZ ETS cap with New Zealand's targets, the government will need to weigh the mitigation opportunities and costs in ETS sectors against those in non-ETS sectors and those from investment in international emission reductions. It will also need to consider interactions between the NZ ETS and other regulations and policies in both ETS and non-ETS sectors. Decisions on ETS mitigation ambition and costs will need to be taken in the context of efficient pathways for achieving both near-term targets and long-term domestic decarbonisation. In the case of near-term targets, the government will need to ensure that New Zealand's net emissions across ETS and non-ETS sectors are no greater than the sum of its target budget for the period (derived from its NDC), net forestry removals, and purchases of international emission reductions.

In the government's provisional carbon budget for 2021 to 2030 under current policies, the government would use its NDC budget to cover non-ETS emissions and industrial free allocation, leaving a balance of 44 million tonnes over the period that would be available for auctioning in the ETS. As shown in Figure 8, this margin for auctioning would be exhausted by the end of the period (Ministry for the Environment, 2018d). This distribution of the NDC budget would not be sufficient to feed a unit reserve for emission price management under the NZ ETS cap, nor would it be likely to satisfy NZ ETS demand at politically acceptable emission prices.

Figure 8: Government's provisional emission budget 2021–2030 (agriculture sector outside the ETS)



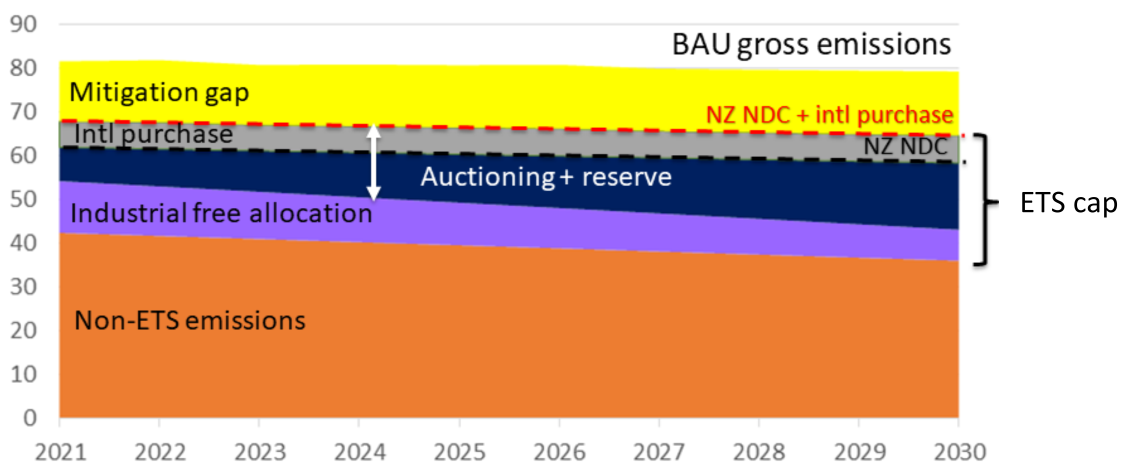
Note: BAU = business as usual, NZ NDC = New Zealand's Nationally Determined Contribution under the Paris Agreement, Source: Adapted from Ministry for the Environment (2018d)

An alternative distribution that increases the available auction volume could be achieved through any combination of:

- increasing the rate of mitigation in non-ETS sectors
- phasing out industrial free allocation
- purchasing international emission reductions.

This is illustrated in Figure 9. Although this figure is not drawn to scale, it demonstrates the potential to increase the auction volume under the NZ ETS and feed a unit reserve sufficient to support price management.

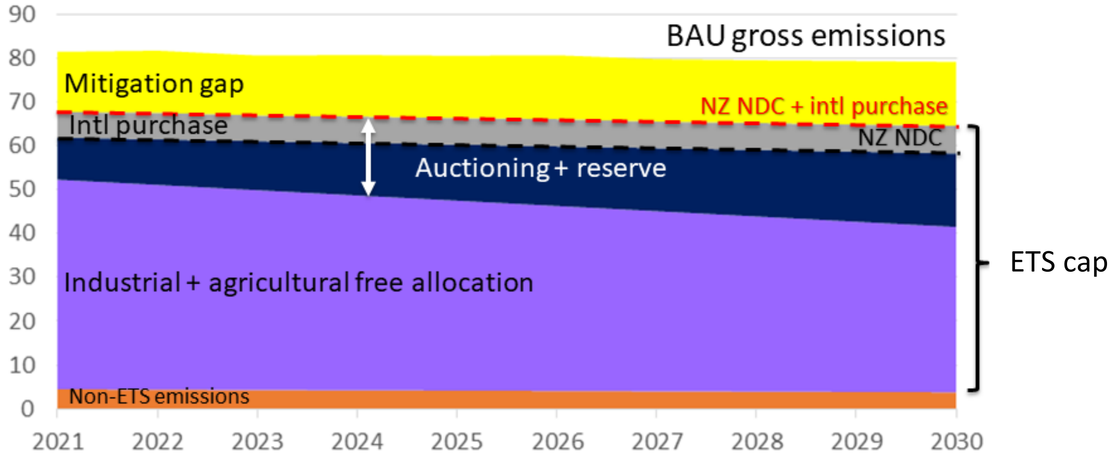
Figure 9: Alternative emission budget 2021–2030 (agriculture sector outside the ETS)



Note: Not drawn to scale

The proposed cap architecture is flexible enough to accommodate any future introduction of unit obligations for biological emissions from agriculture and accompanying free allocation. In this case, the volume of both auctioning and free allocation under the cap would increase. The implications for domestic emission prices and the purchasing of international emission reductions would depend on the relative rate of mitigation in the agriculture sector under an emission price, compared with alternative mitigation policies that would otherwise have applied to the sector. This is illustrated in Figure 10.

Figure 10: Alternative emission budget 2021–2030 (agriculture sector inside the ETS)



Note: Not drawn to scale

5 Conclusion

The fundamental role of an ETS is to set a cap – a limit – on emissions that the trading market can then translate into an efficient emission price to drive behaviour change. For an ETS to be effective, the cap architecture must enable government to make and implement decisions on emission reduction ambition and costs in ETS sectors that align with overarching mitigation targets and economic objectives. From 2008 to mid-2015, the architecture of the NZ ETS relied on the international Kyoto carbon market to set domestic prices. Both international and domestic emission prices proceeded to decline precipitously, eliminating the incentive for domestic mitigation. In the new policy context of the 2015 Paris Agreement, the cap architecture in the NZ ETS requires reform so that it can be used to exert domestic sovereignty over New Zealand’s decarbonisation pathway.

This paper recommends five changes to the cap architecture that would make the NZ ETS a more effective instrument:

1. Using NZUs as the primary unit of trade in the domestic market
2. Placing a fixed limit on NZUs auctioned and freely allocated
3. Incorporating a unit reserve for price management
4. Adding an indicative ten-year trajectory for emissions and emission prices
5. Enlisting independent advice and review.

To maintain the integrity of long-term signals for NZ ETS unit supply in line with New Zealand's decarbonisation goals, these changes would need to be accompanied by limits on both the quality and quantity of international emission reductions purchased by NZ ETS participants, should this become possible in the future. It would also be useful to coordinate future government decision making on cap setting, price management, international purchasing, and free allocation in alignment with New Zealand's mitigation targets and interim emission budgets.

Policy announcements by the New Zealand Government in December 2018 align broadly with these recommendations. Diverging from the Government's stated intentions, we recommend:

1. Fixing the cap for a full five years in advance, instead of enabling government modifications over years 3–5.
2. Adding an indicative ten-year trajectory for unit supply and prices beyond the five-year cap.
3. Limiting the uncertain and variable impact of any future purchasing of international emission reductions by NZ ETS participants by ensuring this offsets other supply under the cap.

With our recommended suite of changes, New Zealand policy makers would have a practical and durable framework for managing unit supply and prices in the NZ ETS. They would also send clear price signals to guide future low-emission investment in line with our international targets and goals for domestic decarbonisation.

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