nzier
authoritative analysis

The impacts of the proposed Emissions Trading Scheme

Summary report

April 2008

Preface

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia, and further afield.

NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions.

Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

NZIER was established in 1958.

Authorship

This report has been prepared at NZIER by John Stephenson and Chris Schilling, and reviewed by Dr John Yeabsley. The assistance of Brent Layton, Johannah Branson, Jean-Pierre De Raad, Patrick Nolan and Trinh Le is gratefully acknowledged.

We are indebted to the team at the Centre for Policy Studies at Monash University in Melbourne Australia for their assistance in pulling together the ORANI-NZ model and adapting it for use in modelling climate change policy measures. The input of Dr James Giesecke, Professor Mark Horridge, Professor John Madden, and Professor Philip Adams was indispensable in getting our research project from ideas to practical application.

Our work has benefited considerably from two workshops at which a range of stakeholders representing industry and union interests and academics and other researchers provided us with feedback on our approach and assumptions and helped with funding. We hope we have addressed the issues raised by workshop participants and where we have omitted some issues, we will address them in future work.

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Summary Report

Background

In December 2002, New Zealand ratified the Kyoto protocol. Under the protocol, the Government agreed to reduce average emissions over the 2008- 2012 period to 1990 levels, or bear the cost of any emissions over and above this level.

The latest emissions forecasts from the Ministry for the Environment suggest that for the 2008-2012 period, New Zealand emissions will be around 15% higher than 1990 levels, and will thus have to bear the cost of around 46 Mt CO_2-e emissions.

Emissions trading

It is in this context that the government has proposed the Emissions Trading Scheme (ETS). The ETS imposes a charge on products and processes that produce greenhouse gases. Just as the government taxes cigarettes because they are bad for your health, the ETS effectively taxes emissions because they are bad for our environment.

The mechanisms of the ETS are slightly different to a standard tax however. Instead of simply paying a tax for total emissions at the end of each year, companies that create emissions during production (e.g. burning coal to make electricity) or sell products that produce emissions when consumed (e.g. petrol) must obtain credits for those emissions. "Credits" are like vouchers that entitle the bearer to produce greenhouse gasses. At the end of the year, the bearer has to surrender one credit for every tonne of greenhouse gas they create.[1]

Some of the credits will have to be bought from overseas, some will be bought from the government, and some will be given away by the government ("free allocation"). Buying the credits is an increased cost to businesses, designed to provide an incentive to reduce emissions rates.

The "trading" part of an "emissions trading scheme" is what makes an emissions trading scheme different to a tax. Companies that buy their credits overseas will be "trading" in credits from overseas. Similarly, if a company is allocated credits from the government, but reduces its emissions, then the company can sell any surplus credits.

The other main difference between an emission trading scheme and a tax is that we know the cost of a tax per tonne of gas because the government tells us what it is, but in an emissions trading scheme the market will determine the credit price.

[1] One credit is usually equal to one tonne of carbon dioxide or the equivalent of one tonne of carbon dioxide. Carbon dioxide is the most common greenhouse gas, but it does not have the “worst” effect on climate change. For example, scientists say that one tonne of hydro-fluoro carbons (HFCs) has a 12,000 times bigger impact on climate change than one tonne of CO_2. That means that a company that wants to emit one tonne of HFCs will have to buy 12,000 one tonne CO_2 equivalent emission credits.

Profile of New Zealand emissions

The make-up of New Zealand's emissions is peculiar when compared to most other countries, especially other developed or rich countries. Specifically:

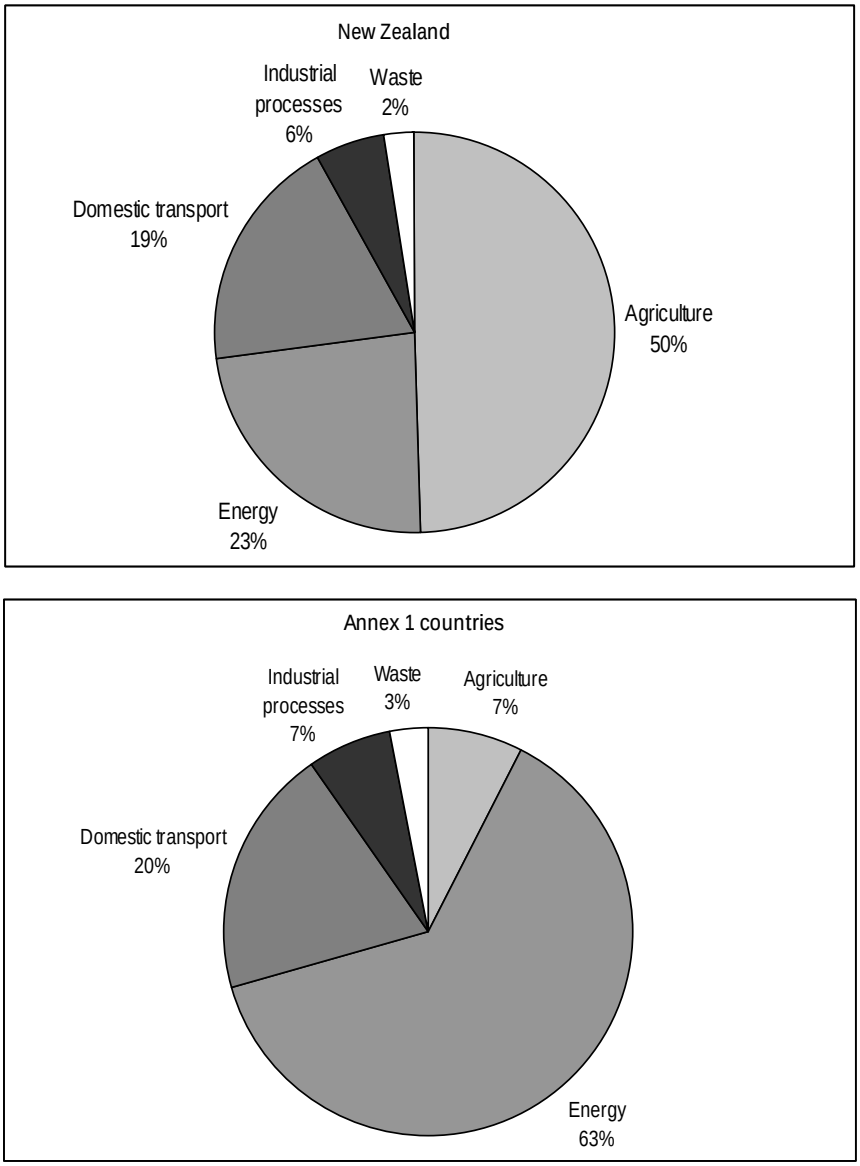
- a disproportionately large proportion of New Zealand's emissions come from agriculture and animals in particular (50% compared to 7% on average internationally)
- a disproportionately small amount of emissions come from energy (23% relative to 63% internationally)
- New Zealand has a relatively high proportion of renewable electricity generation (around 70%) when compared to other countries.

For a small open economy, dependent on exports, the implications of such an emissions profile are important. It is likely that direct emissions reductions will be relatively expensive in New Zealand, because:

- it is expensive to increase our reliance on renewable generation – being weather dependent, renewable generation requires a larger installed capacity to achieve the same level of output generation
- there is as yet limited scope for reducing emissions rates from agricultural activity. While there is optimism around the use of nitrogen inhibitors, no such technology yet exists for methane emissions, which make up the majority of agricultural emissions. This means reducing agricultural emissions most likely requires reducing stock numbers and thus production, a clear negative effect on the economy
- our exporting industries may face competition with countries that don't impose a charge on emissions, and are therefore at a competitive disadvantage. Agriculture, in particular, has not been included in any emissions trading schemes anywhere around the world.

As result of these factors, New Zealand is particularly susceptible to high levels of "emissions leakage". Emissions leakage refers to emissions being reduced in one country but increased in another, for no net benefit to global emissions. For example, if an ETS causes the cost of dairy production in New Zealand to rise, and therefore reduces the amount of dairy exports, there will be a reduction in New Zealand's emissions. However, another country will increase their production of dairy to compensate. Because New Zealand production is efficient, global levels of emissions will not fall. This is a particularly poor result, because New Zealand suffers from reduced economic activity, but global emissions are not reduced.

Comparison of NZ emissions by sector



Source: NZIER

The proposed New Zealand Emissions Trading Scheme

The government's in-principle decisions on the basic design of the NZ ETS are:

- the NZ ETS will, over time, include all major sectors (i.e. forestry, transport, stationary energy, industrial processes (non-energy), agriculture and waste) and the six greenhouse gases specified in the Kyoto Protocol
- the NZ ETS will be introduced across the economy in a staged process to allow gradual adjustment to emissions pricing:
  - forestry will be introduced on 1 January 2008
  - liquid fossil fuels on 1 January 2009
  - stationary energy and industrial process emissions from 1 January 2010 and

  - agriculture, waste and all other emissions from 1 January 2013
- the core obligation will be for participants with unit obligations to surrender to the government one emission unit to cover each metric tonne of eligible emissions in a compliance period (usually a calendar year); the obligation is absolute, rather than intensity-based, so does not vary with the level of output
- the New Zealand Unit (NZU) will be the primary domestic unit of trade; for the first commitment period, NZUs will be fully comparable to, and backed by, Kyoto units by the end of the period for determining compliance. This means the price for a NZU will effectively be set at the international level.
- The government has decided in principle to allocate NZUs initially through a combination of sale and free allocation. In free allocation, as a form of assistance to business 'at-risk', it has decided in principle that:
  - free allocation to forestry will be 21 million tonnes CO_2-e for plantation forest, plus a relatively small allocation set aside for forest weed control
  - from 2013, an additional 34 million tonnes CO_2-e for plantation forest (i.e. taking the total free allocation to owners of pre-1990 exotic forest land to 55 million tonnes)
  - the agricultural sector will be provided with a free allocation equal to 90 per cent of its 2005 emissions
  - eligible industrial producers will be provided with a free allocation equal to 90 per cent of their 2005 or, if firms choose, 2003 or 2004 emissions
  - over 2013 to 2025, the free allocation pools for industrial producers and agriculture will be reduced each year, on a linear basis (i.e. zero from 2026).

Modelling the impact of NZ ETS

Clearly the impact of such a scheme across the entire economy needs to be analysed. To do this, we use a General Equilibrium model, that includes all the key sectors in the economy, including households, government, exports and 131 industries from dairy farming to coal electricity generation to retail. We incorporate greenhouse gas emissions into the model, so we can analyse how putting a cost on each ton of GHG affects each industry, and the economy as a whole. We calculate leakage of emissions to ensure we are considering the global emissions reduction rather than simply New Zealand's for, what is after all, a global problem.

We put the rules of the ETS in the model, and then investigate, which industries and regions are affected and by how much, and the reductions in emissions. We also investigate some broad alternatives. In this case we model a scenario where the government pays all the Kyoto obligation out of general taxes instead, and an intermediate case where the government still introduces the ETS, but maintains free allocation of credits indefinitely to 'at-risk' industries. We believe the results make for important reading.

In its current design, the ETS is not least cost

The challenge is to design a policy that ensures that New Zealand meets its commitments to reduce greenhouse gas emissions "at the lowest achievable long-term cost" (MfE and Treasury, 2007).

An emission trading scheme *could* meet the Government's objective of meeting Kyoto obligations at least cost, but *only if* its design takes account of the extent to which our trading partners also face these costs.

The regulatory impact statement attached to the proposed legislation states that the "macroeconomic impact, as represented by a variety of indicators is very small…. around 0.1 percent of GDP" This statement also reports that the modelling has shown that in the long run an "ETS reduces the impact of meeting our international obligations over the case where government remains responsible for all emissions."

Our analysis, however, shows both that the costs are greater, and that the design proposed in the Bill is not least cost. This is primarily because the ETS, as currently designed, does not adequately deal with New Zealand's exposure domestically and in export markets to competition from producers in countries that do not face the costs of their emissions.

Short term, the proposed ETS would reduce employment and profits

In 2012, the economic impact of the ETS and the cost of New Zealand's Kyoto liability is a:

- $900 million reduction in GDP (0.5%)
- $600 reduction in an average household's spending (0.8%)
- reduction in employment equivalent to 22,000 jobs (1.0%)

Most of these costs come from the way the ETS works through the economy, impacting on the productive capacity of the economy, rather than impacts from paying directly for the remainder of New Zealand's Kyoto liability.

Of the $900 million reduction in GDP, $800 million is directly attributable to the ETS. That is the ETS would cost 8 times more.

Long term, living standards will be lower than they would have been

Longer term, once the free allocation of emission credits have been phased out and the ETS covers substantially all greenhouse gas emissions, including those from agriculture, the ETS is four times more costly than the alternative of paying directly out of taxes for emissions reductions.

In 2025, the combined economic impact of an ETS and the cost of paying for an international emission reduction obligation (in today's prices), is a:

- $5.9 billion reduction in GDP (-2.1%)
- $3,000 reduction in an average household's spending (-3.0%)

- reduction in hourly wages equivalent to $2.30 per hour (-6.7%), or $90 a week for someone working 40 hours a week

Of that $5.9 billion reduction in GDP, $4.6 billion is directly attributable to the ETS.

Of course, GDP per capita would still be 42% higher in 2025 than it was in 2007. But that is still less than Australia's GDP per capita today. That highlights that it is critical to seek least cost solutions before committing to *any* increase in cost on the economy.

…yet emission reductions are not as large

Moreover, for all the additional cost that an ETS imposes on the New Zealand economy, New Zealand achieves 5% less emissions reductions, in terms of contribution to global emissions, than we could achieve if we funded emissions reductions elsewhere in the world or at home.

As proposed, the ETS is not a least cost climate change solution…

This is for two reasons. First, New Zealand production becomes more costly and less competitive compared to production elsewhere in the world leading to reductions in emissions in New Zealand but increased emissions elsewhere in the world. Second, our emissions reductions are expensive. Cheaper alternatives are available elsewhere.

Thus, the ETS as currently proposed is not the least cost solution for mitigating the impacts of climate change.

This finding is in line with earlier work by NZIER:

> *The reality is that it may prove cheaper to pay emitters in another country to reduce emissions rather than to achieve any reduction within New Zealand. (NZIER, 2007)*

…unless producers in other countries also pay for their emissions

The main reason is our assumption that New Zealand producers exposed to import competition or New Zealand exporters are unable to increase their prices to reflect the cost of climate change mitigation policies. If climate change measures are adopted elsewhere in the world such that that assumption no longer holds true, then we would need to revise our analysis.

Agriculture will be hit hardest through reduced competitiveness…

The proposed ETS would increase costs largely in export industries, especially the agricultural sector. In the agricultural sector in 2025:

- dairy farming declines 13%
- dairy land prices fall 40%.

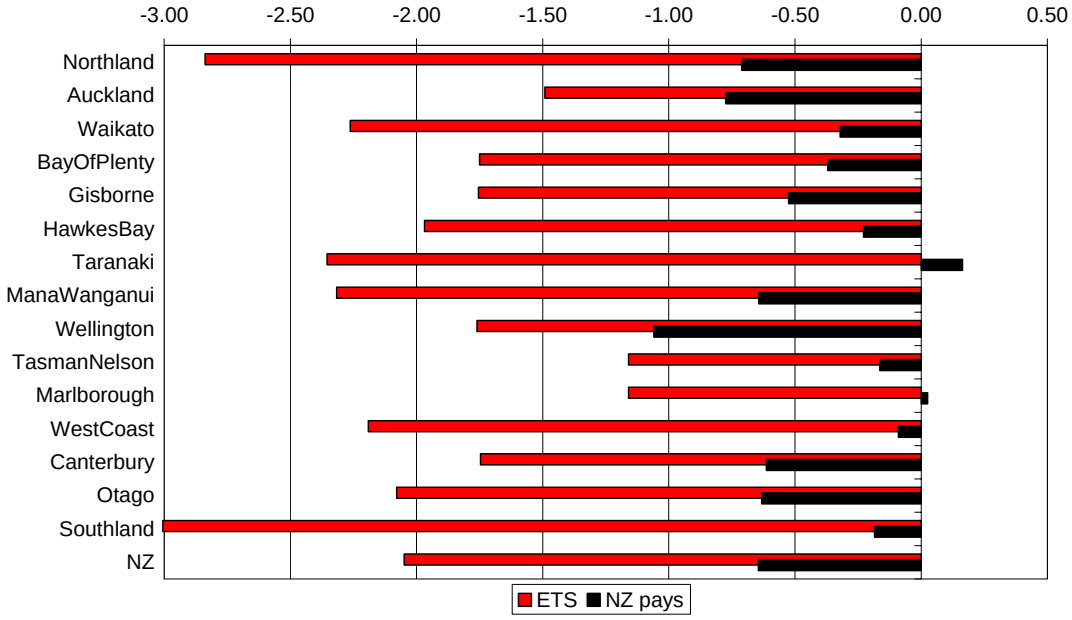
- sheep and beef farming declines 6.6%
- the price of land used in sheep and beef farming falls 23.4%

The impact on the agricultural sector is also a major source of leakage – where emission reductions occur in New Zealand only because our production is replaced with production elsewhere in the world. Our analysis suggests that the ETS would cause leakage from the pastoral sector to more than the equivalent of 3 million tonnes of CO_2 – around a quarter of the emission reductions resulting from the ETS.

Another sector heavily affected is basic metals manufacturing where investment declines and plant, machinery, and equipment and other capital falls by 6.5% and there is a 3.4% reduction in employment.

…and rural regions will shoulder a larger burden than urban centres

Impacts on regional GDP, 2025
% change to what might otherwise have been



Source: NZIER

Variation in impacts of the ETS across different industries also means quite variable impacts across New Zealand's regions - as regions have different concentrations of industries. The regional economies of Northland and Southland contract more than others, because both regions have significant concentrations of agricultural production and substantial employment in other large industries shrunk by the ETS – basic metals (aluminium) manufacturing in Southland and petroleum refining in Northland.

Regions with high concentrations of service industries and public sector employment, such as Auckland and Wellington, do not contract by as much as more rural regions.

The right permit allocation scheme would reduce the cost of an ETS

The impacts of an ETS change considerably when partial free allocation of emissions permits are not phased out. In 2025, an ETS with indefinite free allocation reduces GDP by 1.2% compared to 2.1% under the ETS with free allocation phasing out. Emissions reductions are 4.2% compared to 10.4% under phased out free allocation, but leakage of emissions of almost 3,000 kt CO2-e are completely eliminated.

This result arises because indefinite free allocation of permits at initial allocation levels – i.e. not entirely free allocation – cuts the harm to export competitiveness.

We find that costs to the economy are more sensitive to changes in the quantity of permits allocated freely to industry and agriculture than to assumptions about emissions reductions from technology change.

Our research confirms conclusions from other qualitative reviews

The Government commissioned review of the proposed ETS reached conclusions that our similar to ours (Kerr, 2007):

> *…several very important aspects of the proposal require further development… [including] …the need for clear thinking on interred leakage and allocation issues; how to achieve a smooth, low risk transition; (p.1)*
>
> *Any policy used to address leakage should be simple and closely targeted. It should be designed to phase out as other countries regulate their emissions. (p.7)*
>
> *In the agriculture sector, [output-based or intensity-based allocation] could simultaneously address the question of how to freely allocate units that intend to compensate for capital losses (loss of land values). (p.7)*

Previous research reports have come to similar conclusions (Skilling and Boven (2007), Castalia (2007), and NZIER (2007)).

Conclusions

We find that, as long as there is no comprehensive global commitment, paying directly for emissions reductions out of general taxation is cheaper and more effective than the ETS as is currently designed. Our results are robust to sensitivity testing.

This means that if the Government intends to proceed with the ETS, then it should amend the allocation and phase-out rules to minimise the costs to the economy.