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Paying for Mitigation: How New Zealand Can Contribute to Others' Efforts

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Abstract

Purchasing international emission reductions (IERs) can help New Zealand make a more ambitious and cost-effective contribution toward global climate change mitigation and support developing countries in accelerating their low-emission transition. However, New Zealand must avoid past mistakes by ensuring international purchasing does not derail its own decarbonisation pathway. Furthermore, the Paris Agreement has fundamentally changed how countries will trade IERs over the 2021–30 period. This working paper, which evolved under Motu’s ETS Dialogue process from 2016 to 2018, focuses on how we can balance our international and domestic mitigation efforts. It explores how many IERs we may want, how we should integrate international mitigation support with participants’ obligations under the New Zealand Emissions Trading Scheme (NZ ETS), and what mechanisms we can use to fund international mitigation effectively. Fundamentally, the New Zealand government will need to ensure that all IERs counted toward its targets and accepted in the NZ ETS have environmental integrity and are both approved and not double counted by seller and buyer governments. This paper presents a working model for New Zealand’s purchase of IERs, in which the quantity is controlled by government, purchasing is managed by government for the foreseeable future (with potential participation by private entities), and the quantity is factored into decisions on the NZ ETS cap and price management mechanisms. If NZ ETS participants are able to purchase IERs in the future, then a quantity limit should apply as a percentage of the surrender obligation and the volume should offset other supply under the cap. The paper also highlights an innovative “climate team” mechanism for international climate change cooperation that could facilitate purchasing by the New Zealand government. Two companion working papers address interactions between decisions on international purchasing and the choice of NZ ETS cap and price management mechanisms. 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, greenhouse gas, climate change mitigation, linking

Summary haiku

New Zealand can fund
mitigation overseas
and progress at home.

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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 accounting 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 why and how New Zealand could choose to purchase international emission reductions (IERs) as part of its contribution to global mitigation, and the implications of this for the design of the NZ ETS. Section 2 explores the rationale and policy frameworks for New Zealand's purchase of IERs and defines a typology of options for supporting overseas mitigation. Section 3 presents a short history of New Zealand's experience with carbon market linking and other support for international mitigation. Section 4 focuses on the mechanics of incorporating IERs into the NZ ETS. Section 5 lays out strategic considerations for purchasing IERs. Section 6 presents a working model for New Zealand's purchase of IERs. The paper concludes with some high-level recommendations for future policy.

Decisions on international purchasing have implications for other ETS design features affecting unit supply and emission prices. Two companion working papers (Kerr & Leining 2019; Leining & Kerr 2019) address management of domestic unit supply under an ETS cap and mechanisms for emission price management. 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 Context for purchasing IERs

2.1 The rationale for purchasing IERs

New Zealand's contribution to mitigating global climate change has two components: what we do at home and what we do overseas. Both of these components interact through the NZ ETS. In the near term, we will need to fund mitigation abroad because New Zealand's 2030 Nationally Determined Contribution (NDC) under the Paris Agreement is almost certainly more ambitious than can be achieved at reasonable cost within New Zealand (Stroombergen 2015; Ministry for the Environment 2016). The government has explicitly stated its intention to use international carbon markets to help meet its 2030 target (New Zealand Government 2016). It has projected a target gap over 2021–30 of 203 Mt CO₂eq¹, to be met through a combination of domestic mitigation, domestic sinks, and international purchasing (Ministry for the Environment 2018b). The government is also considering the use of international carbon markets to enable flexibility in meeting an ambitious 2050 emissions target (Ministry for the Environment 2018a).

International mitigation is a bridge that allows us to manage the timing of our domestic decarbonisation and take more ambitious targets. More broadly, we need to fund international mitigation because the whole world needs to reach net zero emissions of long-lived GHGs and reductions in other GHGs if the climate is to stabilise, and many developing countries are unlikely to be able or willing to achieve that alone. Even if they will be able to decarbonise in the long term, most developing and even emerging economies are unlikely to do it quickly enough to support a goal limiting the global average temperature increase to well below 2 °C, let alone 1.5 °C. Our support for mitigation in these countries can help accelerate that shift.² Such support can take the form of payments for IERs, but also provision of capital and expertise, as well as cooperation, to solve common challenges. This paper focuses on payments for IERs where we receive explicit credit toward our NDC.

2.2 International policy framework for carbon markets

To date, New Zealand's approach to funding international mitigation has largely been through the Kyoto Protocol's flexibility mechanisms.³ The Kyoto mechanisms have faced serious problems in ensuring environmental integrity (Wara 2008; He & Morse 2010; Kollmuss et al. 2015; Simmons & Young 2016). New Zealand's connection to those mechanisms, and our poorly

¹ Million tonnes of carbon dioxide equivalent

² Gavard et al. (2016) analyse the potential impacts of volume-limited emissions trading between China and the European Union (EU) or United States. They find that both sets of trading partners can benefit if China captures the rents from differential emission prices and that more ambitious global mitigation can be achieved.

³ The three Kyoto flexibility mechanisms are the Clean Development Mechanism (CDM, involving mitigation projects in developing countries), Joint Implementation (JI, involving mitigation projects in Annex B (industrialised) countries with Kyoto targets), and international emissions trading between Annex B countries with Kyoto targets. New Zealand has also provided climate finance to support mitigation in developing countries through multilateral, regional, and bilateral initiatives. This is relatively small compared to the level of investment by NZ ETS participants in units from the CDM and JI from 2008 to mid-2015.

managed withdrawal from them in mid-2015, has led to extended periods of very low effective emissions prices, a government liability for a large participant-held bank of New Zealand Units (NZUs), and windfall gains to some foresters and recipients of free allocation (Kerr & Ormsby 2016; Leining et al. Kerr 2017; Leining & Kerr 2019).

The 2015 Paris Agreement has created a new framework for global mitigation action and the role of international carbon markets. Importantly, it has greatly expanded the potential set of countries with whom we can work in a robust way and the mechanisms we can create to mobilise mitigation action. Both developed⁴ and developing countries have pledged NDCs under a common legal framework, with provisions for ensuring integrity and transparency and raising mitigation ambition over time. Additional finance for mitigation and capacity building in developing countries is being mobilised through the Green Climate Fund and other multilateral and bilateral finance initiatives. Regarding carbon markets, Article 6.2 of the Paris Agreement enables internationally transferred mitigation outcomes (ITMOs)⁵ through government-to-government agreements, and Article 6.4 provides for the development of a new United Nations (UN) market mechanism for transferring mitigation. In both cases, transferred emission reductions could count toward the buyer's NDC, with a corresponding adjustment by the seller to avoid double counting. While negotiations on implementing provisions for Article 6 have been slow and difficult to date, Parties to the Paris Agreement can still proceed with making their own arrangements for ITMOs under Article 6.2.6

2.3 Domestic policy considerations for buying IERs

The more flexible framework of the Paris Agreement enables New Zealand to design its own approach to buying IERs. We can now focus more on achieving useful longer-term objectives and put less emphasis on a narrow near-term outlook. Whatever approach we use will need to satisfy the scrutiny of both domestic and international stakeholders. The New Zealand government has indicated that any IERs applied toward meeting its Paris target would need to meet criteria for environmental integrity (i.e. produce real emission reductions that are not double counted by other countries), be consistent with New Zealand's own progress with domestic decarbonisation, and make economic sense (Ministry for the Environment 2018a).

⁴ In June 2017, the United States government announced its intention to withdraw from the Paris Agreement.

⁵ Unlike the Kyoto Protocol, the Paris Agreement does not define "emission units" for demonstrating compliance with NDCs and trading emission reductions between countries. In this paper, we use the term "IERs" to refer to the commodity being traded where we might have used the term "international units" in the past. It is possible that traded IERs could take the form of ETS or offset units created by the government of other countries or the new UN carbon market mechanism.

⁶ At the 2018 Katowice Climate Change Conference, Parties to the Paris Agreement negotiated the "rulebook" for implementation. They failed to agree on rules, modalities, and guidelines for Article 6. Contentious issues included avoiding double counting of emission reductions transferred between Parties, whether to allow transfers of emission reductions generated outside the scope of NDCs, and how to ensure net global gains from emission transfers. International transfers of mitigation outcomes under Article 6.2 can proceed without implementing provisions, but development of the new carbon market mechanism under Article 6.4 will be hindered until these issues are resolved (Carbon Brief 2018).

Informed by past experience,⁷ we now face an important question: do we want to control our domestic emission price and speed of domestic decarbonisation? Controlling our domestic emission price entails constraining the use of IERs in conjunction with limits on free allocation and auctioning under the NZ ETS. The advantages of controlling our own emission price are that investors can more easily plan ahead, and we can protect our economy and decarbonisation process from the political instability of others as well as international price volatility and variability. The arguments for adopting international prices by allowing unconstrained purchasing of IERs are that we can take advantage of unlimited low-cost mitigation elsewhere when it is available; that our firms are exposed to the same emission price as (some of) their competitors, thus reducing leakage; and that we may be less politically exposed both domestically and internationally. Enabling NZ ETS participants to surrender unlimited numbers of IERs could also ensure liquidity in the market.⁸ However, regular auctions and improved market institutions would obviate this need.

The optimal level of emission price in the NZ ETS and rate of domestic decarbonisation at each point in time should depend on New Zealand's ambition to contribute to the global mitigation effort, and the costs and benefits of both domestic mitigation and credible international mitigation options. At times, there could be tension between attention to international mitigation costs and a desire to have a predictable price signal for domestic investment that reduces the impact of political instability.

Whether it does so through the NZ ETS or other mechanisms, New Zealand will need to purchase IERs in order to meet its Paris target – or find other ways to support international mitigation that count toward its target. In that context, we are maintaining the following assumptions for this paper:

1. New Zealand is moving toward a future with very low gross and net domestic emissions, and international mitigation cannot replace domestic mitigation in the long term.
2. New Zealand's mitigation contribution should be made in the most globally efficient way – across time, countries, and sectors.⁹
3. New Zealand will be paying for others' mitigation, not vice versa.
4. New Zealand will financially support mitigation only in countries less economically advanced than itself. Equal or more advanced economies should have targets that make

⁷ From mid-2011 until the end of 2012, when the government announced that New Zealand would not take a commitment under the second commitment period of the Kyoto Protocol, the emission price in the NZ ETS was entirely driven by international prices and dropped significantly. The fall in those prices was not driven by an indication that global mitigation was cheaper than anticipated (which would be a good reason for low prices), but by the financial crisis and resulting recession in Europe, by the growth of the CDM, and by the release of large numbers of excess units from eastern Europe that did not represent real emission reductions below business as usual. From 2008 until the present, the global carbon market has not provided a meaningful price signal for efficient long-term mitigation in line with the global temperature goal.

⁸ Liquidity refers to participants' ability to buy or sell units without affecting the price.

⁹ In this paper we are focusing on the architecture for making that contribution, not its ambition.

their mitigation costs at least as high as ours. If they do not, we can apply pressure to them to increase their stringency rather than paying them to increase it.

2.4 Typology of options for supporting overseas mitigation

Future sources of IERs may extend beyond the historical model of project-based mechanisms to include sectoral crediting mechanisms, ETS linking, and/or bilateral (or plurilateral) mitigation agreements (e.g. trading based on Nationally Appropriate Mitigation Actions (NAMAs),¹⁰ results-based contracts, and direct grants) (Kerr & Millard-Ball 2012). Here, we present three options for purchasing IERs: offset mechanisms, ETS linking, and results-based contracts.

2.4.1 Offset mechanisms

Classic offset mechanisms generate tradable emission units through project-based activities.¹¹ Each project is assessed for “additionality” – whether the associated emission reductions would have happened in the absence of the project. A project-based crediting baseline is set for emissions and credits are issued when emissions are below that baseline as the project proceeds. Examples include the Clean Development Mechanism (CDM) and Joint Implementation (JI) mechanisms under the Kyoto Protocol, and the Compliance Offset Program administered by the California Air Resources Board, which establishes protocols for offsets eligible under the California Cap-and-Trade Program.

The new UN market mechanism under Article 6.4 of the Paris Agreement is still under negotiation. It could take the form of an offset mechanism. Whether this will involve a project or programme basis for crediting or some broader approach remains to be seen. In the context of the Paris Agreement, the additionality of traded emission reductions will need to be confirmed in relation to the seller’s NDC; ensuring environmental integrity will require no double counting of credited emission reductions against targets across sellers and buyers.

2.4.2 ETS linking

ETSs can be linked directly with constrained tradability (e.g. buy only or sell only) through to full mutual recognition of emission units (Ranson & Stavins 2014; Partnership for Market Readiness and International Carbon Action Partnership 2016). Several examples exist:

- In the California–Québec linked system, ETS units are not differentiated and auctions are held jointly, but some rules differ across the two jurisdictions.
- The Regional Greenhouse Gas Initiative (RGGI) in the northeast United States extends across a group of states, each with independent regulations based on the RGGI Model Rule.

¹⁰ The concept of NAMAs emerged from the Bali Action Plan in 2007. According to the United Nations Framework Convention on Climate Change, a NAMA is “any action that reduces emissions in developing countries and is prepared under the umbrella of a national governmental initiative” (United Nations Framework Convention on Climate Change Secretariat n.d.).

¹¹ Offset mechanisms can also apply to programmes of activities. This was the case under the CDM.

- The European Union Emissions Trading System (EU ETS) applies across all member states and also has linkages to Norway, Lichtenstein, and Iceland, and a forthcoming linkage to Switzerland.

The Kyoto flexibility mechanisms created the potential for indirect ETS linking through mutual acceptance of Kyoto units. New Zealand took full advantage of this from 2008 to mid-2015; others used these mechanisms in more limited ways.

Two-way linkage of ETS markets as part of a global carbon market is not the holy grail of cost-effective mitigation – at least for the foreseeable future. The instability of this model has been demonstrated through the Kyoto experience (detailed below). Fortunately, full linkage to a global carbon market is not necessary for an efficient New Zealand mitigation effort. What we need is a strong buy-only connection to countries that could apply New Zealand funding to achieve additional mitigation, and an ability to assess an appropriate emissions price for our own market. The key reason to purchase IERs is to achieve credible mitigation at lower cost. That should be our focus.

2.4.3 Results-based contracts

In a results-based contract, a jurisdictional baseline for the seller is agreed between the parties (Kerr 2012). Generally this would be below the level of business-as-usual emissions and would hence involve some autonomous reduction in emissions by the seller. The emissions in each period are monitored for the jurisdiction as a whole. If emissions fall below the agreed baseline, the seller receives a payment in proportion to the emission reduction – at a previously agreed price. If the system is designed to generate internationally recognised credits, they are transferred to the buyer in proportion to the emission reduction under the terms of the contract.

Outside the Kyoto Protocol, Norway, and Brazil have been the leaders in developing these instruments. The Amazon Fund has operated this way since 2008 to reduce deforestation in the Brazilian Amazon.¹² Norway has had a similar agreement with Guyana and has also worked in Indonesia, Peru, and Liberia. These agreements have previously been applied to avoided deforestation, with monitoring by satellite. In countries with robust NDCs and national inventories, such agreements could be applied to the economy as a whole or to specific sectors where a baseline acceptable to both parties can be agreed.

Motu and international researchers are collaborating to develop a “climate team” mechanism for international climate change cooperation, which could facilitate purchasing by the New Zealand government. A group of buyer countries would pool resources to enable large-scale mitigation by the seller beyond its NDC. Payment would be guaranteed upon delivery within a pre-agreed price range that offered benefits to both the seller and buyers. More detail is provided in the box below.

¹² As at the end of 2017, the Amazon Fund had received more than NZ\$1.2 billion, with 93.3% from the government of Norway, 6.2% from the government of Germany, and 0.5% from Petrobras (Brazilian Development Bank 2018).

The “climate team” mechanism for international climate change cooperation

Researchers at Motu, Seoul National University, the Universidad de los Andes in Colombia, the Environmental Defense Fund, and the University of California, Santa Barbara are proposing a new mechanism to extend international climate cooperation. The “climate team” mechanism is designed to allow countries to work together to transfer resources for credible emission reductions.

Under the climate team mechanism, a host country with the potential to generate large-scale (e.g. sectoral- or national-level) abatement beyond its NDC would contract to transfer that abatement to a group of buyers (partners) in return for a guarantee of payment upon delivery.

The host and partners would negotiate a “crediting baseline” that ensured any transferred abatement went beyond the host’s NDC. The host’s actual performance against the crediting baseline would be measured using official national inventory data. If the host reduced emissions below this baseline, partners would guarantee to purchase the emissions reductions beyond the baseline within a pre-agreed price range up to the contracted ceiling for total partner funds.

The partners would need to select hosts with sufficiently ambitious and clearly defined NDCs. Countries would likely choose to work with others with whom they have existing relationships. The negotiated crediting baseline would prevent double counting of emission reductions against the host’s NDC. The large scale of the crediting baseline would reduce concerns about lack of additionality and guard against leakage, both of which have been problems with project-based activities. All countries would have an incentive to work together to set the host country on a trajectory to low emissions. Technical assistance and private capital flows would complement the agreement.

There is an opportunity for New Zealand companies to have a role in a climate team agreement (e.g. by providing some of the necessary upfront guarantee of funds and/or supporting technology transfer and investing private capital, and receiving a share of units when these are delivered in return).

More information is available at <http://climateteams.org>.

Source: Kerr et al. (2018a,b)

3 New Zealand’s history on linking and other international contributions

Unlike other ETSs, the NZ ETS was conceived to link to the global Kyoto market from the start and to rely heavily on linking. Most ETSs impose a hard constraint on the jurisdiction’s emissions through a cap on domestic allocation and limits on imported units. In New Zealand, policy makers commandeered the Kyoto emission cap and Kyoto flexibility mechanisms to set the domestic price and meet domestic unit demand. This was enabled through buy-and-sell linkages to the global Kyoto market from 2008 to mid-2015 without quantity constraints but with some quality constraints. The NZ ETS delinked from the Kyoto market in mid-2015, the result of the government’s decision not to join a second Kyoto commitment period, and it currently operates as a stand-alone system. While the government has always been interested in

linking the NZ ETS bilaterally and has actively explored linking opportunities (most notably with the EU and Australia), no such agreements have been reached to date.

This linking design exposed New Zealand's ETS sectors to the international price of emissions and allowed domestic emissions from those sectors to increase as long as they were offset elsewhere within the overarching Kyoto cap.¹³ In choosing this design, the government was entirely agnostic about whether New Zealand's mitigation investment occurred domestically or abroad. The underlying intention was for New Zealand to support global mitigation at least cost; domestic mitigation would occur only when that was economically efficient on a global basis. Given the small size of the New Zealand market, the government also hoped that linking would safeguard market liquidity and prevent market manipulation. This design satisfied the government's core policy objectives for the NZ ETS as defined in the Climate Change Response Act 2002: "assisting New Zealand to meet its international obligations under the Convention and the Protocol; and reducing New Zealand's net emissions of those gases to below business as usual levels". In 2009, the government added levels of insulation between NZ ETS participants and the international emission price in the form of a one-for-two unit obligation and NZ\$25 fixed-price option, but it retained its original commitment to reflect the international price in the domestic market and enable least-cost compliance.

This approach had important strategic implications. In particular:

1. It positioned New Zealand's carbon market as an international price taker rather than a domestic price maker, absolving the government of the political challenge of setting a domestic emission price and emission cap.
2. It exposed the domestic market to global price uncertainty and risks.
3. It devolved from the government to NZ ETS participants the primary responsibility for purchasing Kyoto units to help meet New Zealand's international obligations.
4. It made the environmental integrity of New Zealand's global mitigation contribution heavily dependent on the quality of the overseas units acquired by NZ ETS participants.
5. It limited New Zealand's bilateral ETS linking opportunities with existing systems that had mutually incompatible settings around unit supply.

These implications influenced each stage of legislative development of the NZ ETS, as discussed further below.

3.1 Policy history of linking in the NZ ETS

The key legislative provisions affecting linking in the NZ ETS are summarised in Table 1.

¹³ The Kyoto cap consisted of a fixed number of Assigned Amount Units (AAUs) allocated to Annex B (developed) countries, plus additional units from forestry removals (Removal Units, or RMUs), the CDM (Certified Emission Reductions, or CERs), and JI (Emission Reduction Units, or ERUs).

Table 1: Linking provisions under NZ ETS legislation

Climate Change Response (Emissions Trading) Amendment Act 2008	
1.	NZUs and approved Kyoto units could be used interchangeably to meet NZ ETS obligations, with no quantity constraints on imported units. Some quality constraints applied to imported Kyoto units. ¹⁴ The government could regulate to change the eligibility of overseas units.
2.	Each NZU issued by the government was required to be “backed” by a Kyoto unit held in a Crown account by the end of the true-up period.
3.	NZUs could be exchanged for NZ Assigned Amount Units (AAUs) at the border for export to overseas buyers. All sectors could export units.
4.	The Crown had broad powers to issue NZUs and sell units. ¹⁵
5.	There were no domestic price-control mechanisms (e.g. price ceiling/floor).
Climate Change Response (Moderated Emissions Trading) Amendment Act 2009	
1.	A price ceiling of NZ\$25/t CO ₂ e _q was introduced through a fixed-price option to apply through to 2012. Fixed-price units had to be surrendered immediately.
2.	While the price cap was in place, only forestry NZUs could be exported.
Climate Change Response (Emissions Trading and Other Matters) Amendment Act 2012	
1.	The price ceiling of NZ\$25, and the export ban on non-forestry NZUs, were extended indefinitely post-2012.
2.	The requirement to back NZUs with Kyoto units was removed with retrospective effect.
3.	The legislation was adapted to enable the NZ ETS to continue to operate in the event there was no second commitment period (CP2) under the Kyoto Protocol or New Zealand chose not to join it.
Climate Change Response (Unit Restriction) Amendment Act 2014	
1.	A restriction was added so that post-1989 forest owners could use only NZUs to clear their unit liabilities if they deregistered from the NZ ETS. This was to prevent re-registration arbitrage using overseas Kyoto units.

3.1.1 *Climate Change Response (Emissions Trading) Amendment Act 2008*

When developing the 2008 legislation, the proposed rules for imported units proved highly controversial throughout the associated public consultation and legislative deliberation. Those supporting broad acceptance of imported units on the grounds of least-cost compliance stood in opposition to those advocating for greater domestic mitigation and more stringent quality

¹⁴ From its commencement, the NZ ETS did not accept Kyoto units from nuclear CDM or JI projects, temporary and long-term CERs from CDM forestry projects, or imported AAUs. Neither participants nor the Crown could use imported AAUs from the first commitment period (CP1) of the Kyoto Protocol (had they become eligible in the NZ ETS) to help meet obligations post-2012.

¹⁵ A proposed mechanism explicitly enabling the government to sell NZUs by public tender was removed from the final legislation.

controls, particularly in regard to imported AAUs from countries with “hot air” targets¹⁶ and Certified Emission Reductions (CERs) from industrial gas destruction projects (particularly involving HFC-23¹⁷). The draft legislation would have permitted imported AAUs subject to change by future regulations, whereas the final legislation prohibited imported AAUs subject to change by future regulations. This was the outcome of end-stage cross-party negotiations to secure votes (Leining et al. 2017).

The government responded to other concerns over unit quality concerns with the assurance that the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat was overseeing the environmental integrity of the Kyoto mechanisms and that the government could impose future restrictions by regulation if necessary. A “firewall” provision blocking the carry-over of imported first commitment period (CP1) AAUs was retained to preserve a “clean slate” to enable future linking with systems that banned those units (e.g. the EU ETS) (Emissions Trading Group & Ministry of Economic Development 2008; Finance and Expenditure Committee 2008).

3.1.2 Climate Change Response (Moderated Emissions Trading) Amendment Act 2009

The change in government in November 2008 led to an immediate review of the NZ ETS by a special select committee, followed by significant legislative amendments. The special select committee affirmed the continuation of the NZ ETS with linking. It did suggest that restrictions on linkages might be needed to facilitate bilateral linking and ensure environmental integrity, especially in the short term. It also concluded that businesses, and not government, were best placed to determine whether New Zealand’s mitigation investment should be directed domestically or overseas (Emissions Trading Scheme Review Committee 2009).

The government’s 2009 amendments were intended to moderate the economic impact of the NZ ETS in a time of recession (Ministry for the Environment 2009; New Zealand Cabinet 2009; Smith 2009a). As a result of changes to the point of obligation and industrial free allocation, the Kyoto market continued to set the domestic emission price but non-forestry participants in the NZ ETS no longer faced the full emission price. During this period of policy development and legislative amendment, Australia was advancing its Carbon Pollution Reduction Scheme (CPRS) and officials in both countries were collaborating on the development of their respective ETSs. This process is discussed further below.

¹⁶ “Hot air” is the term popularly applied to surplus emission units (AAUs and ERUs) that resulted from weak targets and economic downturn in Russia, Ukraine, and eastern European countries rather than “additional” mitigation investment.

¹⁷ Projects involving the destruction of HFC-23, a by-product of manufacturing HCFC-22 (an ozone-depleting refrigerant), had integrity concerns because of perverse incentives to increase production of the gas in order to generate more units. HFC-23 has a very high global warming potential, enabling such projects to generate a large number of units, with significant profits to producers.

3.1.3 NZ ETS Review in 2011 and Climate Change Response (Emissions Trading and Other Matters) Amendment Act 2012

In December 2010, the government appointed an independent panel to conduct a statutory review of the NZ ETS. In its June 2011 report, the review panel encouraged the government to support the global carbon market and enable New Zealand to trade units internationally, but advised against allowing the NZ ETS design to be bound by other systems. It also urged the government to consider restricting imports of CERs from HFC-23 projects, given their potential to flood the domestic market after being banned from other systems (Emissions Trading Scheme Review Panel 2011). The government responded by regulating to ban CERs from industrial gas destruction projects involving HFC-23 and nitrous oxide (N₂O) as of December 2011 (Ministry for the Environment 2011; Smith 2011).

In November 2012, the government passed further amendments to the NZ ETS that extended the previous price moderation settings set to expire after 2012 (see Table 1). These changes preserved the principle of relying on the Kyoto market to set the domestic price while insulating NZ ETS participants from that price. The government hoped that auctioning would help to keep more unit revenue at home and safeguard unit supply given uncertainty about the future global carbon market. Importantly, the government did not intend for auctioning to change domestic prices relative to international prices. Once again, the government chose not to limit the number of imported Kyoto units surrendered by NZ ETS participants, although relatively more submissions supported a limit. The government did initially consider such a limit, but on the grounds that it would compel participants to use the domestic auction, not to raise domestic prices (New Zealand Cabinet 2012b; Smith 2012). During legislative deliberation, the Finance and Expenditure Committee considered the merits of mirroring Australia's 50% limit on imported units (Finance and Expenditure Committee 2009). The government decided that an import limit was not necessary to entice auction participation and could distort domestic prices, and therefore rejected this option (Groser 2012a; New Zealand Cabinet 2012a).

These changes also largely decoupled NZU issuance from the government's international climate change obligations.¹⁸ This was justified on the grounds that fulfilling the NZU "backing" requirement would impose a high fiscal cost without further gains in environmental integrity for CP1 units. Introducing auctioning under a cap was considered a sufficient safeguard for the future environmental integrity of NZUs (Smith 2012). However, while the backing requirement has been removed, no cap has (yet) been put in place.

This decision has had important repercussions. To the extent that the participant-held bank of NZUs is not matched by internationally recognised units held by the government, the NZ ETS bank becomes a liability to taxpayers with regard to meeting New Zealand's target (similar to free allocation) and limits the government's options for future auctioning. It also means that

¹⁸ The government is still required to have regard to New Zealand's international obligations when issuing NZUs.

voluntary cancellation of NZUs by market participants does not produce a consequential adjustment to New Zealand's international obligations, making it difficult for New Zealanders to contribute to domestic mitigation that is not offset by increased emissions elsewhere.¹⁹

In November 2011, the Australian government passed legislation for a Carbon Pricing Mechanism (CPM), which began operation in July 2012. In August 2012, while the NZ ETS amendment bill was still in select committee, the Australian government and European Commission announced an agreement to link their ETSs (discussed further below). The New Zealand government maintained its interest in linking bilaterally to other systems (Ministry for the Environment & Ministry for Primary Industries 2012). Shortly after the passage of amendment legislation, the New Zealand government regulated to ban imports of Emission Reduction Units (ERUs) associated with industrial gas destruction projects and CERs and ERUs associated with large hydropower projects (Groser 2012b). This aligned New Zealand's Kyoto unit quality restrictions with those of the EU and Australia.

3.1.4 Delinking from the global Kyoto market

In November 2012, the day after passage of NZ ETS amendment legislation, the New Zealand government announced that it would take its emission reduction commitment for the period 2013–20 under the UNFCCC rather than the Kyoto Protocol (Groser 2012c). A few weeks later, at the negotiation session in Doha, the Kyoto Parties confirmed that Annex B (industrialised) countries not taking quantified commitments under Kyoto CP2 would lose access to the Kyoto flexibility mechanisms after the end of the CP1 true-up period in 2015. In December 2013, the government confirmed delinking arrangements for the NZ ETS: participants could continue to use imported Kyoto units to meet their obligations through to 31 May 2015, but would not be allowed to carry over imported Kyoto units for future surrender or transfer (Bridges 2013). The Climate Change (Unit Register) Amendment Regulations supporting delinking were passed in December 2014. Since 18 November 2015, New Zealand's emission unit registry has stood alone.

3.2 History of exploring bilateral linkages

The New Zealand government started to explore options for ETS harmonisation and bilateral linking from the earliest stages of NZ ETS design. The most obvious candidates were ETSs in the EU and Australia.

Linking to the EU ETS was considered a longer-term option, given mutually incompatible settings around unit supply²⁰ and price control,²¹ as well as the EU's unwillingness to accept forestry (and agriculture) units. New Zealand officials did consider a buy-only link that would

¹⁹ For example, this means New Zealand producers cannot claim "carbon neutrality" by cancelling NZUs to offset residual emissions.

²⁰ The EU ETS imposed a quantitative limit on imported CERs and ERUs, and banned imported AAUs. It also adopted quality limits on imported CERs and ERUs in advance of New Zealand.

²¹ The EU ETS did not contain a price ceiling or price floor. In 2009, New Zealand added a price ceiling to its ETS.

have enabled the EU ETS to cap prices and safeguard liquidity in the New Zealand market, but this was not pursued further. This option did not appeal to EU officials at the time, and New Zealand officials had concerns about New Zealand's vulnerability to future EU policy making. The EU consistently advocated for international linking but on its terms, which were not founded on the principle of global least-cost compliance (Leining et al. 2017).

Consideration of linking ETSs in New Zealand and Australia pre-dated Australia's ratification of the Kyoto Protocol. Harmonisation with an Australian ETS was considered desirable to minimise transaction costs and facilitate compliance by firms operating in both markets, reduce potential competitiveness impacts from differential emission pricing, and reinforce political and economic ties. Linking to Australia had the potential to safeguard market liquidity for New Zealand and broaden the field for cost-effective emission reductions (Smith 2009b).

The respective ETSs evolved in both countries with mutual information sharing and political support. Australia's first fully fledged attempt at a national ETS was the CPRS. Australia released its Green Paper for the CPRS in July 2008, a month after the Finance and Expenditure Committee reported back to Parliament on the NZ ETS bill. Australia released its White Paper in December 2008, the week after the first NZ ETS review was launched and the NZ ETS was essentially put on hold. The CPRS was intended to support linking in principle, but its price-control features were not immediately compatible with New Zealand's approach (Australian Department of Climate Change 2008a,b).²²

In its 2009 NZ ETS amendments, the New Zealand government took steps toward harmonisation: adding a price cap (although at a lower level than Australia), aligning its free allocation regime for industrial producers with Australia's, and deferring the entry of biological emissions from agriculture using the same time frame as Australia. However, linking prospects faded when the CPRS was repeatedly rejected by the Australian Senate. The Australian government abandoned its proposal in April 2010. The political furore over emissions trading in Australia resulted in leadership changes in both the governing and opposition parties.

Australia's second attempt was the CPM. This was first signalled in February 2011, the detailed plan was released in July 2011, and legislation was passed in November 2011. This system started with a three-year fixed-price phase²³ and was designed to transition to a flexible-price ETS with an absolute cap, a price ceiling, a price floor, quantity and quality limits on unit imports, and restrictions on unit exports (Australian Department of Climate Change and Energy Efficiency 2011).²⁴ The CPM operated from July 2012 to July 2014, when it was abolished following the change of government in the September 2013 election.

²² At the Green Paper stage, the CPRS limited unit imports, but this limit was removed at the White Paper stage. However, the CPRS included a price ceiling of A\$40/t CO₂eq and it prohibited exports of Australian units.

²³ Fixed prices were set at A\$23/t CO₂eq in 2012–13, A\$24.15/t CO₂eq in 2013–14, and A\$25.40/t CO₂eq in 2014–15.

²⁴ The price ceiling was to be set at A\$20 above the expected international price and rise by 5% (real) per year. The price floor was to be A\$15, rising by 4% (real) per year. Unit imports were limited to 50% of participants' surrender

The CPM was intended to support bilateral linking, and during its development the Australian government engaged in serious linking discussions in parallel with the New Zealand government and the European Commission. In August 2012, the Australian government and European Commission announced that they had agreed to negotiate a formal linking agreement to take effect from 2018 and would start with a one-way link, enabling Australian CPM participants to purchase and surrender European Union Allowances from 2015. The price-control settings of the CPM were changed to make this possible: the price ceiling was to align with the EU ETS price, the price floor was removed, and a 12.5% restriction was placed on surrendering imported Kyoto units. Later negotiations were intended to resolve remaining issues, including the treatment of land-based domestic offsets generated in Australia (European Commission & Combet 2012).

Australian Minister for Climate Change and Energy Efficiency Greg Combet announced publicly that Australia was still exploring linking options with other systems, including those in New Zealand, California, and the Republic of Korea (Reuters 2012). However, New Zealand's unit import and price-control rules – as well as the major role of forestry units – were clear barriers to linking for the EU. Once Australia decided to follow the EU into Kyoto CP2 and New Zealand placed itself under the UNFCCC instead, the near-term prospects for adding New Zealand to the joint EU/Australian market diminished even further. The EU/Australian linking agreement ended before it began when the CPM was abolished.

The New Zealand government has remained a strong supporter of carbon market mechanisms in the international negotiations and has explored ETS information sharing, harmonisation, and linking opportunities with other systems through both bilateral initiatives (e.g. Republic of Korea, Thailand, China, and the United States) and regional initiatives (e.g. the Asia-Pacific Carbon Markets Roundtable²⁵). New Zealand was a founding member of the International Carbon Action Partnership in 2007²⁶ and has participated as an observer to the World Bank Partnership for Market Readiness (founded in 2010).²⁷ At the 2015 Paris Climate Change Conference, the New Zealand government led the creation of a Ministerial Declaration on Carbon Markets²⁸ to support their further development with environmental integrity.

obligations. Exports of Australian units would not be allowed while the price cap was in place, except in the case of a bilateral linking agreement.

²⁵ New Zealand founded this initiative, which enables cooperation among governments within the region on carbon market issues.

²⁶ See <https://icapcarbonaction.com>.

²⁷ See <https://www.thepmr.org>.

²⁸ The declaration was also supported by the governments of Australia, Canada, Chile, Colombia, Germany, Iceland, Indonesia, Italy, Japan, Mexico, the Netherlands, Panama, Papua New Guinea, South Korea, Senegal, Ukraine, and the United States.

3.3 Market impacts of linking

Emission prices and market behaviour in the NZ ETS were profoundly affected by the scheme's unconstrained linkage to the global Kyoto market from 2008 to mid-2015 and the decision to delink. The first unit surrender date in the NZ ETS was 31 May 2011, but compliance trading started well in advance of this despite uncertainty over the system's future during the 2009 review and amendments. Kerr and Ormsby (2016) identify three distinct price periods, explained in Table 2.

Table 2: NZ ETS price periods

NZ ETS price period	Characteristics
Inception through to June 2011	NZU prices ranged below international unit prices
June 2011 through to December 2012	NZU prices tracked international unit prices as they declined precipitously
December 2012 through to present	NZUs traded above international unit prices once delinking became apparent and continued to rise after delinking in mid-2015

As discussed in Kerr and Ormsby (2016), the trends in unit surrenders in the NZ ETS reveal how NZ ETS participants responded strategically to the market's price signals. From 2013, participants surrendered low-cost imported Kyoto units – predominantly “hot air” ERUs – to the exclusion of NZUs issued for free allocation or removals, which had higher value as they could be banked for future use. Taking advantage of this arbitrage opportunity, NZ ETS participants built up a considerable bank of NZUs.²⁹ This NZU bank now represents a fiscal liability to the government and limits its future opportunity to auction NZUs and generate revenue.

Ultimately, it turned out that New Zealand could have met its Kyoto CP1 target entirely through domestic effort, with a surplus of 10.6 million NZ AAUs. This contrasted with the projections during the NZ ETS design phase that New Zealand faced a deficit (see

²⁹ This totalled 140 million units as of July 2015 (Ministry for the Environment 2015b).

Figure 1). To meet its CP1 obligations, the government opted to surrender imported Kyoto units in place of NZ AAUs and to carry over 123.7 million NZ AAUs post-2012 for use under its non-Kyoto target (United Nations Framework Convention on Climate Change Secretariat 2016). As of April 2019, the government expects to use 26.9 million carried-over NZ AAUs to help meet its 2013–20 target, leaving it with a surplus of 96.8 million NZ AAUs (Ministry for the Environment 2019). In December 2018, the government announced it would not carry those surplus units into the Paris period (2021–30) (Carbon News 2019).

Figure 1: New Zealand's projected net position for Kyoto CP1



Source: Ministry for the Environment 2015a;
United Nations Framework Convention on Climate Change Secretariat 2016

3.4 New Zealand's other international contributions

New Zealand has contributed to international climate change mitigation in ways extending beyond its purchase of Kyoto units through the NZ ETS. It has played a significant diplomatic role during the climate change negotiations, offering innovative proposals and helping to secure Party agreement in contentious areas such as forestry, agriculture, carbon market mechanisms, and monitoring and reporting. It has participated in external processes to facilitate the negotiations.³⁰ It has contributed policy leadership by sharing its experience with domestic policy development (e.g. on emissions trading, forestry, agriculture, and renewable energy) and supporting capacity building on mitigation in developing countries. Other notable mitigation contributions by New Zealand to date include:

2. Initiating the Global Research Alliance on Agricultural Greenhouse Gases in 2009; as of April 2019, this includes 56 countries engaged in improving the GHG efficiency of agricultural production.³¹
3. Initiating Friends of Fossil Fuel Subsidy Reform in 2010; this brings together eight non-G20 countries to advocate for the removal of inefficient fossil fuel subsidies by G20 and Asia-Pacific Economic Cooperation countries³²

³⁰ See <https://www.mfat.govt.nz/en/environment/climate-change/negotiation-and-agreements/>.

³¹ See <http://globalresearchalliance.org/about/>.

³² See <https://www.mfat.govt.nz/en/environment/clean-energy-and-fossil-fuels/>.

4. Participating in the Climate and Clean Air Coalition to reduce short-lived climate pollutants.³³
5. Supporting work on climate change as a member of the Pacific Islands Forum.³⁴
6. Joining the Carbon Neutrality Coalition launched in 2017; this includes 19 countries and 32 cities working on strategies for reducing emissions in line with the Paris Agreement.³⁵

New Zealand provides targeted climate finance to developing countries through bilateral and regional channels (delivered primarily through the New Zealand Aid Programme), and contributes core funding to multilateral institutions that also support climate change mitigation activity. Its contributions over the period 2015–16 are detailed by the Ministry for the Environment (2017).

New Zealand offers some important comparative advantages in supporting mitigation in developing countries. It is perceived as a constructive and trustworthy collaborator that can operate independently of major regional powers. It can gain experience with domestic innovation relatively quickly and share that experience with sectors that are priorities for mitigation in many developing countries. It already has strong diplomatic relationships and climate change collaboration agreements in place with many developing countries, particularly in the Pacific. The more flexible, bottom-up structure of climate change contributions under the Paris Agreement opens up new opportunities for New Zealand to think creatively about how it can broaden its global impact on climate change mitigation for both domestic and global gain.

4 Linking IERs to the NZ ETS

There are three key reasons to limit the number of IERs available (and anticipated to be available) in the NZ ETS: to support efficient domestic decarbonisation by providing a predictable price signal for investment, to protect our economy from externally driven emission price shocks, and to protect against extreme implications from unforeseen problems with the environmental integrity of IERs. A limit could be applied to both how many IERs can be purchased and who is eligible to purchase them.

4.1 How many IERs should New Zealand buy?

In a textbook case, unlimited two-way ETS linking seems the optimal approach to achieve least-cost mitigation across countries. This is simplistic for (at least) two reasons. First, decisions around the supply of units in each country are heavily political and not driven only (or maybe even primarily) by the desire for an efficient global mitigation path. In a linked system, one

³³ See <http://www.ccacoalition.org/en>.

³⁴ See <http://www.forumsec.org>.

³⁵ See <https://www.carbon-neutrality.global>.

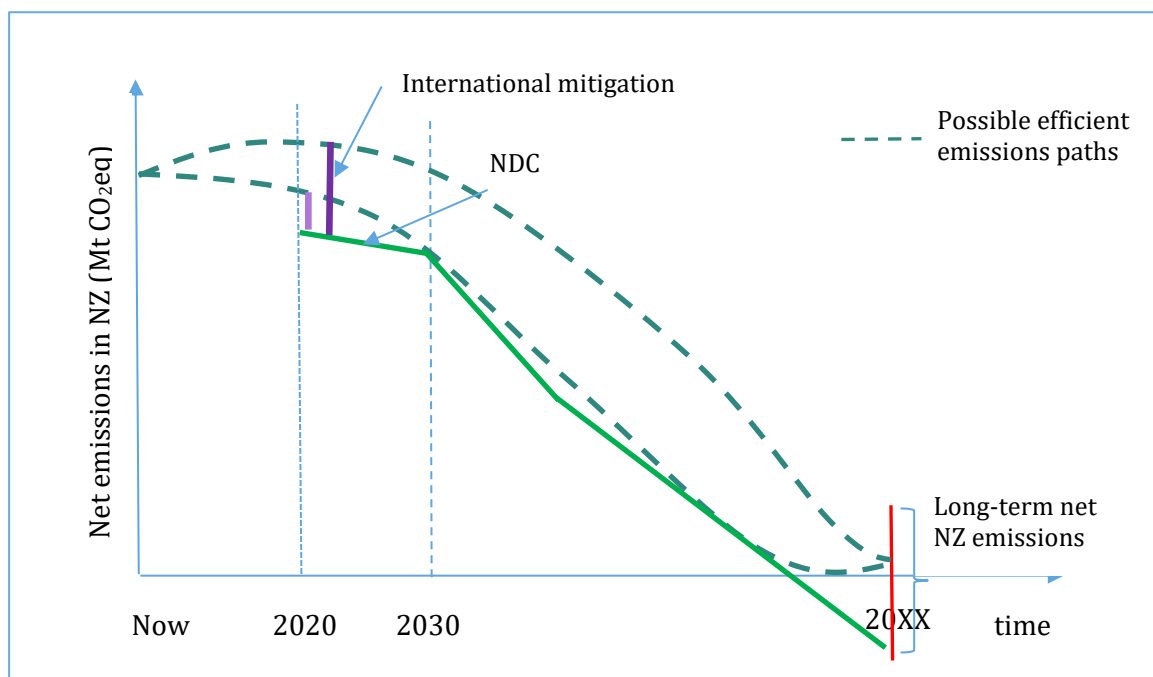
country's politics will affect the emissions price in the other. Second, in the same way that monetary union is not always attractive and currencies move relatively over time, short- and medium-term emission price divergences can be appropriate for local conditions.

If we did not limit IERs in the NZ ETS and could access a source that is large enough to more than meet our needs, New Zealand would have no control over its emissions price. No country or jurisdiction yet has a climate policy that is so stable and suited to New Zealand's local conditions that New Zealand seems likely to benefit from completely ceding emissions price control to that country's system. Any political or economic shocks to the larger system would automatically affect incentives for mitigation, and returns on mitigation investments, in New Zealand. With an entirely externally driven emissions price, we would also be unable to respond to changes in local economic conditions.

If unlimited purchases were achieved through a full two-way ETS linkage, significant harmonisation of rules would also likely be required. At a minimum, effective linking requires compatible rules around unit integrity, supply, and price control; further alignment of features may be needed for political reasons. As discussed above, given the unique characteristics of the NZ ETS and our unusual emissions profile, this could be a serious constraint. In any case, no ETS design is perfect; all are still evolving.

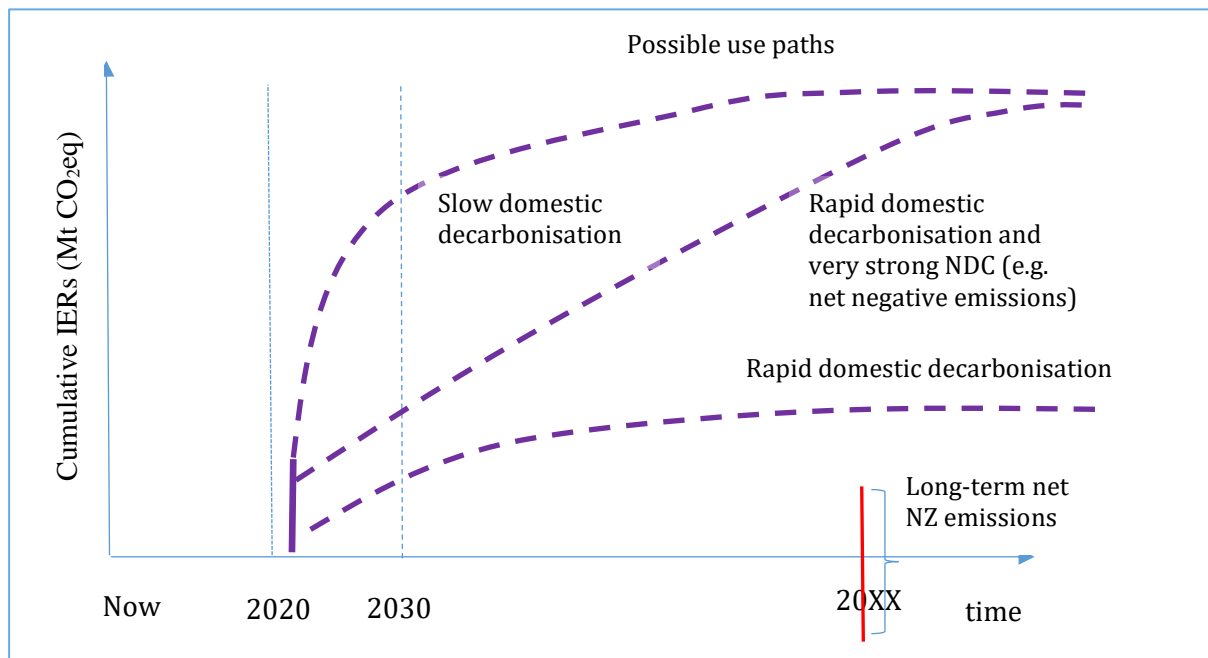
A limit on IERs should reflect how fast New Zealand wants to decarbonise and what targets we will commit to in future. Figure 2 shows a couple of possible paths for socially efficient decarbonisation relative to our targets for international contributions (NDCs), and the implications for the use of international mitigation over time.

Figure 2: New Zealand's possible decarbonisation pathways and international mitigation



We do not need to pay for this international mitigation in the year in which we use it. We could aim to purchase the cumulative amount we are sure we will need and then adjust its use over time – if this is supported by international rules for carry-over of surplus emission reductions between commitment periods. Figure 3 shows the cumulative number of units we might wish to purchase between now and when global net emissions reach zero. It is critically dependent on both our rate of domestic decarbonisation and the contribution targets we agree to in future. For example, under a very ambitious NDC, New Zealand could contribute net negative global emissions.

Figure 3: Cumulative use of IERs under different rates of domestic decarbonisation and NDCs



4.2 Who should purchase IERs for government use?

There are three basic options for purchasing IERs: purchasing conducted by government, purchasing conducted by private agents commissioned by government, and devolution of purchasing to NZ ETS participants.³⁶ Under some mechanisms for generating international units (e.g. a CDM-type project mechanism or if New Zealand can purchase units from another country's ETS), private agents may have some advantage in purchasing units. To meet its ETS and international obligations, the government could in this case purchase IERs from private agents through a tender process. In other cases (e.g. a jurisdictional-scale mechanism), only the government might have the ability to contract for and purchase IERs. If the government were to follow its Kyoto CP1 model of largely devolving purchasing to NZ ETS participants, then rules would be needed to safeguard quality and align the supply and prices of IERs with management of the NZ ETS cap (discussed next).

³⁶ Under all options, IERs could continue to be traded into and out of the New Zealand Emissions Trading Register by private actors for non-government use.

4.3 How would IERs enter the NZ ETS?

Not all of the IERs purchased for New Zealand's use should necessarily be made available to the NZ ETS. ETS cap setting could – and perhaps should – be a separate process, where the cost and availability of IERs is one consideration in determining unit supply in the domestic market (Leining & Kerr 2019). Other purchased IERs could be used to help meet emission reduction objectives for non-ETS sectors or banked by the government for future use. It would serve New Zealand to advocate for sound international carry-over rules for surplus emission reductions with environmental integrity. That would allow a more effective approach to funding international mitigation.³⁷

We start with the assumption that the government sets an absolute cap on free allocation and auctioning, and includes a reserve within that cap for managing domestic unit supply and emission prices. In each period, the government defines the total number of IERs to incorporate in the NZ ETS. This choice will depend on the price and volume of IERs it now holds, the stringency of its international target, and its overarching strategy for domestic decarbonisation. Under this model, there are two basic approaches to incorporating IERs.

In the first, in addition to sourcing NZUs via free allocation and auctioning, NZ ETS participants would be allowed to purchase and surrender IERs up to a specified limit, defined either per participant (e.g. percentage of surrendered units) or for the system as a whole (e.g. percentage of the cap). The purchasers would gain any benefit from the difference between international and NZU prices. This could lead to somewhat arbitrary windfall gains to participants based on the rules around how many IERs each participant can surrender. These types of gains have been seriously criticised in New Zealand (Simmons & Young 2016). This is the model used in the EU and California, but it is not obvious why it is an appropriate way to distribute gains from trade.

Enabling NZ ETS participants to capture gains from purchasing IERs is essentially like handing out cash or free allocation to them at taxpayer expense. Those benefiting from such gains are not necessarily those who bear emission costs or face leakage concerns.³⁸ Furthermore, ETS participants may vary in their ability to capture such gains because of the different scale or sophistication of the purchasing arrangements they are able to achieve.

³⁷ It would also facilitate effective operation of the NZ ETS, including the ability to bank units within the ETS without the risk of creating another fiscal liability. It would need sufficient safeguards in order to avoid inflated or inadequate targets in one period diluting target ambition in later periods.

³⁸ For example, fossil fuel suppliers buying large volumes of units simply pass compliance costs downstream.

Table 3: Implications of different scenarios around IERs

Implications	Scenarios			
	1. No IERs used in NZ	2. IERs used to meet NZ target		
		(i) Only government purchases IERs – ETS cap is fixed within each period	(ii) ETS participants can purchase and surrender limited percentage of IERs	(iii) ETS participants can purchase and surrender unlimited IERs ³⁹
ETS cap⁴⁰	Cap set by ETS/non-ETS burden-sharing decision within NZ's target	Government adjusts cap upward periodically in response to its purchases on behalf of NZ and auctions more NZUs ⁴¹	The effective cap can be the same as in scenario 2(i)	Cap equal to the level of NZ's target minus non-ETS emissions. If permitted internationally, government may bank some units for risk management post-2030
Domestic emission price	Set domestically	Set domestically but lower than in scenario 1	Price could be higher than in scenario 2(i) if participants are unable to find units to purchase	Price is international price ⁴²
Price protection	Can manage price in various ways – ceiling, auction reserve price (price floor), allowance reserve (e.g. Market Stability Reserve) – and send clear signals of policy stability			Can use price ceiling if fixed-price units cannot be exported
Private gains from international trade	None	Economy benefits from lower ETS price. Taxpayers gain difference between domestic price and international price	Economy benefits from lower ETS price. Participants who surrender IERs gain difference between domestic price and international price	Economy benefits from even lower ETS price than in scenarios 2(i) and 2(ii)
Auction revenue to government	Units auctioned consistent with ETS cap, free allocation, and price-control mechanisms	Government has more units to sell than in scenario 1 but at a lower price	Government sells same number of units as in scenario 1 but at a lower price	Government sells same number of units as in scenario 1 but at the international price
Price volatility	Driven by domestic demand and supply, and by expectations about NZ government policy			Driven by international demand and supply and expectations about other countries' policies
Domestic mitigation in short term	Enough to meet target	Less mitigation than in scenario 1		Less mitigation still

³⁹ A fourth scenario would allow unlimited purchase of NZUs by government. These would be used only to adjust future caps, and not released into the market as they are purchased.

⁴⁰ In this case, the "cap" refers to a maximum limit on the number of NZUs issued by the government for free allocation or auctioning. It does not refer to the overall emission constraint on the system, which is a factor of the cap plus rules on banking, borrowing, offsets, linking, removal units, and price-control mechanisms operating outside the cap.

⁴¹ Assume government purchases under scenario 2(i) are less than private purchases under scenario 2(iii) – the limit on purchasing units for use in the ETS is binding.

⁴² Unless the international price is higher than under scenario 1, in which case no trade occurs.

In the second approach, the government would purchase the IERs (directly or through private agents) and adjust the NZ ETS cap for future periods. The emission price would be identical but the government (taxpayers) would receive the full value (or cost) of any price difference between IERs and NZUs. The adjustments in the cap resulting from successful purchase of IERs could be made after the time of purchase, with signals in advance about how large the resulting adjustment in the future cap is likely to be. As long as there is an adequate bank of units, the timing of cap adjustment should not affect price.

Table 3 provides sample scenarios for limiting the purchase and surrender of IERs under the NZ ETS, and their implications for operation of the NZ ETS.

5 Strategic considerations for purchasing IERs

We elaborate below on four sets of issues common to purchasing IERs under diverse mechanisms: ensuring environmental integrity and impact, deciding on cost and volume, managing timing and risk/uncertainty, and adapting the purchasing strategy over time.

5.1 Ensuring environmental integrity and impact

Quality-based restrictions should be placed on any IERs accepted for use as part of New Zealand's global contribution. The global mitigation value of IERs should be comparable to that of New Zealand reductions. If IERs are used to expand the NZ ETS cap, these quality restrictions are critical for domestic credibility of the NZ ETS and hence its effectiveness and political stability. It is also critical for the international credibility of New Zealand's effort, New Zealand's reputation, and our ability to encourage others to act.

5.1.1 Adherence to international and domestic rules

IERs funded by New Zealand should be recognised as eligible for use by the New Zealand government in helping to meet part of its target under the Paris Agreement. In this regard:

- Appropriate measures should be in place to avoid double counting of emission reductions traded as offset units and counted toward the selling country's NDC.
- Countries supplying IERs should be in compliance with their national emissions inventory and reporting obligations under the UNFCCC and the Paris Agreement.
- Mechanisms to generate IERs should comply with the associated rules that are being established as the Paris Agreement is implemented.

Unit quality restrictions in the Climate Change Response Act 2002 (and associated regulations) on temporary Kyoto units from forestry projects and Kyoto units from industrial gas destruction, large hydropower, and nuclear projects should apply to new sources of IERs from projects. However, these restrictions may not be appropriate for units sourced through

sectoral crediting mechanisms or ETSSs. It is probably fairly obvious now that units created under the Kyoto Protocol (AAUs, ERUs, and CERs) should not be accepted. Projects previously developed under the CDM could be recertified under new, more rigorous programmes that meet the rules being developed under the Paris Agreement.

In addition, New Zealand does not want to waste its resources on IERs that may meet a legal requirement according to a narrow interpretation but do not promote New Zealand's long-term interests in climate stabilisation. New Zealand should meet UN criteria at a minimum, but may want to be more strategic in the use of funds. We have previously met UN rules under Kyoto but purchased units with little local or international credibility (Simmons & Young 2016). Also, given that UN rules are likely to be slow to emerge, we can potentially influence them if we can define effective mechanisms.

5.1.2 Additionality

"Additionality" is the requirement that emission reductions recognised for credit by New Zealand would not have materialised without New Zealand's funding. This is challenging because it requires divining what would have happened in a counterfactual scenario. It is exacerbated in an offsets programme where participation is voluntary, so those who already intended to reduce participate disproportionately, and when the emission price is low, so the incentive for real action is limited.

It can be easier to determine the additionality of jurisdictional-scale mechanisms (e.g. linking or results-based mechanisms, including sectoral agreements) than project-based mechanisms, but this determination must be made with care. The challenge with additionality is identifying the level of emissions under the counterfactual scenario. It is hard to identify the signal of real reductions relative to the natural noise in projections. This is easier to do on a larger scale because firm-specific idiosyncrasies will tend to average out. A larger-scale mechanism with a stringent baseline and a high emission price will tend to lead to larger percentage reductions and is more likely to produce a visible and credible signal of real reductions.

The Paris Agreement has implications for the assessment of IER additionality. Under the CDM, project benefits were measured relative to a counterfactual baseline representing business as usual. Under the Paris Agreement, IERs will need to be additional to the seller's NDC in order to have integrity. This poses its own challenges given that many developing country NDCs have variable structures and apply diverse methodologies for underlying emission projections.

5.1.3 Leakage

Actions to reduce emissions in one place or sector can create leakage of emissions elsewhere, negating the benefits of those actions. The risk of leakage is very specific to the activity and its context. Increasing the scope and scale of accounting to the level of a jurisdiction or sector

reduces the potential for leakage because more of the indirect effects of mitigation are captured within the jurisdiction or sector.

5.1.4 Permanence

Impermanence is a form of leakage over time. A reduction in one period should not be negated by an increase in emissions in a future period for which no party takes responsibility. This is most visible in the case of sequestration where removals can later be released. If the country where these occur has a binding target and both sequestration and removals are well monitored over time, then there is no concern. In some developing countries that could be targets for New Zealand funding efforts, we may not be able to assume the country will take full responsibility for any future reversals of credited sequestration.

5.1.5 Contribution to systemic change and increased ambition

New Zealand's efforts could be more effective if we also consider how purchasing IERs could support systemic change and encourage more ambitious mitigation goals in developing countries. Effective decarbonisation involves actions that go beyond reductions within individual firms and over specific timescales. The types of mitigation actions chosen will be different, and more efficient, if the seller is focused on long-term decarbonisation rather than low-cost, short-term mitigation. We want to encourage sellers to invest in political, social, and technological shifts that make long-term mitigation easier and less reversible. A partnership model that brings cash but also capital, technology, and expertise to support a programme aimed at decarbonisation can both lower the cost to the developing country to meet existing commitments and encourage reciprocity in future commitments.

5.2 Deciding on the cost and volume of IERs

New Zealand hopes to buy IERs at low cost, and we can predict to a certain extent how many units we are seeking and when we need them. The sources we approach must, in aggregate, be able to meet those needs. Larger potential sources that can mitigate quickly will initially be more attractive. In this regard, New Zealand faces three costs: the up-front costs of setting up the purchasing programme, transaction costs associated with each purchase of units, and the direct cost of units (i.e. payment for each unit of mitigation).

Different mechanisms have different cost structures. The more efficient the mechanism, the lower the actual cost of mitigation. For example, buying offsets from an existing mechanism has no up-front costs but the transaction costs associated with creating each unit are high. Even if New Zealand purchases offset units through a broker, these costs are embedded in the price we pay. Given that full ETS linking and results-based contracts are much more flexible than offsets, the true cost should be lower. However, full linking may be an option only with more advanced economies where the mitigation cost is high. Offsets may appear cheaper if there is an

excess supply of existing units relative to demand or if some are non-additional. A mechanism that aims for deep reductions in a narrow region or sector is more likely to produce highly credible additional units. In both linking and results-based contracts, the true cost per unit of actual global mitigation will depend on the mutually agreed caps and baselines if the economic gains from trade are partly used to increase the ambition of both parties.

The actual cost to New Zealand of international mitigation will depend also on where and how it is done. If we invest strategically, we might get co-benefits. These could be in the form of reduced leakage (if we invest in such a way that our trade competitors also face emission prices), stronger trade relationships, and benefits for New Zealand companies with mitigation expertise they can commercialise (e.g. in forestry, agriculture, or geothermal energy).

5.3 Managing timing and risk/uncertainty

The international mitigation options that might be accessible quickly may not offer the highest-quality, most strategic, or lowest-cost IERs. Given New Zealand's need to purchase IERs to comply with our 2030 NDC, we might still want to consider purchasing some of the readily available IERs while we develop a more strategic approach. In the face of high levels of uncertainty around crediting mechanisms, and the high level of uncertainty around the supply of units from results-based contracts, a portfolio approach might be most effective in creating a range of options and diversifying our risks (see Table 4).

Conversely, additionality and hence credibility are likely to be greater if we build a more substantive agreement with one country to achieve deep reductions, rather than spreading our resources widely across many small actions. Investing in sectors and countries where we may receive commercial co-benefits reduces the risk of investing with only slow returns in terms of flow of emission units.

Table 4: Characteristics of different options for international mitigation

Characteristic	Offsets	Full ETS linking	Results-based contract
Efficiency	Low	High	High
Up-front costs	Medium	High	High
Transaction costs per unit	High	Low	Low
Additionality	Low	High	High – if baseline/autonomous contribution are strong
Systemic change	Low	Low (unless with a developing country)	High
Who pays	Buyer	Depends on relative caps	Depends on stringency of baseline, and on price
Supply risk	Low – in international programme	Low	High in short term

5.4 Evolution and adaptive management of purchasing mechanisms

New Zealand's strategy for purchasing IERs can be expected to evolve over time. Quality-based restrictions on IERs used within New Zealand (within the NZ ETS or by government) should be reviewed regularly to ensure environmental integrity. Further restrictions on eligible unit sources should not be applied retrospectively to units already held in the registry. As our targets progress and we learn more about the true costs of decarbonisation, we will adjust our expectations for how many IERs we want to purchase. Over time, if results-based contracts are successful or we create strong links with a credible ETS, we can stop purchasing offsets (possibly instead investing in strategic mitigation in low-income countries through our aid programme) and concentrate on one or a small number of mechanisms.

6 A working model for purchasing IERs in New Zealand

Under any regime for purchasing IERs, the New Zealand government needs to ensure that (a) those reductions have environmental integrity, (b) they are additional to (i.e. not double counted under) the seller country's NDC, and (c) they are being traded with government approval by the seller country as well as New Zealand.

From that starting point, we propose the following working model for purchasing IERs:

1. The quantity of IERs counted toward New Zealand's targets and applied to adjust unit supply in the NZ ETS should be controlled by the government in alignment with New Zealand's preferred pathway for domestic decarbonisation and emission prices, as reflected in the targets and emission budgets established under the Zero Carbon Bill.
2. For the foreseeable future, all of New Zealand's purchasing of IERs must be managed by the government. This is the only option currently available under the Paris Agreement. In addition to managing its own purchasing, the government could potentially choose to:
 - a. enable private entities to purchase IERs on the government's behalf using tender or reverse auction mechanisms; and
 - b. include private entities as partners in government-to-government agreements, enabling them to receive IERs in return for providing some of the necessary up-front guarantee of funds, investing private capital, and/or supporting technology transfer.
3. The government would take its actual and intended purchases of IERs into account when setting the parameters for the ETS cap on unit supply and price management mechanisms (e.g. cost-containment reserve, auction reserve price and fixed-price option). By purchasing additional IERs, the government would have the capacity to auction more NZUs into the market and still achieve its Paris targets.
4. The government should take a portfolio approach to purchasing IERs from diverse sources to ensure adequate supply as needed and manage risks of price and availability. It could potentially access IERs through a range of mechanisms over time, including:
 - a. bilateral or plurilateral results-based contracts, such as "climate team" agreements (see the box above);
 - b. buy-only linkages with ETSs in developing countries;
 - c. mechanisms for purchasing REDD+⁴³ units;
 - d. the new UN market mechanism (once operational); and
 - e. other Paris-compatible offset mechanisms (particularly involving least developed countries).
5. If it did become possible in the future for NZ ETS participants to purchase IERs directly from the international market, then a quantity limit should apply as a percentage of the surrender obligation for each participant. Furthermore, international purchasing by participants should offset other supply in the market. This could be done by adjusting the planned auction volume *ex post* to account for the actual volume of IERs surrendered.
6. Even if it became possible in the future for NZ ETS participants to purchase IERs directly, there would be a strong case for retaining the government-led model so that taxpayers

⁴³ These are units associated with reduced emissions from deforestation and forest degradation, as well as conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries. This is addressed under Article 5 of the Paris Agreement.

would receive the benefit of lower-cost IERs, instead of distributing those gains only to points of obligation in the ETS and those who purchase IERs on their behalf.

7. Decisions on the quantity of IERs applied by New Zealand toward its targets and unit supply in the NZ ETS should be coordinated with other government decisions on the size of the NZ ETS cap, settings for price management mechanisms, and provision of free allocation. As with other decisions affecting unit supply and price in the NZ ETS, decisions on IERs are political and belong with government. However, they could be informed by independent advice from the Climate Change Commission.
8. For managing long-term IER supply contracts and avoiding potential fiscal risks from unit banking under the NZ ETS, the New Zealand government should advocate for sound international rules to enable the carry-over of surplus high-quality emission reductions between commitment periods.

7 Conclusion

Under the Paris Agreement, New Zealand can choose to purchase IERs to help with meeting its emission reduction targets. If done well, such purchasing could enable New Zealand to manage the timing of its own decarbonisation more strategically, help to accelerate the low-emission transition of developing countries, and boost its overall contribution to global mitigation.

However, effective measures will be required to ensure the environmental integrity of IERs and preserve sovereignty over our domestic decarbonisation process. Quality criteria should ensure IERs provide the same climate benefit as domestic emission reductions, are not double counted by other countries toward their NDCs, and are approved by both seller and buyer governments. The quantity of IERs that count toward New Zealand's targets and the NZ ETS cap should be limited to align with New Zealand's preferred pathway for domestic emissions and emission prices. The timing of international purchasing can remain independent of the number of IERs incorporated into the NZ ETS – as long as there is no shortage. Decisions on the parameters for international purchasing should rest with government and be informed by independent advice from the Climate Change Commission.

The government will need to manage purchasing of IERs for the foreseeable future given current rulemaking under the Paris Agreement. However, it could involve private entities in this process. If it becomes possible in the future for NZ ETS participants to purchase IERs directly for surrender, the quantity should be limited and displace other unit supply under the cap. At that time, the government could still choose not to devolve such purchasing to NZ ETS participants so that gains from trade continue to accrue to taxpayers.

The emerging Paris framework for international carbon markets offers flexibility and creates new opportunities for New Zealand to shape our own long-term strategy for purchasing IERs and collaborate with others. We need to advocate for sound international rules for carbon

markets that support the environmental integrity of IERs and the carry-over of surplus high-quality emission reductions between commitment periods. We would benefit from planning ahead and investing strategically in high-value international mitigation rather than simply purchasing the most readily available or lowest-cost units. We should pool our expertise and investment with that of other countries looking to buy credible IERs. We should focus our investment on countries where our support could help solve mitigation barriers, where we have experience and existing relationships, and where we could develop new market opportunities. We should evaluate our efforts regularly and adapt our strategic approach over time. Above all, we should share our experience with others so that they can learn from us and replicate our successes on a larger scale.

References

- Australian Department of Climate Change. 2008a. "Carbon Pollution Reduction Scheme: Australia's Low Pollution Future: White Paper", Commonwealth of Australia, Canberra. Available online at <http://pandora.nla.gov.au/pan/99543/20090515-1610/www.climatechange.gov.au/whitepaper/report/index.html>. Last accessed 23 April 2019.
- . 2008b. "Carbon Pollution Reduction Scheme: Green Paper", Commonwealth of Australia, Canberra. Available online at <http://pandora.nla.gov.au/pan/86984/20080718-1535/www.greenhouse.gov.au/greenpaper/report/pubs/greenpaper.pdf>. Last accessed 23 April 2019.
- Australian Department of Climate Change and Energy Efficiency. 2011. "Securing a Clean Energy Future: The Australian Government's Climate Change Plan", Commonwealth of Australia, Canberra. Available online at <http://large.stanford.edu/courses/2012/ph240/aslani2/docs/CleanEnergyPlan-20120628-3.pdf>. Last accessed 23 April 2019.
- Brazilian Development Bank. 2018. "Amazon Fund: Activity Report 2017", BNDES, Rio de Janeiro. Available online at http://www.amazonfund.gov.br/export/sites/default/en/.galleries/documentos/rafa/RAFA_2017_en.pdf. Last accessed 23 April 2019.
- Bridges, Simon. 2013. "Decisions on Kyoto Protocol Emission Units," 7 December, New Zealand Government, Wellington. Available online at www.beehive.govt.nz/release/decisions-kyoto-protocol-emission-units. Last accessed 23 April 2019.
- Carbon Brief. 2018. "COP24: Key Outcomes Agreed at the UN Climate Talks in Katowice", in *Carbon Brief* [website], <https://www.carbonbrief.org/cop24-key-outcomes-agreed-at-the-un-climate-talks-in-katowice>. Last accessed 23 April 2019.
- Carbon News. 2019. "Government Rules out Carried-over Kyoto Credits", *Carbon News*, 11 December. Available online at <http://www.carbonnews.co.nz/story.asp?storyid=15669>. Last accessed 23 April 2019.
- Emissions Trading Group, and Ministry of Economic Development. 2008. "Departmental Report on the Climate Change (Emissions Trading and Renewable Preference) Bill", Departmental Report. Wellington: Ministry for the Environment.
- Emissions Trading Scheme Review Committee. 2009. "Review of the Emissions Trading Scheme and Related Matters", New Zealand House of Representatives, Wellington. Available online at http://www.parliament.nz/resource/en-nz/49DBSCH_SCR4485_1/b60976d3afc789d48b9ecd7f4910d5c53fad3ce8. Last accessed 23 April 2019.
- Emissions Trading Scheme Review Panel. 2011. "Doing New Zealand's Fair Share. Emissions Trading Scheme Review 2011, Final Report," Ministry for the Environment, Wellington.
- European Commission, and Greg Combet. 2012. "Australia and European Commission Agree on Pathway towards Fully Linking Emissions Trading Systems", European Commission and Commonwealth of Australia joint media release, 28 August. Available online at http://europa.eu/rapid/press-release_IP-12-916_en.htm?locale=en. Last accessed 23 April 2019.
- Finance and Expenditure Committee. 2008. "Climate Change (Emissions Trading and Renewable Preference) Bill: Government Bill. As Reported from the Finance and Expenditure Committee", House of Representatives, Wellington. Available online at http://www.parliament.nz/resource/en-nz/48DBSCH_SCR4086_1/e6976c1d54a15860c773ae1ca1e77ff8b0562ce6. Last accessed 23 April 2019.
- . 2009. "Climate Change Response (Moderated Emissions Trading) Amendment Bill: Report of the Finance and Expenditure Committee", 85–1, New Zealand Parliament, Wellington.
- Gavard, Claire, Niven Winchester, and Sergey Paltsev. 2016. "Limited Trading of Emissions Permits as a Climate Cooperation Mechanism? US–China and EU–China Examples", *Energy Economics*, 58, pp. 95–104.
- Groser, Tim. 2012a. "Emissions Trading Scheme Review 2012 – Final Decisions on Amendments to the Climate Change Response Act 2002", Cabinet Paper, New Zealand Cabinet, Wellington.
- . 2012b. "Units Lacking Environmental Integrity to be Banned", New Zealand Government media release, 19 December.

- . 2012c. “New Zealand Commits to UN Framework Convention”, New Zealand Government media release, 9 November. Available online at <http://www.beehive.govt.nz/release/new-zealand-commits-un-framework-convention>. Last accessed 23 April 2019.
- He, Gang, and Richard K. Morse. 2010. “Making Carbon Offsets Work in the Developing World: Lessons from the Chinese Wind Controversy”, *Program on Energy and Sustainable Development Working Paper 90*, Freeman Spogli Institute for International Studies, Stanford, CA. Available online at http://pesd.stanford.edu/publications/making_carbon_offsets_work_in_the_developing_world_lessons_from_the_chinese_wind_controversy. Last accessed 23 April 2019.
- International Carbon Action Partnership. 2019. “Emissions Trading Worldwide: Status Report 2019”, International Carbon Action Partnership, Berlin. Available online at https://icapcarbonaction.com/en/?option=com_attach&task=download&id=613. Last accessed 23 April 2019.
- Kerr, Suzi. 2012. “The Economics of International Policy Agreements to Reduce Emissions from Deforestation and Degradation”, *Motu Working Paper 12-12*, Motu Economic and Public Policy Research, Wellington. Available online at http://motu-www.motu.org.nz/wpapers/12_12.pdf. Last accessed 23 April 2019.
- Kerr, Suzi, and Catherine Leining. 2019. “Uncertainty, Risk and Investment and the NZ ETS”, *Motu Working Paper 19-08*, Motu Economic and Public Policy Research, Wellington.
- Kerr, Suzi, Catherine Leining, Joanna Silver, Phil Brown, Nigel Brunel, Sandra Cortes-Acosta, Stuart Frazer, Adrian Macey, Guy Salmon, and Paul Young. 2017. “An Effective NZ ETS: Clear Price Signals to Guide Low-Emission Investment”, *Motu Note 28*, Motu Economic and Public Policy Research, Wellington. Available online at <https://motu.nz/assets/Documents/our-work/environment-and-agriculture/climate-change-mitigation/emissions-trading/An-Effective-NZ-ETS-Clear-Price-Signals-.pdf>. Last accessed 23 April 2019.
- Kerr, Suzi, Ruben Lubowski, and Robert Heilmayr. 2018a. “Climate Teams: A New Model for Investor–Host Climate Cooperation”, in *International Cooperation in East Asia to Address Climate Change*, Boston: Harvard Project on Climate Agreements, pp. 73–76. Available online at <https://www.belfercenter.org/sites/default/files/files/publication/harvard-project-east-asia.pdf>. Last accessed 23 April 2019.
- Kerr, Suzi, Ruben Lubowski, Robert Heilmayr, and Seong-il Kim. 2018b. “Climate Teams: A New Model for Investor–Host Climate Cooperation”, handout, Motu Economic and Public Policy Research, Wellington. Available online at <https://motu.nz/assets/Uploads/Climate-Teams-handout-final-20180703.pdf>. Last accessed 23 April 2019.
- Kerr, Suzi, and Adam Millard-Ball. 2012. “Cooperation to Reduce Developing Country Emissions”, *Climate Change Economics*, 03(04): 1250023. Available online at <https://doi.org/10.1142/S2010007812500236>. Last accessed 23 April 2019.
- Kerr, Suzi, and Judd Ormsby. 2016. The NZ Emissions Trading Scheme Delink from Kyoto: Impacts on Banking and Prices, manuscript, Motu Economic and Public Policy Research, Wellington.
- Kollmuss, Anja, Lambert Schneider, and Vladyslav Zhezherin. 2015. “Has Joint Implementation Reduced GHG Emissions? Lessons Learned for the Design of Carbon Market Mechanisms”, *Working Paper 2015-07*, Stockholm Environment Institute, Stockholm. Available online at <https://mediamanager.sei.org/documents/Publications/Climate/SEI-WP-2015-07-JI-lessons-for-carbon-mechs.pdf>. Last accessed 23 April 2019.
- Leining, Catherine, and Suzi Kerr. 2019. “Scarcity and Ambition in the New Zealand ETS”, *Motu Working Paper 19-07*, Motu Economic and Public Policy Research, Wellington.
- Leining, Catherine, Judd Ormsby, and Suzi Kerr. 2017. “Evolution of the New Zealand Emissions Trading Scheme: Linking.” *Motu Working Paper 17-06*, Motu Economic and Public Policy Research, Wellington. Available online at http://motu-www.motu.org.nz/wpapers/17_06.pdf. Last accessed 23 April 2019.
- Ministry for the Environment. 2009. “Departmental Report on the Climate Change Response (Moderated Emissions Trading) Amendment Bill: Stage 1”, Ministry for the Environment, Wellington. Available online at https://www.parliament.nz/resource/en-nz/49SCFE_ADV_00DBHOH_BILL9597_1_A16681/1cccb81e3d1b5b765d57fcbdb18e0a9e5189fe7. Last accessed 23 April 2019.

- . 2011. "Consultation on Proposed Regulations Restricting the Use of HFC-23 and N₂O CERs in the NZ ETS", Ministry for the Environment, Wellington. Available online at <https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/hfc-23-n2o-cers.pdf>. Last accessed 23 April 2019.
- . 2015a. "Historic Updates of the Kyoto Protocol Financial Information", in *Ministry for the Environment* [website], <https://web.archive.org/web/20160323173710/http://www.mfe.govt.nz/climate-change/reporting-greenhouse-gas-emissions/nzs-net-position-under-kyoto-protocol/historic>. Last accessed 23 April 2019.
- . 2015b. "New Zealand Emissions Trading Scheme Review 2015/16: Discussion Document and Call for Written Submissions", Ministry for the Environment, Wellington. Available online at <http://www.mfe.govt.nz/publications/climate-change/new-zealand-emissions-trading-scheme-review-2015-16-discussion-document>. Last accessed 23 April 2019.
- . 2016. "National Interest Analysis: The Paris Agreement", Ministry for the Environment, Wellington. Available online at https://www.parliament.nz/resource/en-NZ/51DBHOH_PAP69732_1/b3d874584455ca4c02251f71995b03d6f0aeee42. Last accessed 23 April 2019.
- . 2017. "New Zealand's Third Biennial Report Under the United Nations Framework Convention on Climate Change", Ministry for the Environment, Wellington. Available online at <http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/Final%20Third%20Biennial%20Report.pdf>. Last accessed 23 April 2019.
- . 2018a. "Our Climate Your Say: Consultation on the Zero Carbon Bill," Ministry for the Environment, Wellington. Available online at <https://www.mfe.govt.nz/sites/default/files/media/Consultations/FINAL-%20Zero%20Carbon%20Bill%20-%20Discussion%20Document.pdf>. Last accessed 23 April 2019.
- . 2018b. "The NZ ETS and New Zealand's Provisional Carbon Budget for 2021–2030", in *Ministry for the Environment* [website], <http://www.mfe.govt.nz/climate-change/nz-ets-and-nzs-carbon-budget-in-the-2020s>. Last accessed 23 April 2019.
- . 2019. "Latest Update on New Zealand's 2020 Net Position: April 2019", in *Ministry for the Environment* [website], <https://www.mfe.govt.nz/climate-change/climate-change-and-government/emissions-reduction-targets/reporting-our-targets-0>. Last accessed 23 April 2019.
- Ministry for the Environment, and Ministry for Primary Industries. 2012. "Departmental Report on the Climate Change Response (Emissions Trading and Other Matters) Amendment Bill", Ministry for the Environment. Wellington. Available online at https://www.parliament.nz/resource/en-nz/50SCFE_ADV_00DBHOH_BILL11566_1_A278716/52785362f7155bd98a42b25164b86f630d2ca3b3. Last accessed 23 April 2019.
- New Zealand Cabinet. 2009. "Moderated Emissions Trading Scheme: Amendments to the Climate Change Response Act 2002", Cabinet Minute CAB Min (09) 33/9, New Zealand Cabinet, Wellington. Available online at <http://www.mfe.govt.nz/sites/default/files/cab-min-09-33-9.pdf>. Last accessed 23 April 2019.
- . 2012a. "Emissions Trading Scheme Review 2012 – Final Decisions on Amendments to the Climate Change Response Act 2002", Cabinet Minute CAB Min (12) 23/10, New Zealand Cabinet, Wellington.
- . 2012b. "Emissions Trading Scheme Review 2012: Proposed Amendments", CAB Min (12) 8/7, New Zealand Cabinet, Wellington. Available online at <http://www.mfe.govt.nz/sites/default/files/cabinet-minute-12-87.pdf>. Last accessed 23 April 2019.
- New Zealand Government. 2016. "New Zealand Submission under the Paris Agreement: New Zealand's Nationally Determined Contribution", New Zealand Government, Wellington. Available online at <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/New%20Zealand%20First/New%20Zealand%20first%20NDC.pdf>. Last accessed 23 April 2019.
- Partnership for Market Readiness, and International Carbon Action Partnership. 2016. *Emissions Trading in Practice: A Handbook on Design and Implementation*. Washington, DC: World Bank. Available online at <https://openknowledge.worldbank.org/handle/10986/23874>. Last accessed 23 April 2019.

- Ranson, Matthew, and Robert Stavins. 2014. "Linkage of Greenhouse Gas Emissions Trading Systems: Learning from Experience", *NBER Working Paper 19824*, National Bureau of Economic Research, Cambridge, MA. Available online at <http://www.nber.org/papers/w19824>. Last accessed 23 April 2019.
- Reuters. 2012. "No Early Australian Link to Californian", *Sydney Morning Herald*, 3 September. Available online at <http://www.smh.com.au/environment/no-early-australian-link-to-californian-carbon-market-20120903-25afb.html>. Last accessed 23 April 2019.
- Simmons, Geoff, and Paul Young. 2016. "Climate Cheats: How New Zealand is Cheating on Our Climate Change Commitments, and What We Can Do to Set it Right", The Morgan Foundation, Wellington, available online at http://morganfoundation.org.nz/wp-content/uploads/2016/04/ClimateCheat_Report9.pdf. Last accessed 23 April 2019.
- Smith, Nick. 2009a. "Amendments for a Moderated NZ ETS and Second Order Amendments to the Climate Change Response Act", Cabinet Economic Growth and Infrastructure Committee Paper EGI (09) 13/2, New Zealand Cabinet, Wellington. Available online at <http://www.mfe.govt.nz/cabinet-papers/egi-09-132.html>. Last accessed 23 April 2019.
- . 2009b. "New Zealand Emissions Trading Scheme: Harmonisation with Australian Carbon Pollution Reduction Scheme", Cabinet Paper CAB (09) 107, New Zealand Cabinet, Wellington. Available online at <http://www.mfe.govt.nz/sites/default/files/cab-09-107.pdf>. Last accessed 23 April 2019.
- . 2011. "Slowing of ETS Recommended by Review Panel," media release, 16 September, New Zealand Government. Available online at <https://www.beehive.govt.nz/release/slowng-ets-recommended-review-panel>. Last accessed 23 April 2019.
- . 2012. "Emissions Trading Scheme Review 2012 – Proposed Amendments to the Climate Change Response Act 2002", Cabinet Paper, New Zealand Government, Wellington. Available online at <http://www.mfe.govt.nz/sites/default/files/cabinet-paper-proposed-amendments-part-1.pdf>. Last accessed 23 April 2019.
- Stroombergen, Adolf. 2015. "A General Equilibrium Analysis of Options for New Zealand's Post-2020 Climate Change Contribution", Infometrics for the Ministry for the Environment, Wellington. Available online at <http://www.mfe.govt.nz/node/20761>. Last accessed 23 April 2019.
- United Nations Framework Convention on Climate Change Secretariat. 2016. "Final Compilation and Accounting Report for New Zealand for the First Commitment Period of the Kyoto Protocol", FCCC/KP/CMP/2016/CAR/NZL, United Nations Framework Convention on Climate Change Secretariat, Bonn. Available online at <http://unfccc.int/resource/docs/2016/car/nzl.pdf>. Last accessed 23 April 2019.
- . n.d. "Nationally Appropriate Mitigation Actions (NAMAs)", in *United Nations Climate Change* [website], <https://unfccc.int/topics/mitigation/workstreams/nationally-appropriate-mitigation-actions>. Last accessed 23 April 2019.
- Wara, Michael W. 2008. "Measuring the Clean Development Mechanism's Performance and Potential", *UCLA Law Review*, 55, pp. 1759–1803.

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