



Kyoto Protocol

Disclosure of Contingent Liability

Executive Summary

The New Zealand Government signed the Kyoto Protocol in 1997. The Protocol aims to reduce emissions of greenhouse gases into the atmosphere in order to stem an apparent rise in average world temperatures. Developed countries ratifying the Protocol have agreed to reduce emissions in line with targets set for each country. New Zealand's initial commitment is to hold emissions to their 1990 level during the first Commitment Period, 2008-12. Achievement of these initial emission targets is expected to have little discernable impact on the climate, and is seen as a demonstration of goodwill. Emission targets in subsequent periods will need to be substantially lower to achieve the intended objectives.

Under the Protocol, the New Zealand Government is committed to the cost of purchasing emission units from other countries to cover any emissions in excess of its agreed targets. On current policies and trends, some net emissions can be expected during the first and second Commitment Periods, 2008-12 and 2013-17. In the third and fourth Commitment Periods, 2018-22 and 2023-27, there will be substantial net emissions because of continued reductions in emission targets and the flow on effects of reduced forest plantings after the late 1990s. The present value of the cost of purchasing emission units through to 2027 will be substantial.

The Government's financial statements are required to comply with generally accepted accounting practice, including disclosure of contingent liabilities. It follows that the Government's accounts should disclose its commitment to the Kyoto Protocol as a contingent liability. It is a possible obligation that arises from ratifying the Protocol, and it becomes a liability if and when the Protocol comes into force. Accounting standards require the disclosure of each class of contingent liability at the balance date, with a brief description of its nature and an estimate of its financial effect.

We have estimated the financial effect. This involves two steps: estimate of excess emissions and forecast of the prices of emission units. Clearly, there is considerable uncertainty about the likely outcomes. We therefore consider a range of possibilities. In general, we err on the conservative side, that is on the side of least cost to the Crown.

Depending on the assumptions, a conservatively estimated present value of the contingent liability for the first four Commitment Periods ranges from \$9 billion to \$14 billion. This is the amount that needs to be disclosed in the Crown accounts. We have not attempted to forecast beyond 2027, since by then new technologies may emerge. On current technologies, with the addition of each subsequent period, the liability would increase further. Hence again, we have deliberately erred on the conservative side.

1 Introduction

The New Zealand Government signed the Kyoto Protocol in 1997. The Protocol aims to reduce the emissions of greenhouse gases into the atmosphere in order to stem an apparent rise in average world temperatures. As a first step, developed countries, listed in Annex B to the Protocol, have agreed to reduce emissions below their 1990 levels by specified percentages by the first Commitment Period, 2008 – 2012. The percentages were intended to amount to a collective commitment to reduce emissions by 5 percent by that period. New Zealand's commitment is to hold emissions at their 1990 level, which is 15 percent below their level in 2001.

For the Protocol to come into force, it requires ratification by 55 countries which were parties to a 1992 UN Convention on Climate Change and which account for at least 55 percent of the emissions in 1990 by the parties to the Convention. The US and Australia have not ratified the Protocol because of the harm they believe it will do to their economic growth. They are nevertheless adopting policies aimed at reducing greenhouse gas emissions. Whether the Protocol comes into force or not now depends on whether Russia ratifies it. It is likely to be a year or more before Russia announces its decision.

The developing countries have not so far accepted emission reduction commitments under the Protocol. It is generally accepted that for the Protocol to achieve its objective of slowing global warming, it will need developing countries to accept emission reduction commitments, and it will need target reductions in emissions that are substantial.

Governments are adopting or planning to adopt a variety of measures to achieve their target reductions. Where countries are unable to achieve their targets through the measures they adopt, they can purchase emission credits from other countries - either from governments or from companies authorised by their governments. Emission trading is an important device for achieving global targets at least cost. Any obstacles to trading would further increase the economic impacts of the Protocol.

The position of each country is calculated in an agreed manner. CO₂ and other greenhouse gases are emitted by industries and consumers, and CO₂ is absorbed by trees as they grow. For each five year Commitment Period, the total emissions from agriculture, energy, industry, transport and waste are added up and their excess over an assigned amount is determined. The CO₂ released from forest that is harvested, but not replanted, is added. Finally, the CO₂ absorbed by the growth of forests planted since 1990 on land that was previously in another land use is deducted to give the net position.

The New Zealand Government has announced a range of policies designed to balance the need to reduce emissions with the need to protect the New Zealand economy from the extreme effects of the Protocol. In particular, the Government has exempted agricultural emissions (about half New Zealand's total emissions) from any carbon tax and has provided protection to the sectors said to have their international competitiveness placed at risk through Negotiated Greenhouse Agreements (NGAs). The overall effect of these policies is that New Zealand's emissions will exceed its targets. Initially there was hope that, at least during the first Commitment Period, the difference between the actual emissions and the target would be covered by forest sinks. This now appears unlikely. The Government will need to cover the balance through purchases of emission units in the international markets. The magnitude of the purchases during each Commitment Period depends on a number of factors, including growth in agriculture, energy demand, industry and forestry.

2 Disclosure of Contingent Liability

The Government's financial statements are required to comply with generally accepted accounting practice. In this respect the accounting practice is set out in FRS – 15: Provisions, Contingent Liabilities and Contingent Assets. It defines contingent liabilities. "A contingent liability is:

- (a) a possible obligation that arises from past events and whose existence will be confirmed only by the occurrence or non-occurrence of one or more uncertain events not wholly within the control on the entity; or
- (b) a present obligation that arises from past events but is not recognized because
 - (i) it is not probable that an outflow of resources embodying economic benefits will be required to settle the obligation; or
 - (ii) the amount of the obligation cannot be measured reliably."

The standard distinguishes between:

- (a) provisions – which are recognised as liabilities because they are present obligations and it is probable that an outflow of resources embodying economic benefits will be required to settle the obligations; and
- (b) contingent liabilities – which are not recognized as liabilities because they are either:
 - (i) possible obligations, as it has yet to be confirmed whether the entity has a present obligation that could lead to an outflow of resources embodying economic benefits; or
 - (ii) present obligations that do not meet the recognition criteria in this standard (because either it is not probable that an outflow of resources

embodying economic benefits will be required to settle the obligation, or a reliable estimate of the amount of the obligation cannot be made).

The Government's commitment to the Kyoto Protocol represents a contingent liability because it is a possible obligation arising from an obligating event - the signing of the Protocol. The obligation will be confirmed by the ratification of the Protocol by Russia, which is an uncertain event not within the control of the New Zealand Government.

FRS 15 defines obligating events. "An obligating event is an event that creates a legal or constructive obligation that results in an entity having no realistic alternative to settling that obligation." If Russia ratifies, New Zealand is obliged to comply with the Protocol.

FRS 15 continues (paragraph 11.3) to say that "an entity must disclose for each class of contingent liability at the balance date, a brief description of the nature of the contingent liability and, where practicable:

- (a) an estimate of its financial effect;
- (b) an indication of the uncertainties relating to the amount or timing of any outflow; and
- (c) the possibility of any reimbursement."

In paragraph 6.4 the FRS discusses the estimation of the amount of a provision. It refers to the statistical method of estimation of an expected value by weighting all possible outcomes by their associated probabilities. In paragraph 6.10 it says that "where the effect of the time value of money is material, the amount of a provision must be the present value of the expenditures expected to be required to settle the obligation." In paragraph 6.12 it says "the discount rate must be a pre-tax rate that reflects current market assessments of the time value of money and the risks specific to the liability." We have followed these guidelines in estimating the financial effect of the contingent liability.

3 Financial Effects

The financial effects of ratifying the Kyoto Protocol can be reasonably estimated for the purposes of complying with the accounting standards. We have constructed a simple model to do so. Its results are summarized below.

If the Protocol comes into force, New Zealand will be bound forever. We assume that future implementation of the Protocol will follow the currently envisaged pattern, and will proceed in five year Commitment Periods. Each Commitment Period will involve step-wise reductions in emission targets. We have modeled the financial effects over the first four Commitment Periods: 2008-12; 2013-17; 2018-22 and 2023-27. Beyond that, there is the possibility that technological change will begin to take root. Limiting our horizon to 2027 also makes for a more conservative approach, since costs escalate with each reduction in emission targets.

The present value of the costs of purchasing credits to cover net emissions is calculated at a discount rate of 6 per cent in real terms.

The method for accounting for obligations under the Protocol is as follows. For each Commitment Period each country is set an assigned amount, which is related to its emissions in 1990. The total emissions from agriculture, energy, industry, transport and waste are added up for the Commitment Period. The assigned amount is deducted to give the excess emissions over the assigned amount. The CO₂ content of forests that are harvested, but not replaced, referred to as deforestation, is added to the excess emissions. The CO₂ content of the growth of forests planted since 1990 on land that was previously in another land use is then deducted to give the net emissions or net absorption for each Commitment Period. The Government has to purchase emissions units to cover these resulting net emissions; or, if it is a net absorption, the Government can sell emission units or carry them over to a later Commitment Period.

The key factors in our calculation of the net emissions or net absorptions are described in the next section. As far as possible, we have based them on official forecasts and methodologies. There are uncertainties over a number of component forecasts. In order to recognize these uncertainties and to keep the explanation of the analysis simple, we have taken a conservative approach that leads to under-estimating the financial effect.

The final factor in estimating the cost of the obligations which have been accepted in ratifying the Protocol is the price of emission units. We explain the basis of our forecasts of the price of emission units in Section 3.3. Again, we have tried to adopt a conservative position that would generally be favourable to the Crown.

3.1 Assigned amounts

The assigned amount is the target level for each country for a Commitment Period. The overall target for developed countries during the first Commitment Period is to reduce greenhouse gas emissions to a level 5 percent below their 1990 level. At present there are no enunciated reduction targets for the second and subsequent Commitment Periods. On the one hand, to have any meaningful effect on the stock of greenhouse gases in the atmosphere, and therefore on global warming, the reductions will have to be significant. On the other hand, the likely reluctance of developed countries to accept tighter constraints on their economic growth and of developing countries to accept any constraints, mean that significant reductions in assigned amounts are unlikely to be agreed. We therefore expect further reductions in the overall target to represent a balance between the apparent climate related need to cut emissions in the course of the century, and political realities.

In this context, New Zealand's assigned amount for the first Commitment Period is to bring net emissions back to their 1990 level. Given the difficulties in achieving significant reductions in targets for all countries, developing and developed, we have conservatively assumed the assigned amount will be reduced by 5 percent for the second Commitment Period, by a further 5 percent for the third Commitment Period, and by a further 5 percent in the fourth Commitment Period. We realize that, for the Protocol to be effective in

reducing global warming, reductions generally need to be more substantial than this assumption for New Zealand. The assumption is conservative.

3.2 Forecast of Emissions

Agricultural Emissions

Livestock emit methane, which is a greenhouse gas like CO₂. We have taken MAF's latest forecasts of livestock numbers, which have just been updated, although they have not yet been published. Along with MAF, we assume that animals will continue to become more productive each year. Greater output per animal involves greater grass conversion and higher emissions. The expectation is that emissions per animal will continue to increase at the same rate as in the past. The result is growth of agricultural emissions of about 1.1 percent per annum.

Emissions from the Use of Coal and Gas in Electricity Generation and Industrial Processes

There is a range of views on likely emissions from industry and, in particular, from electricity generation. Even among government agencies, forecasts range from the low rates of energy demand and emissions growth contained in a MED Energy Outlook to 2025, to higher forecasts issued by Transpower. Forecasts principally differ for three reasons:

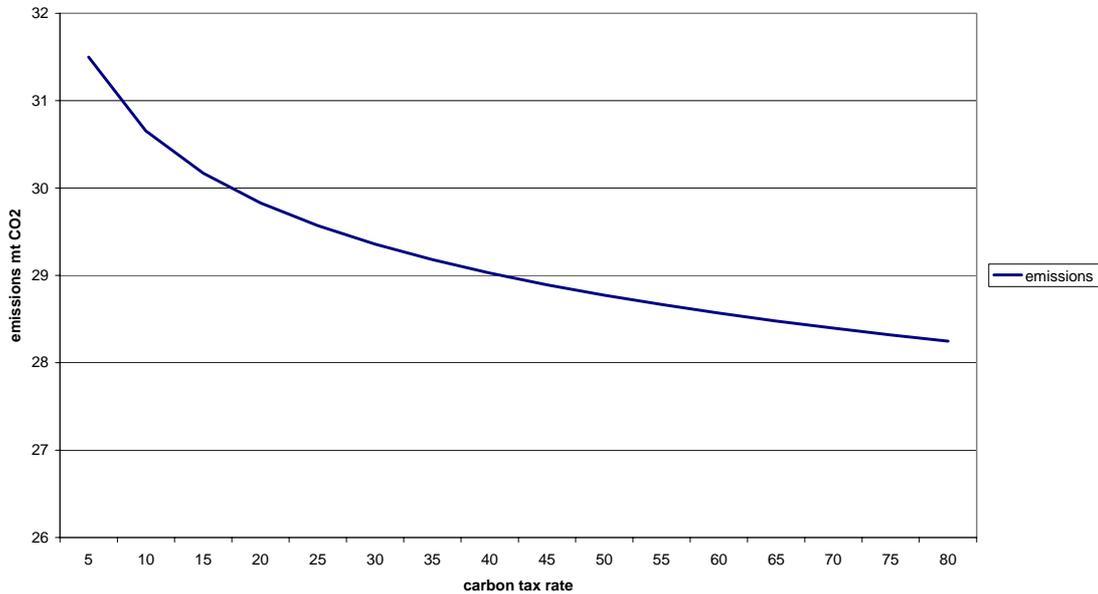
- Differing views on the possibility for improvement in energy efficiency
- Differing views on the extent to which discoveries of new gas fields will offset the need to rely on coal as the marginal source of thermal energy
- Differing views on the rate at which wind and other renewable energy can be harnessed.

In order to be conservative, we have adopted the MED forecasts in their reference scenario in their Energy Outlook to 2025.

The level of energy and industry emissions will also depend on the level of the carbon tax, and on the extent to which productive activities are sheltered by the NGAs. On current policies, we estimate that the NGAs will shelter 17.5 percent of energy and industrial emissions from the impact of the carbon tax.

We used the NZIER model to estimate the effects of different levels of the carbon tax on the emissions from the sectors exposed to the tax. The graph below shows this relationship.

Emission Abatement with Tax



For the purposes of estimating the impact of the carbon tax, we assume that the Government will set the carbon tax at the level of the international emission prices, with the exception of the first Commitment Period, during which the Government said it will cap the tax at \$25 per tonne.

Emissions from waste

We assume that emissions from waste will continue to decline at 4.5 percent per annum until 2010, recognizing the progress with landfills, and then increase in line with other non-agricultural emissions at 1.7 percent per annum.

Deforestation

Deforestation occurs when land on which forests have been harvested is not replanted, but reverts to another land use instead. It has traditionally been about 3 percent of the land area harvested. However, given the outlook for international supply of forest products, and the consequential outlook for log and forest product prices, deforestation will be high over the next few years and will then reduce towards earlier levels. We assume that it will be at 10 percent until 2004, then fall steadily to 3 percent again by 2022, and remain at that level until 2027. Again, if anything, this errs on the conservative side, since New Zealand will struggle to stay globally competitive in plantation forestry.

Sequestration by New Plantings of Forests

The conversion of land use to forestry by new plantings of forests since 1990, referred to as Kyoto forests, is a credit against the growth of emissions in calculating New Zealand's net obligation at the end of each Commitment Period. In the early 1990s new plantings were high as the price outlook for forest products was positive. In 1993, however, prices fell back

substantially and have continued to decline since then. The expansion of forests onto new land has therefore diminished substantially. A decline in new plantings and increased deforestation would occur together because they are driven by similar factors.

In line with official forecasts we assume new plantings will fall to 13,000 ha in 2005, then rise to 19,000 ha by 2008, to 20,000 ha by 2012, and then remain at that level. We believe this is an optimistic view, and may well over-estimate the likely new plantings.

3.3 Price of Emission Units

It is very difficult to assess the path of emission prices once the Kyoto Protocol comes into force. Current prices emerging from various partial markets which are already in existence are a poor guide. They reflect both the limited extent of the existing market and uncertainty about whether the Protocol will come into effect.

A realistic estimate of the likely liability if the Protocol comes into force would need to be based on prices that would prevail once there is no further uncertainty about the Protocol. In such a world, prices for emission units would tend to reflect the marginal cost of abatement among the participants of the trading regime. For example, if trading is restricted to the EU, prices would tend to be high to reflect the marginal cost of abatement available in the EU. Wider trading regimes will lead to lower prices, since marginal abatement costs in developing countries would tend to be lower.

We have come across a number of estimates of marginal abatement costs:

- In the short term, one of the most commonly identified forms of abatement is the substitution of gas for coal in electricity generation. The International Energy Agency estimates that the price of emission units would need to exceed €23/tonne CO₂ (NZ\$43), to make it economic to replace existing coal-fired capacity with gas.¹ Hence, emission prices would need to reach this level to achieve emission abatement through such substitution
- The Intergovernmental Panel on Climate Change in its 2001 report estimates that “marginal abatement costs are in the range of US\$20-US\$135/tC if international trading is allowed.” (NZ\$9 to NZ\$61/tonne CO₂)²
- The Australian Bureau of Agricultural and Resource Economics (ABARE) has reported to the Australian and New Zealand Governments on the economic implications of the Kyoto Protocol. In its report on the economic implications for Australia³ ABARE estimated a price of emission units of US\$27/tC in 2002 dollars for 2010 (NZ\$12.30/tonne CO₂). This estimate is at the low end of the range, and to a large extent reflects an availability of emission permits from Russia and Ukraine

¹ Julia Reinaud, International Energy Agency, Emissions Trading and its Possible Impacts of Investment Decisions in the Power Sector, page 7

² Report of Working Group III, Technical Summary section 8.3. Note that a tonne of carbon (tC) is equivalent to 44/12 tonnes of CO₂

³ ABARE, COP7: The economic implications of the Kyoto Protocol for Australia, page 14

in the first Commitment Period. This price cannot be sustained into future Commitment Periods

- Nordhaus and Boyer of Yale University maintain a global General Equilibrium Model for estimating the effects of greenhouse gas policies. They estimate prices in 2010, assuming trading within Annex I countries, at US\$61/tC in 1990 dollars, which converts to NZ\$38/tonne CO₂⁴

It is difficult to choose from the range of estimates. To be conservative, we estimate the Crown's contingent liability for two price scenarios. The low price scenario is NZ\$25 per tonne of CO₂ in 2008. This is close to where emission units are currently trading in Europe (€12.50 per tonne CO₂). The high price scenario of NZ\$40/tonne CO₂, is near the price needed to equate coal and gas generation costs (€23/tonne CO₂). We believe these assumptions to be conservative.

From 2008 onwards prices of emission units will rise. As they can be traded between Commitment Periods, given a well informed and liquid market, the price is likely to rise at something like the discount rate. Such a projection is in line with the price path shown in economic evaluations. Nordhaus and Boyer show it rising from US\$80/tC to US\$137/tC between 2014 and 2024 (in 1990 prices), a rate of 5.5 percent. ABARE's analysis for Australia shows it rising from US\$27/tC to US\$38/tC between 2010 and 2015, a rate of 7 percent. We assume the price of emission units rises at the discount rate of 6 percent per annum.

3.4 The Projects Mechanism

The 'Projects to Reduce Emissions' program is designed to support specified projects which would reduce New Zealand's emissions in the first Commitment Period, but which would not occur without the incentives provided by the program. The incentive is provided by transferring emission units, which will be potentially tradable on an international carbon credit market, to successful tenderers.

The Government initially made four million tonnes of credits available. The tender is likely to be repeated in the years up to the first Commitment Period. If there are three more tenders as large as the first one, then the Government could transfer around 16 million tonnes of credits under this scheme.

The Government appears to secure the full value of the savings beyond the first Commitment Period. For example, if the project has a life of 20 years and 12 or 13 years of this extended beyond the first Commitment Period, the Government would secure at least 70 percent of the emission credit value of the project. The Projects mechanism nevertheless incurs a fiscal cost. First, the Government loses potential revenue from the carbon tax that would have been paid by the producers had they not adopted the projects. Secondly, the

⁴ Nordhaus and Boyer, Yale University – Requiem for Kyoto: An Economic Analysis of the Kyoto Protocol, 1999

Government assumes liability for having to re-purchase any emission credits which winning tenderers sell abroad.

A numerical example illustrates this point. Let's say a winning project is a wind electricity generator, which replaces a coal generator that would have emitted 1 million tonnes of CO₂ over its life. Let's say this project received a subsidy of 0.5 million tonnes of carbon sinks from the Government.

If the project sells the credits it received to a foreign entity, under the Kyoto accounting rules, the project improves New Zealand's net international position by 0.5 million tonnes: 1 million tonnes due to abatement minus 0.5 million tonnes of credits transferred to foreigners. In the first instance, the Government also enjoys a fiscal benefit in that it has 0.5 million tonnes fewer credits to purchase internationally to cover New Zealand's shortfall. However, the Government then loses 1 million tonnes worth of carbon tax revenue due to the abatement under the project. Hence, the overall fiscal position deteriorates by 0.5 million units compared to the situation without the project.

Thus the Projects program is fiscally costly. We have incorporated this effect in our analysis by adding the 16 million units that the Government grants under the Program to its net purchase requirement for the first Commitment Period. Emission savings from the Program are included in the emission forecasts.

4 Estimates of the Contingent Liability

The estimates of the contingent liability using various assumptions are shown in the table below. During the first and second Commitment Periods our forecasts suggest a limited amount of net emissions or net absorption, depending on the assumptions about the price of emissions units. There is likely, however, to be a significant increase in net emissions during the third and fourth Commitment Periods, because sequestration credits which arise from high new plantings of trees in the early 1990s cease when those trees are felled in the third and fourth Commitment Periods. The bulk of the contingent liability arises during these later Commitment Periods.

At a price of emission units of \$25 per tonne CO₂ in 2008, we estimate the contingent liability at a present value of \$8.8 billion; and at a price of \$40 per tonne CO₂ we estimate the contingent liability at a present value of \$13.7 billion.

5 Revenue from the Carbon Tax

The contingent liability which the Government needs to disclose reflects the costs it will incur in purchasing emission units. The Government can also expect to collect revenue from the carbon tax. The Government has expressed the desire to use revenue from the carbon tax to reduce other taxes, so as not to raise the overall tax burden. It is unavoidable, however, that the overall tax burden will have to rise by the amount needed to cover the

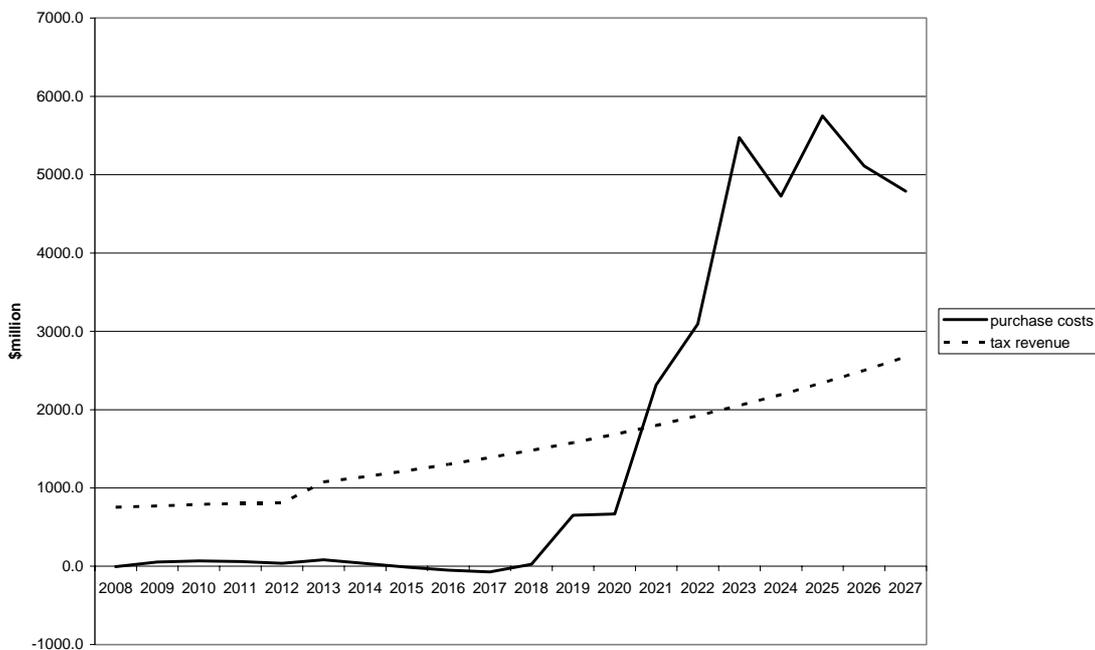
expected liability. At a price of emission units of \$25 per tonne CO₂ the present value of the carbon tax revenues is \$10.7 billion; and at a price of \$40 per tonne CO₂ the present value of the carbon tax revenues is \$15.6 billion. These figures assume the carbon tax rate equates the emissions price, with the exception of the first Commitment Period, during which it will be capped at \$25/tonne CO₂.

Taking the four Commitment Periods together, the present value of the tax revenues exceed the present value of the cost of purchasing emission units. However, under no emission price scenario does the present value of tax revenue exceed the liability by more than about \$2 billion. In other words, only relatively small reductions in other taxes would be possible to offset the increased tax burden of the carbon tax.

Moreover, the time profile of revenues and liabilities creates significant risks for the Government. In the first and second Commitment Periods the tax base of emissions is large compared to the net emissions or net absorption. In the third Commitment Period, however, the net emissions reach a similar magnitude to the tax base. In the fourth Commitment Period the volume of emissions to be purchased significantly exceeds the tax base. Prudent fiscal management will require the Government to set early surpluses aside to cover the growing obligations in future periods. However, it may be difficult to resist the pressure either to follow through with the initial promise to cut other taxes or to spend the apparent windfall.

The costs of the purchases (excluding the Projects Mechanism) and the revenue from the carbon tax are illustrated in the graph below for an emission price and carbon tax of \$25/tonne CO₂ in 2008.

Purchase Costs and Tax revenue



By 2020, the carbon tax revenue will no longer be sufficient to cover the Government's obligations. Other taxes will need to rise. This increase in tax burden will come at the same time as the expected increase in tax burden needed to cover the costs of superannuation. The combined effects will be dramatic.

In addition to declaring the contingent liability, we strongly believe the Government should incorporate the effects of the Kyoto Protocol into its Long Term Fiscal Model, and plan accordingly.

In conclusion, we reiterate that the Government has a requirement to disclose in its accounts the contingent liabilities arising from ratifying the Kyoto Protocol. The contingent liability is conservatively estimated at \$9 – 14 billion, which is a significant amount. While the Government's income from the carbon tax would cover the costs of purchasing emission units, the expectation of this revenue does not absolve it from disclosing the contingent liability.