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Achieving and Maintaining Institutional Feasibility in Emissions Trading: the case of New Zealand

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Abstract
Emission trading schemes (ETS) have emerged as a popular climate policy measure and are increasingly advocated as policy instruments to support the transition to a green economy. Using complementary analytical methods, this research investigated the institutional developments and complexities of the New Zealand Emissions Trading Scheme (NZ ETS). It focuses on (1) institutional experience and administrative capacity, and (2) political acceptance during formation, design, implementation, and review. The research answer questions concerning critical conditions that have affected the institutional feasibility of the NZ ETS and the trade-offs in achieving and maintaining institutional feasibility. The experience in New Zealand has demonstrated that bipartisan political support and obliged participant acceptance for an ETS can be achieved and the administrative burden can be kept low through an inclusive consultation process and particular aspects of design to provide more certainty about costs. However, this institutional feasibility has also been a trade-off with other important aspects such as environmental effectiveness, predictability, and legitimacy, posing risks to maintaining political acceptance of the policy design and achieving the longer term objectives of transitioning to a green economy.

Keywords*:* climate change mitigation; emissions trading scheme; institutional feasibility; New Zealand; policy evaluation

1. Introduction

Triggered by the 2008-2009 global financial crisis, green economic growth and a new green economy have again become topics of mounting policy attention. In the late 1990s, a green economy was framed around technology innovation, resource efficiency, natural capital, ecological risks, and human development (Pearce et al. 1989). Lately, a green economy has been framed as offering a "low-carbon, resource efficient and socially inclusive" type of economic growth (United Nations Environment Programme (UNEP) 2011, p. 16). Building upon the theoretical efforts of Coase (1960) and Dales (1968) emissions trading schemes (ETS) have been often advocated as policy instruments to support the transition to a green economy (e.g. Barbier and Markandya 2013; Organisation for Economic Co-operation and Development (OECD) 2012; Pearce et al. 1989; The World Bank 2013; UNEP 2011). ETS have emerged as a popular climate policy for reducing carbon dependency and greenhouse gas (GHG) emissions with several regional and national level schemes currently implemented and in design (The World Bank 2013; International Carbon Action Partnership (ICAP 2013)).

In theory, ETS are a means of achieving emission reduction targets in a cost-effective manner by giving incentives to emitters to make reductions and transactions (Hahn 2000; Stavins 2012; Tietenberg 2006). The theory assumes well-functioning institutions, a well-designed ETS, successful implementation, effective enforcement and market conditions necessary to achieve the least cost (Tietenberg, 2006). However, emissions trading schemes have been found to differ in practice from theory (Andersen and Sprenger 2000; Stavins 2012). It is difficult to predict how theoretical principles behind emission trading will actually play out within the market, within its own infrastructure, or the wider socio-economic contexts in which it operates (Owens and Nye 2008). Empirical data from ex-post evaluations therefore have an important purpose for providing insight into the actual performance of emission trading schemes.

Research about the performance of ETS has grown rapidly in the past decades. Whereas much of the research evaluates environmental and economic aspects (e.g. Braun 2009;

Markussen and Svendsen, 2005; Skjærseth and Wettestad 2009; Venmans 2012; Wråke et al. 2012), much less is known about institutional aspects that inescapably affect performance and feasibility of ETS in reality (e.g. Gupta et al. 2007; Tietenberg 2006). Ignoring institutional aspects in policy analysis can generate biases in the overall assessment of ETS (Tietenberg 2006; Gupta et al. 2007). While some multi-criteria assessments have recognized the importance of including institutional feasibility as a criterion (see e.g. Mundaca and Neij 2009; Venmans 2012), it is often presented briefly without an in-depth analysis. This is despite the fact that better understanding and overcoming institutional challenges has been emphasized as critical to better policy design and realizing a green economy (Barbier 2011; Barbier and Markandya, 2013).

Emissions trading schemes are suggested to have high political acceptability (Stavins 2008; Tietenberg 2006). However, Aldy and Stavins (2012) state that "[a] key question is whether the process of developing such support reduces a policy's effectiveness (for example, by muting the price signals of a market based instrument) or increases its cost." (p.54). Examinations of these institutional aspects of ETS have been mostly confined to the European Union ETS (EU ETS) (e.g. Braun 2009; Markussen and Svendsen 2005; Skjærseth and Wettestad, 2009; Venmans 2012; Wråke et al. 2012) and the United States (U.S.) Acid Rain Program (e.g.Joskow and Schmalensee 1998; Burtraw and Palmer 2004).While some political economy and administrative aspects of the NZ ETS have been described (e.g. Bullock 2012; Bertram and Terry 2010; Cameron 2011; Coria et al. 2010; Jiang et al. 2009; Moyes 2008; Stavins 2009), there has not been a systematic ex-post evaluation of institutional feasibility. Institutional feasibility consists of a policy instrument (1) being politically acceptable and (2) having administrative capacity available to implement it (Gupta, et al. 2007; Meltsner 1972; Nordhaus and Danish 2005; Venmans 2012).

Within this context, an ex-post evaluation of ETS with a focus on institutional feasibility is presented, through a case study of the New Zealand ETS (NZ ETS), the first mandatory national-level ETS outside Europe. The hypotheses of ETS having high political acceptability (Stavins 2008; Tietenberg 2006) and relatively low administrative burden (Barbier

and Markandya 2013) are tested. The research further explores in depth how political acceptability and low administrative burden are achieved and maintained throughout the policy cycle (i.e. from formation to design, implementation, and review). A further question of what are the implications of ensuring institutional feasibility for other important aspects of the scheme is also examined. While outcomes from ETS evaluations are likely to be context-specific (see Gupta et al. 2007, p. 756-760), greater understanding of individual ETS performance can highlight issues of general relevance.

1.2 New Zealand Emissions Trading Scheme

The NZ ETS was implemented in 2008 and has completed a full policy cycle with a review in 2011 and further amendments in 2012.It is the country's primary policy for addressing climate change. The country contributes only 0.2-0.3% to the global CO2-eq emissions; however, its per capita emissions are the 5th highest in the OECD (MfE 2009c). The New Zealand cabinet has stated high level objectives for the ETS policy to deliver New Zealand's "fair share" of "cost-effective emission reductions" and help New Zealand meet its obligations under the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol. (Ministry for the Environment (MfE) 2012b, p. 18) New Zealand has had a target of returning to 1990 levels under the Protocol's first commitment period but it has not signed up for a second commitment. Short term considerations are to be balanced with a third objective: "ensuring clear long term price signals that encourage a smooth transition to a low carbon economy" (New Zealand Cabinet, 2012, p 1). A criterion for assessing such a transition is that the ETS should "provide incentives for the long-term development of low cost emission abatement technologies" (MfE 2012b, p. 10). The ETS is also expected to help New Zealand reach its long term target of 50% (net) reduction of 1990 GHG levels by 2050 (New Zealand Government 2011), though the target and the ETS are not formally linked in legislation. The International Energy Agency (IEA) also noted that the NZ ETS is the "principal policy to encourage investment in renewable energy" (International Energy Agency 2011, p. 34). Striking the right balance between short term flexibility and long term risk reduction remains a

critical consideration in New Zealand's transition towards a low carbon economy (Bibbee 2011).

The NZ ETS is the first to cover all six of the main greenhouse gases and is the first ETS to directly cover forestry (though there is a distinction between pre-1990 foresters who are directly covered) and post-1989 who may voluntarily opt in) and, in principle, the agriculture sector (which represent almost half of the country's emissions). The NZ ETS is a hybrid trading system with a mix of both tax and cap-and-trade features. The NZ ETS has an effective safety valve with the option to purchase New Zealand units (NZUs) from the government for $25 New Zealand Dollars (NZD) (approximately €10-16 Euros or $13-21 United States Dollars (USD) between 2009 and 2012), but there is no minimum price. Obliged parties can also purchase units from the forestry sector or eligible international units for example from Joint Implementation or Clean Development Mechanism projects without quantitative restriction so there is price flexibility. The $25 maximum price was part of transitional cost containment measures introduced to the scheme in 2009 (which also included a one for two surrender obligation for all sectors except forestry). These transitional measures were originally to phase out starting in 2013, but amendments in 2012 extended these measures indefinitely. A final notable difference between the NZ ETS and a more classic cap-and-trade design like the EU ETS is the absence of an absolute cap on emissions. The key elements of the scheme are summarized in Table 1.

PLEASE INSERT TABLE 1 HERE

2. Methodology

2.1 Analytical approach

As a whole, the methodology was framed by policy evaluation, understood as a discipline which uses multiple methods of inquiry to generate policy-relevant information that can be utilised to resolve policy problems (Dunn 1981). Institutional feasibility as policy evaluation criterion was used as the focus of this research. As mentioned, this criterion pertains to both political acceptance and administrative burden. A politically feasible policy is one which is

"acceptable to, or at least not opposed by, a sufficient number of the relevant policy-makers so that the proposal is likely to be adopted" (Webber 1986, p. 549). It involves examining the policy's context and the process of its formation, how it is designed and implemented, stakeholder interactions, and the issues that arise that impede or facilitate this acceptance throughout the policy cycle (Mundaca and Neij 2009; Nordhaus and Danish 2005, Webber 1986). Administrative burden pertains to the time and resources necessary for public authorities to implement and enforce a policy to generate administrative outcomes (Harrington et al. 2004; Mundaca and Neij 2009). Administrative burden is tied to institutional feasibility in that a high administrative burden can render a policy infeasible whereas low administrative burden may enhance feasibility. Examining this burden involves examining the costs of administering the ETS and the capacity of administrators. While institutional feasibility was a focus criterion, its relationship and trade-offs with other important criteria of environmental policy evaluation (such as environmental effectiveness, cost effectiveness, distribution, predictability, legitimacy – as described by Adger et al. 2003; Gupta et al.; Mickwitz 2003; Mundaca and Neij 2009; Venmans 2012) were also examined.

The NZ ETS policy process and design were analysed (with the institutional focus described above) using discourse analysis (as described by Hajer and Versteeg 2005) to examine the substance of collected interview and document data. Uncertainty and complexity in policy-making was examined explicitly through analysis of policy risk and uncertainty and the influence on institutional feasibility (based on concepts in Bradbury 1989; Brunner et al. 2012; Howes 2005; Martin and Williams 2010) and using intervention theory (Vedung 2009, Mickwitz, 2003). Intervention theory was used to reconstruct the causal linkages between actors, inputs, outputs, and outcomes in the intervention through mapping out an 'implementation chain'. The mapping out of the intervention theory can help highlight what, where and from whom data needs to be collected (Mickwitz and Birnbaum 2009). Based on analysis of the design of the ETS, a chain was constructed and empirically tested with observations, market and government data, and information from interviews and questionnaires

with key actors identified in the map. Further detail about the analytical approach can be found in Richter (2012).

2.2 Data collection

Data collection for this study was based on interviews and a questionnaire, supported by the review of official documentation and related studies. The latter included a variety of sources including academic and government literature and data available from the NZ Emission Unit Database (www.eur.govt.nz). In addition, over one thousand individual written stakeholder submissions from public consultations between 2009 and 2012 were examined and analysed.

An online questionnaire was circulated among obliged parties (2320 in total) under the NZ ETS. The level of response to our questionnaire was 169, of which 124 clearly indicated their obligations under the NZ ETS, with the majority (85) representing foresters involved in the scheme. Taking into account the sample size (124) and a confidence level of 95%, the margin of error contained in the reported information was 8.6% approximately.

To complement the information obtained through our survey, over 30 interviews were carried out from May to August 2012. Interviews were conducted with stakeholders including the two (National and Labour Party) Ministers for Climate Change Issues between 2005 and early 2012, eight public officials from the Ministry for Environment, Ministry for Primary Industries, Environment Protection Agency, the Treasury and the office of the Parliamentary Commissioner for the Environment, and sixteen with direct market participants (e.g. carbon traders) and obliged participants representing large emitters in the industrial processes and stationary energy sectors as well as participants in the forestry sector. Where practical and permissible, these interviews were recorded and information used was checked with the interviewee. The interviews were also useful for triangulating and filling gaps in information from the literature and observations, and for testing the intervention analysis and discussion points. More information about the methodology and protocols of interviews can be found in Richter (2012).

3. Findings: Institutional Feasibility in the NZ ETS

3.1. Political Acceptability

Like the EU ETS, the NZ ETS was viable after other policy instruments failed first (the EU experience was described by Ellerman et al. 2010). A carbon tax in New Zealand was first seriously considered in 1994, but voluntary reduction agreements were favoured. A tax was proposed again in 2002 but was abandoned in 2005 in favour of an ETS (MfE and The Treasury, 2007). In 2005, the state of the New Zealand's net position in relation to its Kyoto Protocol target (which for the first time showed a deficit) necessitated a policy that would be effective in halting GHG growth, or to at least halt deforestation to keep more forestry credits to offset this growth. This situation spurred urgent parliamentary debates in 2005 and propelled the agenda for climate policies (Bullock 2012, Bertram and Terry 2010)

3.1.1 Building the NZ ETS

Interviewed politicians, businesses and consultants emphasised the importance of early dialogue groups between the government, experts, and obliged participants in building the capacity of participants and enhancing acceptance of the ETS policy. A Climate Change Policy Dialogue group was run in 2007 by the independent Motu Economic and Public Policy research institute and roundtable discussions have been hosted by Victoria University's (Wellington, New Zealand) Institute of Policy Studies since 2007. In September 2007, the government released its ETS design proposal and set up the Climate Change Leadership Forum to discuss it. The forum consisted of 33 members, including the Minister for Climate Change and the Minister of Finance, top government officials, ETS sector participants, science experts, as well as environmental, local government, and Maori representatives (New Zealand Government, 2010). Membership of the Climate Change Leadership Forum was by invitation only, and according to the then Climate Minister interviewed, constructive large emitting businesses were invited to create a credible stakeholder group'.

Before the legislation went to Parliament, the Forum announced their support for the scheme, outlining 10 key points. Critical aspects included that the "ETS should form part of New Zealand's long term durable response to climate change… to reduce greenhouse gas emissions and encourage the uptake of low carbon emission technologies" (Climate Change Leadership Forum 2008, key point 2). It also stated that firms should begin adjusting to the cost of their emissions as soon as possible, albeit with transitional protection measures to keep the initial economic impact modest, but these should not "reduce firms' incentives to reduce emissions" (Climate Change Leadership Forum 2008, key point 7). Not all business leaders involved in the process agreed with the Climate Change Forum's key points (Business New Zealand 2008). Interviews with involved stakeholders and reviewed documents suggested that many businesses, and certainly BusinessNZ (a large national organisation representing the interests of the business sector in New Zealand), were looking for more flexibility than the government was willing to give.

At the time, the opposition political (National) party was willing to negotiate a memorandum of understanding with the Labour government on the ETS design (New Zealand Labour and National Parties 2007). Interviewed politicians stated that differences about agriculture and loss of trust between the parties undermined the accord in 2009. After a review of the policy, the newly elected National government presented its own modified ETS design in 2009. The legislation was passed by a vote of 63-58 (House of Representatives, 2009). In 2011, the Minister for Climate Change Issues appointed an independent review panel to formally evaluate the scheme. Following this review process, an amendment bill was passed in November 2012 by a vote of 61 to 58 (House of Representatives 2012).

Interviews indicated that later consultation processes (i.e. 2009-2012) were perceived as being more inclusive of business perspectives (businesses were part of technical advisory groups) and thus viewed more favourably by this stakeholder group. However, among environmental and civil society groups (who were more positive about the 2008 consultations), both technical advisory groups and the 2011 Review Panel were criticised for being stacked with only business interests. Public consultations on amendments and reviews between 2009

and 2012 were perceived as rushed and inadequate; for example, over 90% of individual submissions for the 2012 amendments complained about this (Hood, 2010; MfE, 2009a, 2012a). The seven week review process for the 2012 amendment bill was also criticised by opposition parties because the process "did not include environmental organisations, the general public, or members of opposition parties who rely on a genuine select committee process to hold the Government of the day to account." (FEC, 2012, p. 18).

3.1.2 Design of the NZ ETS

Uncertainty and concerns about the costs on participants and the economy have continuously challenged the political acceptability of the NZ ETS. The original 2008 legislation included grandfathering allocation, linkage to international markets, and staggered sector entry as cost containment measures for participants. These were seen as enough protection whilst maintaining an acceptable level of environmental effectiveness (MfE & Treasury 2007). The subsequent National Government amendments introduced in 2009 aimed for even more protection of competitiveness, greater certainty for economic growth, and harmonisation with the proposed Australian scheme (CPRS), which had intensity based allocation (ultimately the Australian CPRS was not legislated). Interviews and public submissions revealed that the amendments enhanced the acceptability of the policy to businesses by providing more safeguards against significant uncertainties primarily related to costs and the design of the policy itself (ETS Review Panel, 2011; MfE 2012c). Businesses have argued that their overseas competitors do not face carbon costs or that increased costs unduly burden consumers and smaller businesses in a weak economy. However, the cost containment measures also have implications for environmental effectiveness and low-carbon investment that have raised opposition from other political parties, forestry participants and civil society stakeholders.

Table 2 summarises the significant changes to the design between 2008 and 2012 as well as the 2011 Review Panel recommendations. It also summarises the government and our own analysis of public submissions made during the public consultations from 2009-2012

(Individual submissions from 2008 were not available.), indicating the acceptability of these changes amongst the submitters.

PLEASE INSERT TABLE 2 HERE

The Ministry for the Environment's analysis of the 755 public submissions it received regarding the 2012 amendments revealed that while nearly 60% of industry or professional organisations (who made up 9% of the total submissions) expressed support for the Bill, less than 5% of individual submitters (who made up 88% of the total submissions) expressed support (MfE 2012d). A review of official documents, individual submissions, and in-depth interviews provided greater insight into the critical elements for political acceptability of the ETS. These are now examined in more detail.

Allocation of NZUs

Allocation of allowances in emission trading schemes is nearly always contentious and often free, criticised as overly generous, as well as heavily influenced by lobbying (see e.g. Ellerman et al., 2007; Hahn and Stavins 2011; Joskow and Schmalensee 1998; Markussen and Svendsen 2005). The NZ ETS is no exception in this regard. Free allocation for the industrial processes sector, agriculture (when covered), and some downstream energy and fuel users (but not upstream fuel and energy companies who can pass prices on to consumers) was deemed necessary to protect competitiveness and reduce carbon leakage risks (MfE 2009b).While the change in 2009 from grandparenting to intensity based allocation was criticised for weakening incentives for emission reductions (see e.g. Bertram & Terry, 2010), most businesses in interviews and public submissions claimed that the intensity-based allocation system incentivises emission reductions at the margin. The largest business lobby argued that being too generous and over-allocating was not as large a risk as under-allocation, which would result in lost investment (Business New Zealand 2011).

However, similar to the EU experience, interviews and public submissions from civil society groups and the Parliamentary Commissioner for the Environment revealed criticisms of free allocation for being overly generous, phasing out too slowly, transferring substantial fiscal

costs to taxpayers, and delaying investments for a low carbon economy (these criticisms were echoed in academic literature, see e.g. Hood 2010). Interviewed participants in other sectors perceive high levels of free allocation giving favourable treatment to some sectors over others (see also ETS Review Panel 2011). The lack of transparency around the actual methodology used and justification of the levels of allocation has also been a source of contention (Bertram and Terry 2010; Hood 2010; Parliamentary Commissioner for the Environment 2011).

Access and use of international units

The access to international units like certified emission reduction units (CERs) or emission reductions units (ERUs) in the design of the NZ ETS was intended to promote emissions reductions at the least possible cost, regardless of where the emissions reductions occur. The more eligible units included in the scheme, the more flexibility offered to both buyers and sellers in the ETS (MfE & Treasury 2007), thus enhancing the acceptability of the policy. The EU experience was similar to New Zealand's with industry in favour of maximum access while Non-government organizations (NGOs) and some member states were opposed to allowing a high proportion of CERs and ERUs, arguing that it would dilute the effectiveness and price signals (Ellerman et al. 2010). While there are some qualitative restrictions on units (e.g. industrial gas CERs), unlike the EU ETS, there are no quantitative restrictions (there were also restrictions in the Australian ETS design - see Australian Government, 2012). This has resulted in the price of the NZU closely following the prices of the eligible CERs and ERUs, as seen in Figure 1. As emitters entered the scheme, the NZU was cheaper than CERs and ERUs and the preferred unit to purchase. As the international carbon market price fell, so did the supply of NZUs, as many foresters refused to sell at low prices. Interviews and public submissions revealed that allowing unlimited volumes of low priced international units has not only been a concern to foresters, but also a wider group of stakeholders who perceive it undermining the environmental integrity of the scheme and the investment incentives for low-carbon technology.

PLEASE INSERT FIGURE 1 HERE

Public submissions and interviews indicated a difference of opinion as to whether international emission reductions should be valued equally with domestic reductions. A lack of demonstrated domestic reductions leaves the NZ ETS vulnerable to critics (both those wanting to strengthen the scheme as well as those who want to abolish it). Interviews with politicians also highlighted their awareness of the risks involved in only meeting mitigation obligations through international offsetting. For example, in an interview for this research, former Minister for Climate Change Issues Nick Smith questioned if "the policy of international units being of equal value to taking domestic action is in fact correct." (Smith 2012). Only relying on international offsets may damage the country's reputation and it could be criticised for not respecting the concept of supplementarity expressed by Article 17 of the UNFCCC Kyoto Protocol, which states that "[emissions] trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments" (UNFCCC 1992, p. 15).

Sectoral coverage

The NZ ETS has been designed as an all-sector scheme with staggered entry to allow more time for sectors to prepare for compliance. Inclusion of all sectors was seen as more equitable and credible (Emissions Trading Scheme Review Panel (ETSRP) 2011; Kerr 2007). It also makes the NZ ETS unique, as forestry and agriculture sectors have yet to be included directly in any other emission trading design (though offsets are allowed in some). ETS designs generally have not included these sectors directly because they are often dealt with by other policy instruments (e.g. subsidies), and because there is a strong debate about potential mitigation opportunities (see Cooper et al. 2012). The latter argument underpins opposition to the inclusion of agriculture by Federated Farmers, one of New Zealand's strongest lobby groups (Federated Farmers 2011). Delaying this sector's entry has helped manage this opposition. However, as the ETS is the primary policy for New Zealand to reduce its emissions and with a high proportion of its emissions from agriculture (approximately 47% in 2011), it has been claimed that significant reductions cannot be made without including this sector (ETSRP 2011; Bertram &

Terry 2010) and that it is important for efficiency (MfE 2009a). These arguments, as well as issues of equity were raised by stakeholders opposing the deferral of the entry.

The need to manage New Zealand's substantial carbon sink and the relatively low abatement costs identified in the forestry sector motivated the mandatory pre-1990 forestry inclusion in the NZ ETS (MfE & The Treasury, 2007, p. 32). The distinction between pre-1990 and post-1989 aligns with the Kyoto Protocol. One-off free NZU allocations appeased pre-1990 foresters and many post-1989 foresters saw the ETS as an opportunity. Post-1989 foresters are only liable up to the amount of NZUs they have received. Internationally this afforestation reforestation debit credit (ARDC) rule has changed with full liability for post-1989 deforestation from 2013, but the rule remains in the NZ ETS. Within the first three years of the scheme about half of eligible post -1989 hectares voluntarily opted into the scheme (though over 535 registered foresters have opted out of the scheme since the persistent low carbon prices in mid-2011 – see EPA 2013).

Fixed price option

The fixed price option of $25 NZD acts as a mechanism commonly referred to as a safety valve in literature (but also referred to as a price cap in New Zealand). The Finance and Expenditure Committee in 2008 had considered and ultimately rejected a safety valve because it would undermine the scheme if set too low and be irrelevant if set too high (FEC 2008). The 2009 amendments added the fixed price option to address concerns about price volatility and lack of price certainty. At the time, CERs and ERUs were priced around NZ $28 and expected to rise with a successful outcome at the UN Climate Change Conference (COP 15) in Copenhagen, Denmark. This implied a greater cost shifting to taxpayers as they absorbed the difference between the price in the NZ market and the price on the international market, raising opposition from some policymakers and stakeholders. The price of CERs and ERUs has not reached NZ $25 since 2009 and is not expected to in the near future (MfE 2012b), but the fixed price is still supported by businesses (in their public submissions) for more certainty about price risk. Stakeholder interviews, public submissions and the 2011 Review Panel revealed allegations that some fuel and energy companies have been using the fixed price as a proxy for carbon

costs passed on to consumers while buying cheaper units from the market (ETS Review Panel, 2011). The fixed price is strongly opposed by many environmental and civil society groups and the forestry sector because it can also decrease incentives to invest in low carbon technology and reduce emissions (however, this will only function in this manner if the price of other eligible units are higher).

One for two rule

The 2007 ETS design outlined a progressive obligation in which one unit is surrendered for two tonnes of CO2-eq at the start and this obligation is then scaled up to a full surrender obligation over time. This was originally considered as an alternative to free allocation (see MfE and The Treasury 2007). In 2009, it was introduced in addition to free allocation. Not surprisingly, the obliged emitters supported the measure while opposing policy makers felt that this rule was "inappropriate and unduly dampens adjustment incentives" (FEC 2009, p. 8). The rule applies in all sectors except forestry and has resulted in reducing the volume of units in the NZU market as well as halving costs for emitters. It has been opposed by opposition parties, carbon traders and environmental and civil society groups who have argued in interviews and public submissions that it is decreasing carbon market liquidity and reducing the environmental effectiveness of the scheme. Foresters are also opposed to the rule because it reduces demand for their NZUs and does not apply to their sector (ETS Review Panel 2011).

3.2 Administrative Burden

The administration of the ETS requires policy and operational staff from the Ministry for the Environment (MfE), the Ministry for Primary Industries (MPI) and the Environmental Protection Authority (EPA) (see Figure 2). The establishment of the EPA in 2011 put the ETS regulatory functions "more arm's length from Ministers" (Smith 2010, p. 3) by making it a separate Crown Agent rather than a Ministry. While initially providing hope of more independent and "de-politicised" administration (Bibbee 2011, p. 27), it is not viewed to be an independent administrative body by interviewed stakeholders. This is largely because the EPA

does not advise on targets like other independent administrative bodies (e.g. the UK Committee on Climate Change). Arguably the Parliamentary Commissioner for the Environment in New Zealand has an independent role as an advising officer of Parliament; however, when interviewed, representatives in the Commissioner's office explained that its powers do not extend beyond persuasion and it has limited capacity to take on a more involved role with the ETS.

PLEASE INSERT FIGURE 2 HERE

3.2.1 Building administrative capacity

Gaining experience with market based instruments (MBIs) was a key component in building administrative capacity. Officials and experts explained in interviews that well before the NZ ETS, public authorities in NZ were working with MBIs; for instance, NZ established one of the world's most comprehensive tradable fishing quotas program in 1986 (Boyd et al. 2003). The ratification of the Kyoto Protocol in 2002 necessitated learning and using international trading mechanisms, accounting for assets and liabilities, and creating an online registry. Technology has also played a role in making the ETS infrastructure feasible. Officials mentioned that the use of online and electronic formats for data handling and monitoring has been instrumental in keeping administrative burden low. The important role of technology in improving the quality of administration and minimizing costs has been found in other ETS cases as well (e.g. Tietenberg 2006).

International experience and technology developments were instrumental to enabling the ETS a few years later and were headed by the Treasury and the Ministry for Economic Development (MED), cooperating with other ministries and experts. Aligning the NZ ETS rules with the Kyoto Protocol made for simple adjustment of the existing online registry for domestic use, as well as transfer of knowledge from the international to domestic regime. In 2007 the Emissions Trading Group (ETG) was formed to begin designing the NZ ETS with officials from key ministries and technical experts, many with prior experience in the U.S. and the EU

trading systems. Interviews with public officials revealed that having the same staff involved throughout all stages of the NZ ETS was crucial to the successful administration of the policy. The interviewed regional administrator working directly with foresters on the ground, who was not involved in prior stages, found the ETS far more complex than other programmes administered.

3.2.2 Design for low administrative burden

The NZ ETS was designed with an objective to keep administrative burden low (MfE & The Treasury 2007). To this end, a self-reporting enforcement process was implemented. Under this model, participants do not have to submit verified information; instead the authorities selectively audit the inputs for compliance. Auctioning is currently being designed in response to Doha and the 2012 amendments. Interviewed administrators could not comment on its impact before the design is finalised but confirmed that a low administration burden would influence choices.

The number of mandatory participants is lowered by the upstream points of obligation for most sectors, with approximately 100 participants in the industrial, transport, and energy sectors combined (see MfE 2011). For example, the transport sector consists of only 4 major fuel importers and officials noted that these firms have experience with GHG inventories and expertise in managing such obligations, thus requiring little public administrative assistance. The upstream approach also involves trade-offs with effectively incentivising downstream users to reduce emissions (see MfE & The Treasury 2007, pp 33-36). The NZ ETS allows some downstream users (e.g. large purchasers of fuel like Air New Zealand) to opt in and manage obligations directly.

Interviewed administrative officials commented that the staggered entry of sectors in the design could also have reduced the administrative burden with additional time to work through the regulations for each sector; however, the reviews and changes to the legislation reduced this time. Officials also noted that deferring agriculture has delayed a potentially very

large increase in the administrative burden, with up to 50,000 farmers entering the scheme, depending on the ultimate choice in point of obligation. While the point of obligation in agriculture is currently at the processor level, the 2011 Review Panel suggested that the point of obligation should lie with farmers because they are best able to reduce their emissions (ETSRP 2011).

3.2.3 Related costs

A review of official budget documents showed the implementation costs of the NZ ETS to be relatively low. Nearly NZ$22 million is appropriated for 2012/2013 specifically for the administration, implementation and operation of the NZ ETS, representing approximately 1% of the total budgets for the respective agencies. While different accounting methods in administrative costs make absolute comparisons between policies misleading, comparisons to other MBI like the fishing quota system support the finding that the administrative burden imposed by the NZ ETS has not been extraordinary. This is consistent with the fact that the administrative costs of the NZ ETS were not perceived to be problematic by interviewed stakeholders.

3.3 Trade-off with Environmental effectiveness

Findings have suggested that in ensuring political acceptability, the changes seen in the ETS legislation have responded primarily to concerns about costs, but very little to concerns about environmental performance. The trade-offs and prioritising of cost concerns can further be evidenced in the Ministry for the Environment's regulatory analyses, (e.g. MfE 2012b, p. 7-8; 2012c). The emphasis on cost-effectiveness and economic growth in New Zealand climate policy discourse is further discussed in Bullock (2012), Bührs (2008) and Roper (2012).
The government's 2011 ETS report on the ETS showed that emissions in the first reporting period (2008-2010, when prices in the scheme were higher, see figure 1) were 2.56 Mt less than projected, though it did not explicitly attribute this to the ETS, with influential recession and

weather factors playing a role. The 2011 ETS Review Panel found the impact of the scheme to be modest, mainly being a decline in deforestation (ETSRP 2011). While the net change in planted forest area has been positive since 2008 (i.e. afforestation levels have been higher than deforestation), increased afforestation rates could also be attributed to log prices (Covec, 2011) and the latest government reports project this will change in 2013 with deforestation increasing while afforestation significantly declines in response to low carbon prices and high prices for dairy (prompting conversion of land use from forestry to dairy farming) (see MfE 2013a, Manley 2013). Planned renewable energy installations have increased (MfE 2011), however, interviews with energy company representatives confirmed that renewable energy installations are often profitable in New Zealand without a carbon price and a distinct causal relationship between renewable energy consents and the ETS has not be established (Covec, 2011). Reductions in energy have also been attributed to decreased energy demand following the Canterbury, New Zealand earthquake (MfE 2013).

Despite this, New Zealand is projected to meet its obligation under the Kyoto Protocol, but Table 3 shows that this is primarily due to removals by forestry rather than by emission reductions. Many of the removals are from forests planted in the early 1990s in response to a spike in log prices and a government policy for tax deductible costs. This so called wall of wood is due to be harvested in the 2020s and has a significant impact on projected emissions, with significant potential liabilities (Bertram and Terry 2010; Karpas and Kerr 2011); influencing New Zealand's decision not to sign up to the second commitment period under the Kyoto Protocol (Smellie 2012), and highlighting the use of forest sinks as only a temporary solution for mitigation (Bibbee 2011).

PLEASE INSERT TABLE 3 HERE

Using a rather narrow definition of cost-effectiveness (see Ellerman 2003), pre-conditions such as trading and common market price between parties facing different costs have been identified in the NZ ETS (see Richter and Mundaca, 2013). However, academic critics in the context of cap-and-trade schemes have emphasised the need to shift the focus from trading to the importance of the cap to deliver meaningful environmental performance (see e.g.

Bell 2005; Sterk and Schüle 2009). Without an overall cap or mandated emission reduction target (only general objectives described earlier and in Table 1) part of the design of the ETS, a crucial pre-condition to determine the environmental effectiveness of the scheme does not exist (Mundaca and Richter 2013). With environmental effectiveness difficult to measure or predict, the environmental performance of the scheme, in both the short and long term, can be questioned. The country's 2020 target is a 5% reduction below 1990 levels. There remains the possibility of a 10-20% reduction from 1990 levels if certain conditions are met, but there are considerable challenges to meeting this (Fallow 2013). With gross emissions continuing to rise and the conversion of forestry land to dairy now higher under the ETS than under a non-ETS scenario (Manley 2013), it is difficult to see how the NZ ETS in its current design settings will help New Zealand achieve either a 2020 or its 2050 target (50% net reductions of 1990 levels).

There have also been clear trade-offs between the short term goals of keeping costs low for greater political acceptance and longer term environmental objectives of the ETS to help New Zealand transition to a low carbon economy. While the maximum price provides more cost certainty to businesses, there is also a need to provide certainty to investors in low carbon technologies (c.f. Jacoby and Ellerman, 2004; Jotzo, 2012; OECD and IEA, 2010; Philibert, 2006). The NZ ETS does not provide this certainty for investors. The 2011 Review Panel noted that the ETS has not had a "significant impact on investment decisions" and has "not yet incentivised behavioural changes" (ETSRP 2011, p. 17-18). Obliged participant interviews and responses to the questionnaire in this research indicated that until carbon costs increased, they were unlikely to make a material difference in investment decisions. As one questionnaire respondent commented: "[w]e are not able to include ambitious carbon prices in investment decisions and therefore low carbon initiatives are unable to be economic and cannot get approval to go ahead." Those businesses indicated they were making low carbon investments were already doing so before the ETS; with renewable energy having been profitable in New Zealand without the carbon price.

3.4 Trade-off with Predictability

The NZ ETS has been flexible in its ability to cope thus far (albeit often through amendments) with changing government leadership, changing economic situations, and continued uncertainty in the international arena. Retaining flexibility also motivated the 2012 amendments (New Zealand Cabinet, 2012) and public submissions indicated it was a key component to gaining support from obliged participants. However, flexibility can conflict with predictability in policies (c.f. Mickwitz 2003; Brunner et al., 2012). The 2011 Review panel suggested that there could be a balance between the two; that even if initial progress of the ETS has been slow to ensure feasibility, "so long as this does not reduce the certainty that businesses and households have about the costs they will face in future, it should not threaten the transition that New Zealand needs to make in the longer term" (ETSRP 2011, p. 7). The research findings presented here suggest that short term flexibility has in fact reduced certainty about the future costs and direction of the NZ ETS.

A predictable path of gradually increasing stringency is an important aspect of an ETS (Stavins 2003). For example, evidence that the "impact of the EU ETS on policy and business continues to progress and intensify" served as a defence against criticism of its short term failings (Ellerman, et al. 2010, p. 1). The lack of an "implied transition path for firms over the medium- to long-term" in the NZ ETS was a criticism of the Treasury's review of the 2009 amendments (The Treasury 2009, p.3). The 2011 Review Panel affirmed the importance of "a clear signal as to the direction the ETS is heading" (ETSRP 2011, p. 18). However, the Government did not implement most of the Panel's recommendations to continue (albeit more gradually) increasing the stringency of the scheme as it was designed (with phasing out of cost containment measures and increasing sectoral coverage). Instead, by removing dates, indefinitely delaying the entry of agriculture and extending transitional measures, the 2012 amendments have impeded the evolution of the government's own ETS policy in this respect

The flexibility in allowing open access to international carbon markets has also been a trade-off with predictability. There has been a large amount of uncertainty about the projected

prices (and access to units of questionable environmental integrity) in the international carbon market and the international climate negotiations on New Zealand's emission reductions commitments (ETSRP 2011). The decision in Doha to restrict the ability to purchase units created by the flexible mechanisms under the Kyoto Protocol (e.g. CERs) only to signatories has removed access to this market after 2015, removing this uncertainty (see Groser 2012) but raising others, namely: how the government will supply units in its auction and how ambitious its shorter term targets will be in the absence of a binding commitment. The auction design is still being developed and it remains to be seen how stakeholders react when auctioning is presented, if the auction cap will increase environmental credibility, and how the government provides certainty in the domestic market in the absence of international access.

3.5 Trade-off with Legitimacy

Legitimacy can be seen as "procedural justice and the extent to which decisions are acceptable to participants on the basis of who makes and implements the decisions" (Adger et al. 2003, p 1099). Building the NZ ETS involved a variety of stakeholders, public consultations, and independent reviews commensurate with New Zealand's commitment to democratic and legitimate policy making processes. However, wide criticism of the consultations processes from different stakeholder groups has been found in this research. The 2011 Review Panel, after its own public consultations, released its recommendations to the government that it felt best balanced the interests of all stakeholders (ETSRP 2011). The subsequent 2012 amendments largely abandoned these recommendations in respect to cost containment measures (and also amended the requirement for the Minister to appoint such panels for reviews). The findings revealed that the cost containment amendments have not been accepted by many stakeholders, but have been introduced regardless, and largely reflect only the interests of business stakeholders.

A public survey (Horizon Research 2012) of 2829 New Zealanders found that the majority thought climate policy should be a high or very high priority, and that businesses and

government should be taking more action. However, public support for emissions pricing was evenly split, a change from the majority public support it had in the 2009 survey (New Zealand Business Council for Sustainable Development 2009). The Parliamentary Commissioner for the Environment, academics, and civil society groups continue to strongly criticise the government amendments impeding the scheme's environmental effectiveness. Opposing members of parliament have gone as far as to accuse the government of "ecocide" on behalf of future generations for passing the 2012 amendments (Davison 2012).

4. Maintaining Institutional Feasibility

Building institutional feasibility for carbon pricing is not straight-forward, as evidenced by the fact that it took 15 years from the first suggestion of imposing a price on emissions for it to be implemented in New Zealand. The bilateral support from the major political parties for an ETS (in some form) is an advantage for continued institutional feasibility (in contrast for example with Australia where the political party elected in September 2013 committed to repealing the carbon price legislation implemented on 1 July 2012 - see Jotzo 2012; Griffiths 2013). However, consensus on the policy instrument is only the first step, the next being consensus on the design itself. A more stringent ETS has been politically feasible in New Zealand as evidenced by the original 2008 legislation. Failure to reach an accord on design has yielded the situation in which one party decreases the policy's stringency (even if it is its own policy) while the other party promises to do the opposite. While the 2009 amendments signalled one government's intent to modify the ETS settings legislated by another government, the 2012 amendments set the precedent of a government slowing the pace of its own ETS policy within 3 years. If elected, the main opposition party has promised to address these concerns, while retaining the NZ ETS as its climate policy instrument (Labour Party 2011). However, repeated government amendments have themselves created uncertainties, a fact acknowledged by the 2011 Review Panel (ETSRP, 2011) and many stakeholders interviewed, as well as public submissions (MfE 2012a)

The increasing criticism and concern amongst stakeholders about the ability of the NZ ETS to achieve meaningful environmental outcomes poses risks to maintaining institutional feasibility. Without a demonstrated and sustained direction with regard to environmental effectiveness, the policy's credibility will continue to be undermined and wider support will remain elusive. Many stakeholders interviewed advocated further de-politicization of climate policy with increased independence in the administration. Experience in the EU has found that the EU Commission assuming an increasingly assertive and independent position, has been important for ensuring tightening the ETS cap (Ellerman et al. 2010) and that member states' National Allowance Plans were more stringent in Phase II (Egenhofer 2007). Australia has a similar independent body advising on target for its climate policies, however, the Climate Change Authority is likely to be abolished by the new government (Griffiths 2013).

Beyond political aspects, maintaining institutional feasibility requires maintaining administrative capacity. While the administrative burden is most influenced by the policy design and without major changes is likely to remain low, maintaining capacity through robust monitoring, evaluation and learning is necessary to ensure lasting institutional feasibility (Moyes 2008). There are on-going operations improvements and some effects of the ETS are currently monitored, e.g. forestry intentions are surveyed each year (see Manley 2013). The New Zealand Emission Unit Registry (NZEUR) tracks volumes of transactions, however, this data is not made public and price data is not recorded (in contrast to the EU ETS). There remain uncertainties about impacts of the NZ ETS on businesses because they remain unmonitored or muted by the low carbon prices (ETSRP 2011; ETS Review Panel 2011). While some initial ex-ante data of business behaviour in response to the ETS was collected (see Numan-Parsons et al. 2011), this project has been discontinued. While the administration has been monitoring some aspects of the ETS, interviews with public officials revealed that formal and reflexive evaluations of the policy have yet to be a focus. Lack of robust systems for evaluation and reporting is not specific to the ETS, but has been noted as a weakness in New Zealand's public management model in general (Cook 2004).

5. Conclusions

The objective of the study was to analyse the institutional feasibility of the New Zealand Emission Trading Scheme (NZ ETS). In particular, our research focused on key drivers explaining the political acceptability and low administrative burden of the NZ ETS. The New Zealand experience confirms the importance of trade-off analysis when evaluating policy instruments. One can observe that the institutional feasibility criterion used in this analysis is not completely independent from other important criteria or aspects of evaluation (e.g. environmental effectiveness).

The NZ ETS secured political bilateral support and successfully built administrative capacity to introduce a carbon price and create a functioning market. In all, our findings show that a variety of critical issues help explaining how political acceptability and low administrative burden were achieved under the NZ ETS. Among them the access to international units and cost containment measures like the $25 price cap were especially important for gaining political acceptance from key stakeholder groups while the upstream design of obligations and alignment with Kyoto Protocol rules and reporting helped to keep the administration burden low. However, the cost containment measures the gained support from some stakeholders have also weakened the environmental stringency of the NZ ETS design. There remain political disagreements about these and other critical design aspects (e.g. the inflow of cheap CERs and ERUs into the market and sectoral coverage).

We conclude that the NZ ETS design is incomplete (or inadequate) to ensure longer term domestic emission reductions at a level desired by a wider group of stakeholders. A formal emissions cap, gradually tightening in the long-term, is technically feasible. This would likely increase the environmental effectiveness of the scheme and provide certainty for both businesses and investors. A secure long-term policy horizon and price signal are necessary for reducing uncertainties so market players can factor the costs and benefits of reduced emissions in their business plans. Despite the potential as a policy instrument for transitioning to a low-carbon economy, the New Zealand experience so far suggests that even if successfully

implemented and operated, a scheme may have a limited ability to seriously address climate mitigation if multiple objectives are not balanced.

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FIGURES AND TABLES (with captions)

Figure 1 The market price of NZUs and CERs on a given day based on publicly available information (in New Zealand Dollars, NZ$)

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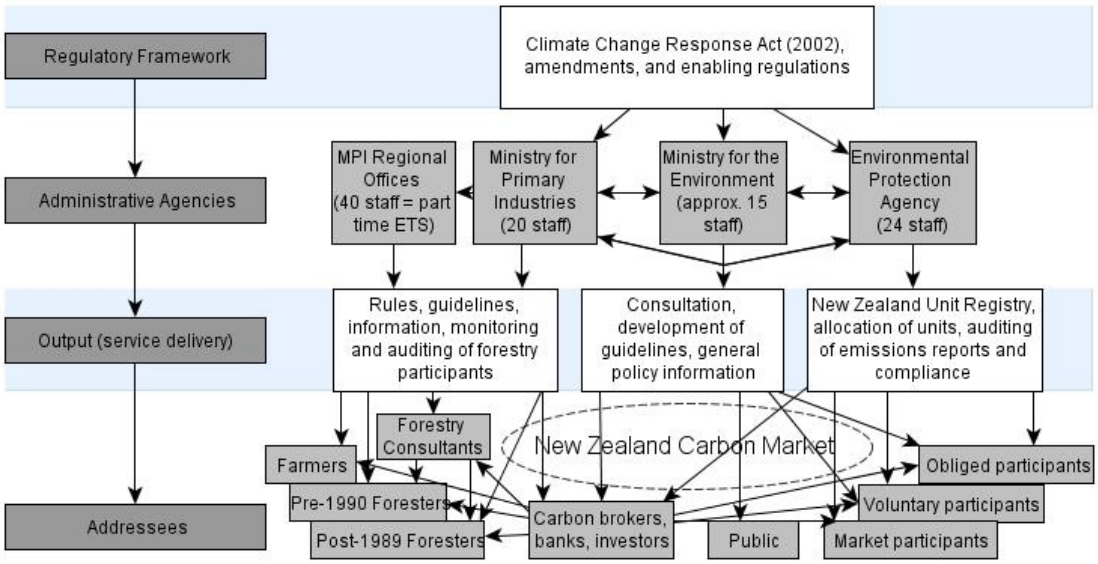

Figure 2 Administration of the NZ ETS

Four levels are shown on the left side of the figure. The top level outlines the regulatory framework that gives direction to the specific government agencies administering on the level below. The number of staff in each agency working directly with the ETS has been estimated by officials in interviews. Note that MPI regional staff members administer a variety of programmes, including the NZ ETS. Level 3 describes the output of each agency in terms of services addressed to the (level 4) key participants and stakeholders in the NZ ETS.

Table 1 Overview of Key Design Elements of the NZ ETS

	Details
Legal framework	Climate Change Response (Emission Trading) Amendment Act 2008. This is a framework act further enabled by regulations.
Stated purpose	"assisting New Zealand to meet its international obligations under the Convention and the Protocol; and (ii)reducing New Zealand's net emissions of those gases to below business-as-usual levels" – Climate Change Response (Emissions Trading and other Matters) Amendment Act 2012
Greenhouse gases covered	All 6 Kyoto Protocol gases (CO_2, CH_4; N_2O, HFCs, PFCs, SF_6)
Sectors covered and timing of entry	• 1 January 2008 – forestry • 1 July 2010 – stationary energy, liquid fuels/transport and industrial processes • 1 January 2013 – waste, synthetic gas (levy) • No date for entry - agriculture
Cap	No absolute cap
Units and surrender obligations	• New Zealand units (NZU = 1 tonne CO_{2eq},), assigned amount units (AAUs), Removal units (RMUs), Emissions reduction units (ERUs) and Certified Reduction Units (CERs) (subject to ban of certain CERs/ERUs) may be surrendered (CERs and ERUs only eligible for surrender until 31 May 2015) • Units are held by obliged parties, voluntary participants, and trading brokers • NZUs may be purchased from the Government for a fixed price ($25 NZD) • In the transition phase 1 NZU surrendered for every 2 tonnes of CO_{2eq} for all sectors except forestry (progressive obligation) • NZ EUR (www.eur.govt.nz) is the official registry for the NZU market
Allocation of units	• Free allocation on an intensity basis (New Zealand average benchmark) for industrial process sector and agriculture (high and medium intensity activities) • Phase out rate of 1.3% points per annum once sectors face full obligation (i.e. when the progressive obligation is phased out - currently no date for this)
Banking	• Banking allowed (but no borrowing) of units for future use (CERs and ERUs only eligible for surrender until 31 May 2015)
Penalties for non-compliance	• Fine up to $24,000 for failure to comply with supplying information • Fine up to $50,000 and/or 5 years prison for knowingly submitting false or misleading information. • More leniency shown in first year of sector compliance and if errors are voluntarily reported.

Data sources: House of Representatives (2012); Emissions Trading Scheme Review Panel (2011); and information available from www.climatechange.govt.nz

Table 2 Changes to the NZ ETS and political acceptance summary
Key aspects of the original 2008 legislation are presented with the changes proposed to these aspects by the 2009 and 2012 legislation. The level of support for each proposed amendment is based on the analysis of public submissions in response to the proposals (more specific details of analysis and data sources are found below the table).

2008 Labour Legislation	**2009 National Legislation**	**% sub-mission support[1]**	**2011 Review Panel/ Government Consultation Document**	**% sub-mission support[1]**	**2012 National Legislation**	**% sub-mission support[1]**	
Free allocation to emissions intense industry of 90% of 2005 emissions phasing out by 2030	Free allocation on intensity/ output basis, 90% for high and 60% for med.intensity, phase out at 1.3 % p.a. to 2090	**14%** of 218	Maintain status quo with phase out beginning in 2012	No direct consult-ation	Status quo but with phase out not beginning until end of transition period	**64%** of 11	**4%** of 595[2]
100% obligation of one unit for one tonne CO_{2eq}	One for two surrender rule expires 2012	**11%** of 168	Phase out in three equal steps: between 2013 and 2015.	**56%** of 82	Extension of one for two, no dates specified	**23%** of 70	
No maximum price	$25 fixed price option expires 2012	**11%** of 189	The fixed price should increase $5 per annum from 2012 to 2017 ($50)	**24%** of 100	Maintain $25 fixed price, no dates specified	**24%** of 70	
2013 entry of agriculture with 90% free allocation based on 2005 levels	2015 entry of agriculture with 90% free allocation phasing out at 1.3% p.a.	**9%** of 162	2015 entry of agriculture with 3 year transition (one for two, 90% allocation), phase out at 1.3% p.a.	**38 %** of 76	Removal of date for entry of agriculture	**15-21%**[3] of 92-45	
Allocation to pre-1990 foresters of 16 million NZUs	Allocation to pre-1990 forestry, two tranches: 32% (2009) and 68% (2012), subject to review	Separate consult-ation	Allow offsetting / the potential fiscal impact/ risk benefit to foresters should inform allocation	**75%** of 141	Allow offsetting/ allocate full 68% second tranche to those who do not offset	**67%** of 30	
No volume restrictions on international units, cap of NZUs equal to Kyoto AAUs	No restrictions on volume of international units, no explicit auction power or cap on NZUs	No comment	Government proposed restriction on volume of international units and more explicit power to auction	**70%** of 120	No restrictions on volume.	**22-30%**[3] of 58-40	
					Power to auction within an overall cap *on the supply of NZUs only*	**65%** of 17	

1. Unless otherwise noted, the % refers to the number of submissions specifically expressing support for a particular amendment compared to the total submissions (second number) commenting on that same amendment.

2. A large number of submissions commented on the transition amendments in general and are included in the calculations for the second column.

3. Compared to the government analysis, we interpreted more submitters specifically commenting on the deferral of agriculture and lack of restriction on the volume of international units, therefore we include the range between the two analyses.

Data Sources: MfE and Treasury (2007); Finance and Expenditure Committee (2009). Indications of support based on government (see ETS Review Panel, 2011; MfE 2012a, 2012d) and author analysis of individual public submissions found at New Zealand Parliament (2009, 2012) and MfE (2012c).

Table 3 New Zealand estimated emissions by sector

		Emissions (millions of tonnes of $CO_{2\text{-eq}}$)				
	1990	**2008**	**2009**	**2010**	**2011**	**2012**
Energy		34.3	31.6	31.3	31	31.7
Industrial processes and Solvents		4.3	4.3	4.8	5.5	4.4
Agriculture		33.3	33.5	33.7	34.4	35.2
Waste		2.1	2.0	2.0	2.0	2.0
Forests (Deforestation)		2.8	2.7	2.5	2.8	3.5
Gross Emissions		*76.8*	*74.1*	*74.3*	*75.7*	*76.8*
Forests (Net Removals)*		–15.3	–15.5	–15.9	–15.6	–14.9
Gross Removals*		*–18.1*	*–18.2*	*–18.3*	*–18.4*	*–18.4*
Net Total	**61.9**	**58.8**	**56.0**	**56.0**	**57.2**	**58.4**

*Gross removals are the total removals (i.e. carbon sequestration) from the forestry sector; however net removals reflect the emissions from deforestation in the forestry sector.
Data Source: Ministry for the Environment (2013)