MINISTRY OF SOCIAL DEVELOPMENT
Te Manatū Whakahiato Ora

Ministry for the Environment
Manatū Mō Te Taiao

The Low-carbon Society: Evolution or Revolution?

Introduction

Reducing NZ's greenhouse gas emissions will drive a number of economic and social changes

Over the course of the 21st century New Zealand society will undergo a number of changes driven directly or indirectly by global warming. We will have to *adapt* to the direct effects of climate change, but most of these effects will not be experienced until the middle of the century and beyond. More immediate will be the social impacts resulting from attempts to *mitigate* changes to the climate by reducing our emissions of greenhouse gases. Minimising our reliance on fossil fuels has the potential to drive a number of changes in the economy and society in general.

New Zealand has weathered social and economic change in the past - for example from the 1980s to the early 90s

New Zealand has weathered major change in the past. For example, between the mid-1960s and the early 1970s New Zealand's export prices collapsed and we experienced the first oil price shock. This brought an end to the economic boom that had been created by previously favourable terms of trade, and the beginning of a period of low growth and high inflation that eventually led to the economic reforms of the mid 1980s and early 1990s.

Over that period, social outcomes deteriorated in a number of areas, and some groups in society were affected more than others – notably Mäori

Throughout that period, social outcomes deteriorated over many areas of wellbeing. For example, the unemployment rate rose from 4.1% in 1986 to peak at 10.4% in 1992, and the rate of suicide among young people[i] rose by approximately 70% from 1986 to peak at around 25/100,000 people in the mid-1990s.

Some sections of society fared worse than others. Mäori and Pacific peoples' unemployment peaked at 28% and 25% respectively in 1991, compared to the peak European rate of around 8% the same year. Even life expectancy showed a distributional impact. After several decades of convergence in the life expectancy of Mäori and non-Mäori, the increase in Mäori life-expectancy flattened off from around the mid-eighties until the early-90s (especially for Mäori males) while non-Mäori life expectancy continued to increase.

Following the economic reforms, many of these outcomes recovered either to their mid-1980s levels or better. Average unemployment fell to 3.7% in 2005, and suicide among the young is now almost as low as it was in the mid-1980s.

Since the reforms, most outcomes have improved to pre-1980 levels, but there is still a legacy of disadvantage in some key areas

However, while outcomes are now improving, the legacy of previous adjustment is still with us. Examples include the gap in life expectancy between Mäori and non-Mäori, which has reduced in recent years but is still larger than it would have been had the pre-1980s trend not been interrupted by the events of the 1980s and 1990s, and the higher proportion of people with incomes below 60% of the median.

The transition to a low-carbon economy will generate both micro- and macro-economic change and is also likely to involve changes to the behaviour and lifestyle of the average Kiwi. What we want to explore at this symposium is the scale of these impacts, and where across

society they are most likely to fall. How might these changes compare to previous economic shocks and will they have a significant impact on outcomes; what lessons have we learned from the past, and what levers do we have to help us manage them?

This paper outlines some of the main drivers of change to help set the context for the symposium discussion on the impacts of climate change policy.

Mitigation Policies

NZ has binding emission obligations as a Kyoto signatory, providing a strong incentive to move to a low carbon society

The Kyoto Protocol's First Commitment Period (CP1) began on 1 January 2008, and New Zealand is part of a group of nations with binding emission obligations. These (and future) obligations provide a strong incentive to move economies and societies to a low-carbon emission path. Government intervention will be central to this transition, and we are likely to see increasing government influence being exerted to achieve this objective over the coming 10 to 20 years.

In his 2006 review into the economics of climate change for the UK Treasury, Sir Nicholas Stern identified three necessary strands to policy required to address climate change. They are:

- the establishment of a carbon price via either an emission tax, or emissions trading, or by direct regulation
- the promotion of relevant technologies through research and development policy
- addressing widespread market failures. It is well known that problems in property and capital markets inhibit investments in energy efficiency. Further, price signals work better when supported by relevant information. [ii]

Government intervention will be central to this transition

Climate Change Minister David Parker has also noted that: "To reduce greenhouse gas emissions, New Zealand is likely to need a combination of voluntary, price-based and regulatory measures, some targeted towards individual sectors of the economy and some for the economy as a whole." [iii]

Government's response

As recommended by Stern and outlined by Minister Parker, the NZ Government will introduce a mixture of pricing and other mechanisms, regulations and public information designed to encourage these changes in behaviours.

A broadly applied emissions trading system is planned to be introduced as the key regulatory instrument to manage greenhouse gas emissions from New Zealand. The New Zealand Emissions Trading Scheme (NZ ETS) covers: land use change and forestry from 2008; transport fuels from 2009, and stationary energy from 2010 with on-farm emissions (methane and nitrous oxide) included from 2013.

An Emissions Trading Scheme will be introduced as the key regulatory instrument

The NZ ETS will be complemented by other, largely sectoral, regulatory actions such as those outlined in the New Zealand Energy Strategy and the New Zealand Energy Efficiency and Conservation Strategy. The price impacts from the NZ ETS will emerge over several years and there are policies in place or planned, such as free allocation for industries exposed to international competition by countries without comparable policies until 2025.

In addition to the ETS, government has agreed to a number of high level targets for New Zealand to provide a focus for climate change policies over the next 30+ years.[iv] Detailed policies are currently being developed in the relevant sectors to implement these targets.

A number of high level targets have been set as a focus for climate change policies over the next 30+ years

- By 2025, 90 per cent of our electricity generation will be from renewable sources [at present it is around 70%].
- By 2040, our per capita transport greenhouse gas emissions will be reduced by half of those in 2007.
- We will be one of the first countries in the world to widely deploy electric vehicles.
- We will remain a world leader in agricultural emissions reduction research, and in the early adoption and application of new technologies and processes that reduce agricultural greenhouse gas emissions.
- By 2020, we will achieve a net increase in forest area of 250,000 hectares of that in 2007."[v]

Achieving these goals – or anything like them – will involve significant changes in the technologies associated with electricity generation, energy supply and its utilisation. It is also likely to involve some major changes in the behaviours and values associated with energy use. Similar, or even greater, change can be expected in the agriculture and land use sector.

Main Policy Impacts

Mitigation policies will push up energy prices, but current modelling suggests the effect will be modest.

The primary impact of mitigation policies will result from an increase in energy prices. Officials working for NZ's Emissions Trading Group estimated that establishing a price for carbon is likely to cause retail electricity to rise by between 5-20% over the base case between 2008-2012 (see table below).[vi]

Carbon price scenario	$15/t CO_2-e	$25/t CO_2-e	$50/t CO_2-e
Retail electricity c/kWh rise over base case	1c (5%)	2c (10%)	4c (20%)

However, this modelling may underestimate the future price of carbon

However, the above scenarios assume that the carbon price will remain within the band $15-50/tonne. Several studies have suggested that the future price could rise much further if it starts to reflect the full environmental and social costs of emissions, although there is little agreement on the extent of this rise. For example, the Stern review suggested the price could reach NZ$121/t$CO_2$-e, and a UK Economic Service Working Paper suggested an even higher price of around NZ$200/t$CO_2$-e.

Part of the uncertainty arises because existing carbon markets (such as the EU system) are relatively immature and subject to the effects of government intervention. Moreover, market prices don't yet incorporate the cost of stabilising atmospheric CO_2-e at 'safe' levels because no international agreement has been reached on what this level should be. The Intergovernmental Panel on Climate Change has reviewed modelling on the price effect of such targets, and suggested that stabilising global temperature increases at 2°C by 2030 would translate into a price of about NZ$133/t$CO_2$-e.

If any of these figures prove correct then future electricity prices could rise considerably more than has been suggested by the NZ Emissions

Trading Group. However, it is impossible to model this with any accuracy because high carbon prices would change the dynamics of the energy market quite significantly, prompting increased investment in renewables and – potentially – changes in the way the market is structured and/or regulated. What does seem certain is that the cost of both supplying and using energy is going to rise.

Another certainty is that the cost of oil-powered transport will increase as NZ and other developed nations try to lower transportation emissions. Again, officials modelling the impact of the ETS concluded that the impact would be fairly modest (see table below[vii]).

Carbon price scenario	$15/t CO_2-e	$25/t CO_2-e	$50/t CO_2-e
Petrol cost/litre rise over base case	3.7c (2.5%)	6.1c (7%)	12.2c (8%)
Diesel cost/litre rise over base case	4c (4%)	6.7c (7%)	13.3c (14%)

However, not only might this increase in line with a higher carbon price, but the evidence suggests that vehicular running costs would have to rise significantly more than a few cents per litre if they are to have a long term impact on transport behaviours. Future governments therefore may have to introduce additional pricing and other measures (such as the differential registration charges used in the UK) in order to achieve targets for transport emissions reduction.

The Effects on Industry

Some NZ firms will benefit from carbon pricing, however others will face costs

Some New Zealand firms will benefit from the introduction of carbon pricing. These include the owners of renewable energy assets and the suppliers of renewable and energy efficiency technologies, as well as the developers of clean technologies such as nitrification inhibitors in agriculture.

However, many New Zealand companies will face costs under the ETS, either because they face higher energy and fuel prices or because they will be required to surrender emissions units to cover their emissions. The modelling done for the NZ Emissions Trading Group suggests that the aggregate impact on the CPI will range between 0.2-0.5% in 2010 (depending on the price of carbon), rising to 0.3-1.2% in 2011 (the year after stationary energy firms join the ETS – see table below[viii]).

Carbon price scenario	$15/t CO_2-e	$50/t CO_2-e
Increase in CPI over base case in 2010	0.2%	0.5%
Increase in CPI over base case in 2011	0.3%	1.2%

Not all firms will be able to pass the costs down the supply chain – profits and competitiveness may suffer

However, some firms will incur higher additional costs than others. These include firms that:

- use a lot of energy in their production[ix]
- generate greenhouse gases as a by-product of their production processes[x]
- produce goods that have a high petrochemical content[xi]
- have a high transport component in their costs.

Many companies will be able to pass a portion of any additional costs down the supply chain, thus reducing the impact on their profitability. However, firms that do not have this option are likely to experience greater profit impact and a loss of competitiveness – particularly where they compete with offshore firms that are not subject to the same degree of emissions-pricing. The ETS includes measures to address these issues.

The Effects on Households

Household energy costs will rise – and it will take time to improve the energy-efficiency of our houses

Households will face higher energy bills unless they are able to find ways to reduce their energy use. The Government has recently broadened the scope of its energy efficiency support for households.[xii] However, New Zealanders live in some of the coldest houses in the developed world [xiii] and much of our housing stock is damp and poorly insulated. From the perspective of energy efficiency, we are starting from a relatively low base and we have a lot of capital stock to replace or change. Put simply, energy prices could start rising well before there has been sufficient time to improve the energy efficiency of anything other than a small proportion of our housing stock.

Again, there will be distributional differences in impact:

- by income – because those on lower incomes spend a greater proportion of their income on energy (see graph below)
- by region – because heating costs in the south are higher than in the north
- by adaptive capacity – for example, the very young, the elderly and the unwell can be more affected by the cold.

There will be distributional effects – by income, region and adaptive capacity

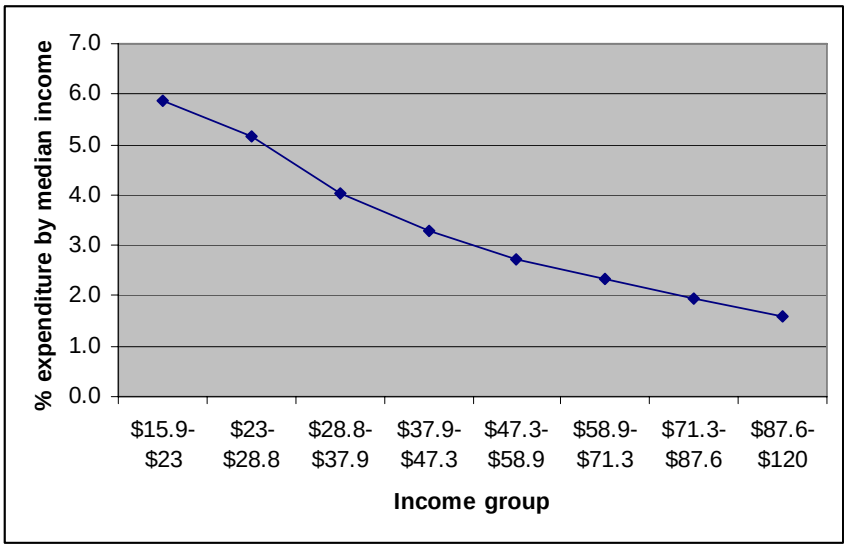

Figure: Total expenditure on domestic fuel as a % of household income[xiv]

Transport costs may also have a major impact on households. New Zealanders rely on the private car for their mobility more than people in most other developed nations – as reflected in our relatively high rate of car ownership (see below[xv]).

If private transport costs rise significantly, it could reduce the mobility of many NZers during the transition to a low carbon transport system

Country	NZ	Canada	USA	UK
Cars/1000 population	613	561	482	429

It is possible that policies may have to be introduced that significantly increase the price of running oil-powered vehicles before low-emissions substitutes have yet become widely available and affordable. If this were to happen, it would be likely to reduce the mobility of many New Zealanders – particularly those on lower incomes - during the transition to a more sustainable transport system. This would reduce their access to a range of factors important to wellbeing, including employment; social and family networks; health services; and amenities such as shops, sports facilities and early childhood learning centres.

People at particular risk would include:

- those living in rural areas, or regions with particularly poor public transport networks
- people with age-related or other disabilities that affect their mobility, and
- families that rely on cars to transport young children.

Again, some people would be more at risk than others

Factors affecting the degree of socio-economic impact

Many factors will influence the dynamic described above. The key areas of uncertainty are as follows.

1. <u>The amount of behavioural change required</u>
The absolute degree of change that the transition to a low-carbon economy will involve will have a major impact on the challenge that transition creates. This, in turn, will be affected by a number of factors. One factor is the capacity of people to adapt to change; for example: doing things in new ways or simply giving up things that are becoming costly.

   Another is the pace of technological development. The evidence suggests that when the incentives are right, technological innovation can occur relatively quickly. It is possible that technologies will be developed that will enable emissions reduction while allowing lifestyles and economic activity to be relatively unaffected.

The greater the degree of change required in society, and the faster that change has to occur, the greater the risk of social hardship

2. <u>The speed with which the transition may be forced upon society</u>
The pace of change is the second major determinant of the impact of the transition, and again it remains highly uncertain. Factors influencing this include the emerging scientific evidence on the pace of climate change itself – and the risk of climatic tipping points in particular. Our understanding of the complex dynamics of global warming is still evolving. As more resources are put in to climate change research we may discover that the need for action is more (or less) urgent than we currently believe.

   Related to this is the speed and enthusiasm with which the international community adopts policies to reduce emissions. At present, the world has only just begun to consider the implications of reducing emissions but emissions control has yet to exert any real influence over people's lives, or require them to change their behaviours significantly.

Both climate change and efforts to control it will bring economic and social benefits as well as costs. The relative weighting of each will be key

3. <u>The relative costs and benefits of climate change</u>
Climate change will not be all bad for New Zealand. The physical changes themselves will bring some advantages, and the innovation that will be driven by mitigation policies could create economic opportunities and benefits for the country. The balance of costs versus benefits that will accrue to New Zealand remains uncertain and

subject to many influences, but we already have a strong base of renewable energy and experience on which to build.

Discussion Points

- Should decision makers be viewing the impact of climate change policy as a relatively minor process of social and economic adjustment, or will it have effects similar to (or greater than) previous shocks that have affected the New Zealand economy?

- How great is the risk that the transition to a low carbon economy will create a legacy of social disadvantage similar to the one generated during the changes of the late twentieth century?

- Will technology solve the problem? Could innovation allow us to maintain our current ways of living, working and producing while still reducing emissions?

- How great is the risk that the world will do too little too slowly to reduce emissions, and then be forced to do a lot very quickly in order to avoid catastrophic climate changes? What would be the implications for New Zealand society?

Endnotes

[i] Combining the Social Report's 15-24 and 25-34 age groups.

[ii] Stern, N. et al (2006), *Stern Review: The Economics of Climate Change*, HM Treasury, London.

[iii] 11 December 2006. See http://www.beehive.govt.nz/node/28030

[iv] Ministry for the Environment, '*New Zealand's climate change solutions: An overview'*, September 2007, p 19.

[v] NZ Government (2007) New Zealand's Climate Change Solutions: an overview. September. P 19.

[vi] NZ Government (2007) Regulatory Impact Statement for the Proposed NZ Emissions Trading Scheme.

[vii] Op cit

[viii] These figures were drawn from work done to explore the potential impact of the ETS. The Ministry of Social Development participated in this work along with Treasury and other agencies.

[ix] Such as cement, which is estimated to be responsible for around 4% of global greenhouse gas emissions. (Source: Netherlands Environmental Assessment Agency (2007) China now no. 1 in CO_2 emissions; USA in second position. Retrieved Aug 2007 from http://www.mnp.nl/en/dossiers/Climatechange/moreinfo/Chinanowno1inCO2emissionsUSAinsecondposition.html)

[x] Such as aluminium, steel – and cement.

[xi] Such as polypropylene – used for clothing – plastics, etc

[xii] The EnergyWise Homes package includes information for all income groups; grants for low income households, and a package of interest free loans for low to middle income households. Funds have also been allocated to increase public awareness and to help councils reduce consenting barriers.

[xiii] Schipper L et al (2000) *Indicators of Energy Use and Efficiency in New Zealand: An International Perspective: Comparison of Trends Through 1995.* International Energy Authority.

[xiv] This graph is based on data from the 2004 Living Standards Survey.

[xv] World Bank statistics: retrieved April 07 from http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20394834~menuPK:1192714~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html