

Implementing the carbon tax

A government consultation paper

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First published in May 2005 by the Policy Advice Division of the Inland Revenue Department,
P O Box 2198, Wellington.

Implementing the carbon tax – a government consultation paper.
ISBN 0-478-27125-5

FOREWORD

Climate change is one of the biggest environmental challenges facing the world today. It is a global problem that needs a global solution. In ratifying the Kyoto Protocol, New Zealand has joined more than 140 other countries in making a strong commitment to begin controlling emissions of greenhouse gases that cause climate change.

The Kyoto Protocol is designed to begin a long-term global economic transition to a future in which limits will increasingly be put on emissions. It does this by attaching a price to greenhouse gas emissions. That price is determined through the international trading of emissions units, with each unit representing one tonne of carbon dioxide or equivalent. Under Kyoto, the price of fossil fuels better reflects the environmental costs of using them, and business and consumer choices will begin to take these environmental costs into account.

Following extensive consultation, in 2002 the government announced a package of policies that New Zealand will implement in responding to climate change. As part of that package, it was decided that the international price of emissions should initially be reflected in our economy through a carbon tax, approximating the international price of emissions but capped at NZ\$25/tonne for the first Kyoto commitment period, 2008 to 2012. Carbon tax revenue will not be used to improve the Crown's fiscal position: it will be recycled into the economy through the tax system.

We view the carbon tax as a transitional path toward full or partial emissions trading, which may become a better option as world markets develop.

This consultation paper provides further implementation details on the carbon tax, and seeks views on its proposed operation. It is a technical paper, and will primarily be of interest to industries that will be directly involved in its implementation, such as fuel suppliers and firms that carry out certain industrial processes.

Most New Zealand consumers and businesses will not pay the tax directly. Rather, they will see changes in the relative prices of different sources of energy, transport options, and other products. Even though the flow-on effects of the carbon tax will not affect most household budgets by more than a few dollars a week, it will make a significant contribution to our adjustment to a world in which the environmental costs of our choices can no longer be avoided.

Tackling climate change will not be easy, but it is our obligation to future generations to try. The New Zealand government is proud to be part of the global effort that is taking the first step.

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Chapter 1

INTRODUCTION

- 1.1 The world's natural climate balance has begun to be seriously affected by human activities such as rapid industrialisation, agriculture and transport. They are increasing the concentration of greenhouse gases in the atmosphere, resulting in the Earth heating up at an accelerated rate. Weather patterns and climatic conditions are changing in the process. This is known as climate change. Unless global action is taken to curb the emission of greenhouse gases, the impacts of climate change are expected to become increasingly severe.
- 1.2 New Zealand and over 140 other countries are working to begin to reduce emissions through the Kyoto Protocol. The Protocol is designed to be the first step in a transition to a future in which limits will increasingly be put on greenhouse gas emissions. The key mechanism for achieving reductions is a "cap and trade" system of emissions allocations – each country receives a capped allowance of emissions, then trading is allowed between countries to encourage least-cost abatement. Trading establishes an international price for greenhouse gas emissions.
- 1.3 In 2002 the government consulted on, then confirmed, a package of domestic policies for responding to climate change. As part of that package, it was decided that the international price of emissions should be introduced to the New Zealand economy through a carbon tax, approximating the international price of emissions but capped at NZ\$25/tonne for the first Kyoto commitment period, 2008 to 2012.
- 1.4 Revenue from the carbon tax will be "recycled" by reducing other taxes by the amount expected to be collected. How this will be achieved will be announced in the 2005 Budget.
- 1.5 This consultation paper provides further detail and seeks comments on the proposed implementation of the carbon tax. It will primarily be of interest to industries that will be directly involved in implementation of the tax, such as fuel suppliers and firms involved in certain industrial processes. Feedback is sought on how it will apply to specific industries, and whether the detailed design proposals in this paper can be improved.
- 1.6 Most New Zealand consumers and businesses will not pay the tax directly. Rather, they will see changes in the relative prices of different sources of energy, transport options, and other products. These price changes will provide an incentive to switch to cleaner energy sources and make better use of energy. More information on the implications of the carbon tax for consumers and businesses is available on the Climate Change Office website, www.climatechange.govt.nz.

- 1.7 The carbon tax is to be applied to production and importation of various products known to result in emissions to the atmosphere of carbon dioxide, methane, and certain other greenhouse gases when used. The tax will also apply to some other human-induced emissions of these gases.
- 1.8 A consistent price will be put on these emissions, initially set at \$15 a tonne of carbon dioxide or carbon dioxide equivalent. The rate of the tax will not be changed in the first commitment period unless it diverges significantly and on a sustained basis from the international price, nor will it exceed \$25 a tonne.
- 1.9 The carbon tax will come into effect on 1 April 2007. Starting on 1 April 2007 will help to ensure that progress on reducing emissions begins early, enabling a more gradual transition to an economy with lower emissions.
- 1.10 The design of the tax aims to minimise the administrative costs of government and the compliance costs of those liable to pay the tax or eligible to claim rebates.
- 1.11 The tax is intended to affect only emissions for which New Zealand is responsible under the Kyoto Protocol,¹ which limits it to emissions occurring within New Zealand. If a fossil fuel that has been taxed is exported or the greenhouse gases from it are permanently embedded or sequestered (other than in biomass), rebates will be available. Rebates will also be available to firms with Negotiated Greenhouse Agreements, to ensure that New Zealand remains internationally competitive.
- 1.12 Legislation giving effect to the tax will be introduced late this year or early next year, and is expected to be enacted by the third quarter of 2006.
- 1.13 The Inland Revenue Department and the Customs Service will administer the carbon tax. The following types of firms are likely to be required to file regular returns with Inland Revenue:
- firms that mine petroleum products² except for crude oil that is sold in its raw state;
 - firms that mine coal;
 - oil refineries, in regard to production of emissions in the course of their activities;
 - firms that supply jet fuel to a domestic flight of a domestic airline;
 - firms that use geothermal energy for process heat or electricity generation;

¹ For further information on the Kyoto Protocol and the government's climate change policies, refer to www.climatechange.govt.nz.

² Generally petroleum mining permit holders.

- firms that carry out certain industrial processes (such as calcination of limestone for cement) that result in emissions; and
 - firms that seek rebates of the tax, except for the export of most petroleum products.
- 1.14 Rather than filing regular returns, the following types of firms are likely to be required to pay the tax to the Customs Service, together with any tariff or excise duty and/or GST:
- importers of coal, coal products, gas, and refined petroleum products (except crude oil imported through a refinery and jet fuel);
 - oil refineries, with regard to their refined products (other than jet fuel and non-emitting products); and
 - importers of carbon anodes, carbon pitch and carbon black.
- 1.15 Firms seeking rebates for the export of most petroleum products would claim a “drawback” from the Customs Service.
- 1.16 The carbon tax will apply from 1 April 2007 and continue until the end of the first Kyoto Protocol commitment period, on 31 December 2012. Policy for the second commitment period will be developed before the end of the first commitment period.
- 1.17 The government is open to the possibility that the carbon tax will be replaced by an emissions trading system when the international carbon market has developed sufficiently.

Submissions

- 1.18 The government welcomes submissions on the proposed approach to implementing proposals in this document. Submissions need not be limited to the suggested submission points.
- 1.19 Submissions should be addressed to:
- Carbon Tax
C/- The Deputy Commissioner
Policy Advice Division
Inland Revenue Department
PO Box 2198
WELLINGTON
- Or email: policy.webmaster@ird.govt.nz with “Carbon tax” in the subject line.
- 1.20 The closing date for submissions is 8 July 2005.

- 1.21 Please note that submissions may be the subject of a request under the Official Information Act 1982. The withholding of particular submissions on the grounds of privacy, or for any other reason, will be determined in accordance with that Act. If there is any part of your submission which you consider could be properly withheld under that Act (for example, for reasons of commercial sensitivity), please indicate this clearly in your submission.

Chapter 2

WHY A CARBON TAX?

- 2.1 The objectives of the proposed carbon tax are to help New Zealand to reduce its greenhouse gas emissions³ resulting from human activities, and to prepare the New Zealand economy for a smooth transition to more challenging commitments after 2012.
- 2.2 The 35 developed countries that have ratified the Kyoto Protocol have agreed to a cap on their national greenhouse gas emissions. Each country starts with an allocation of emissions units equal to its target – in New Zealand’s case, this is 1990 emissions levels. If a country reduces emissions below its target level, it will have surplus emissions units that it is able to sell. Conversely, countries that choose not to cut emissions to their target level will need to buy additional emission units to cover the excess. This trading of units between countries allows cuts to be made where they are most cost-effective and establishes an international price for emissions.
- 2.3 Putting a price on greenhouse gas emissions is a fundamental element of the Kyoto Protocol. It means that the price of fossil fuels will better reflect the environmental costs of using them, and that business and consumer choices will begin to take these environmental costs into account.
- 2.4 The carbon tax will signal to investors and consumers that they should reduce emissions when the cost of doing so is less than the cost of the tax. Over time, the broad awareness that there is, and will continue to be, an emissions price will mean lower emissions than would have been the case without a carbon tax.
- 2.5 Moreover, as international agreements become increasingly challenging beyond 2012, countries that have already integrated a price for emissions into their economies will see a growing competitive advantage over those countries that delay and need to act more abruptly.

Coverage

- 2.6 The carbon tax aims to price all major greenhouse gas emissions, other than methane and nitrous oxide from the agricultural sector, according to their global warming impact, when doing so is feasible and cost-effective.
- 2.7 Although farming emissions⁴ of methane and nitrous oxide are exempt from the tax in the first commitment period, farming groups are contributing to research to help reduce these emissions.

³ Emissions within New Zealand’s National Inventory under the United Nations Framework Convention on Climate Change (UNFCCC).

⁴ That result from animals and soil.

- 2.8 The tax will apply to New Zealand's emissions from fossil-fuel based energy supply and use, industrial process emissions, and fugitive energy emissions⁵ of carbon dioxide, methane and nitrous oxide. It will also include perfluorocarbons (PFCs) that result from industrial processes.
- 2.9 For the present, the government is not considering applying the carbon tax to sources of emissions that will be covered by other policies. They include emissions of synthetic gases, other than PFCs, from process emissions and methane from the waste sector.

Negotiated Greenhouse Agreements and business adjustment assistance

- 2.10 The government has introduced Negotiated Greenhouse Agreements (NGAs) to reduce the risk of economic activity moving from New Zealand to countries with less stringent climate change policies. This "carbon leakage" could occur if the carbon tax reduced the international competitiveness of some firms or industries relative to producers in other countries that do not have similar climate change policies.
- 2.11 In return for reducing emissions intensity to World's Best Practice (WBP) levels, eligible firms that successfully negotiate an NGA will receive either a partial or full exemption from the carbon tax. WBP will be determined with reference to the performance of the applicant's international peers.
- 2.12 The government has also agreed on policy to assist energy-intensive small to medium-sized enterprises adjust to a carbon tax, and will be working directly with energy-intensive sectors on its implementation. Further details are available at www.climatechange.govt.nz.

Expected impacts of the carbon tax

- 2.13 With the introduction of the carbon tax, consumption and investment are expected to shift to less carbon-intensive goods and services. Responses to the tax could take a wide variety of forms, ranging from investment in more fuel-efficient technology, to improved logistical planning, to substitution of fossil fuels with renewable energy sources. Investors and firms involved in carbon-intensive activities may invest in forest sinks⁶ or the Projects to Reduce Emissions programme⁷ to manage their exposure to the price of greenhouse gas emissions.

⁵ Fugitive energy emissions are those that leak or are vented during production and use of sources of energy, such as flaring at oil and gas production sites, leaks from gas distribution lines and methane emissions from coal mines.

⁶ Through the government's Permanent Forest Sink Initiative – <http://www.climatechange.govt.nz/policy-initiatives/sink-credits.html>.

⁷ Under the Projects to Reduce Emissions programme, the government awards internationally tradable emission units to firms undertaking projects that would not otherwise be viable and that will achieve additional reductions in emissions. Further details on Projects can be found on the Climate Change Office website at www.climatechange.govt.nz.

- 2.14 The tax is expected to lead to a one-off increase in some prices. There will be some costs to the economy as a result of the carbon tax, but these are a necessary consequence of New Zealand playing its part in reducing global emissions. However, there will also be offsetting benefits to the economy from the business tax reforms that will be financed by the carbon tax.
- 2.15 Overall, estimates of the macroeconomic impact vary, although a small but negative impact on economic activity (measured by GDP) is expected. Depending on the international emissions price, GDP in 2010 is likely to be in the order of 0.03% lower than it would otherwise have been.⁸
- 2.16 The effect of a \$15 a tonne carbon tax on household budgets is difficult to predict precisely. The complex nature of the electricity supply industry makes a key element, the expected increase in electricity prices, difficult to pin down, and households have a wide range of patterns of energy use. From a current residential price of around 17 cents per kWh, electricity could increase in price anywhere between 0.7 cents and 1.1 cents per kWh. The cost of a \$15 a tonne CO₂ tax to a typical household is estimated to total in the order of \$4 a week for electricity, petrol and other fuels, assuming average energy usage.
- 2.17 The table sets out a range of specific energy price increases that could result from the carbon tax, assuming a tax rate of \$15 a tonne of carbon dioxide or carbon dioxide-equivalent greenhouse gas and that all of the cost of the tax is passed on to customers, and the wholesalers and retailers do not price to retain their margins (in percentage terms).

Examples of price effects of the carbon tax

Product	Approximate price increase (GST exclusive)	Approximate price increase (GST inclusive)
1 litre of petrol	3.5 cents	4 cents
1 litre of diesel	4 cents	4.6 cents
1 GJ sub-bituminous ⁹ coal	\$1.33	\$1.50
10kg sub-bituminous coal	30 cents	34 cents
1 GJ natural gas ¹⁰	79 cents	88 cents
9 kg bottle of LPG	41 cents	46 cents

⁸ See ABARE Economics (2003) *Economic implications of the Kyoto Protocol for New Zealand: Sensitivity analysis*. Report to DPMC, May 2003.

⁹ Over 90% of coal used in New Zealand is of the "sub-bituminous" rank.

¹⁰ Ignores tax on emissions during gas processing.

Fiscal matters

- 2.18 The revenue from carbon tax will not be used to improve the Crown's net fiscal position, but will be recycled through the tax system. Tax changes will be announced in the 2005 Budget.
- 2.19 The carbon tax is also expected to have a number of incidental effects on the government's fiscal position. Renewable electricity generators, many of which are state-owned, are likely to benefit. The government's own energy costs will increase. Some forms of income support are also expected to increase as price rises caused by the tax flow through to the Consumer Price Index. These incidental effects will be managed through the normal budget process.

The climate change policy package

- 2.20 In October 2002, following extensive consultation, the New Zealand government confirmed the policies that will assist it to achieve its obligations under the Kyoto Protocol. Among these policies are a number of price-based measures that are designed to provide financial incentives to reduce greenhouse gas emissions. They include the carbon tax, Negotiated Greenhouse Agreements and the Projects to Reduce Emissions programme.
- 2.21 Policies have also been developed for specific sectors such as agriculture, forestry, small to medium-sized businesses and local government.
- 2.22 Other foundation policies which have been in existence for some time and will assist New Zealand to achieve emission reductions include:
- the National Energy Efficiency and Conservation Strategy, or NEECS, which promotes energy efficiency and conservation and renewable energy through establishment of energy efficiency and renewable energy targets, research, education and some financial support;
 - the New Zealand Transport Strategy, which guides use of transport services and infrastructure, including support for public transport;
 - the New Zealand Waste Strategy, which manages waste streams and has contributed to reductions in greenhouse gas emissions from landfills;
 - the government's Growth and Innovation Framework, since there is a strong relationship between growth in output, energy and CO₂ emissions;
 - public funding, through the Foundation for Research, Science and Technology, of research into energy technologies, including those enabling greater use of renewable energy;
 - a programme of raising awareness of greenhouse gas emissions and what the public can do about them, run by the Climate Change Office – for example, the “4 million careful owners” campaign; and

- the Sustainable Energy Framework work programme, led by the Ministry of Economic Development, which examines longer-term energy options from a sustainability perspective, of which climate change is a major component.
- 2.23 The policy package is built around commitments made by New Zealand when it ratified the United Nations Framework Convention on Climate Change in 1993, signed the Kyoto Protocol in 1998, and ratified the Kyoto Protocol in 2002. These commitments signal New Zealand’s commitment to working with the international community to address the global problem of climate change, and allow New Zealand entities to take advantage of the international demand for Kyoto Protocol-compliant emission units.
- 2.24 Under the Protocol, New Zealand has agreed to limit its greenhouse gas emissions in the first commitment period (2008 to 2012) to 1990 levels or take responsibility for emissions over this target. The long-term goal is to achieve lasting reductions in human-caused emissions.
- 2.25 See www.climatechange.govt.nz for more details about the government’s climate change policy package.

International approaches to incorporating the price of carbon in domestic economies

- 2.26 Countries such as Denmark, Norway, the UK and the Netherlands have implemented climate change-related taxes¹¹ (such as a duty on CO₂ in the Netherlands) and Switzerland has recently decided to do so.
- 2.27 Although developing countries and some economies in transition do not have legally binding emissions targets under the Kyoto Protocol some are implementing emission reduction initiatives. In some cases they are doing this in co-operation with developed countries using the Kyoto Protocol’s “Clean Development” mechanism.¹²
- 2.28 Emissions trading has begun in the European Union and in Norway, and is planned to begin in Canada from 2008.
- 2.29 Japan is considering possible emission pricing instruments.
- 2.30 Although the USA and Australia have not ratified the Kyoto Protocol, they have a number of national and state policies aimed at greenhouse gas emissions (such as Australia’s Mandatory Renewable Energy Target scheme) as well as some voluntary regimes.

¹¹ Some of these may be superseded or modified as a result of participation in the EU ETS.

¹² This mechanism allows developed countries to meet their target emissions through emission reduction projects in other countries.

Chapter 3

PUTTING A PRICE ON GREENHOUSE GAS EMISSIONS

- 3.1 Producers and importers of fossil fuels and firms that carry out certain industrial activities that produce greenhouse gas emissions will be responsible for paying the carbon tax.¹³ It is expected that they will pass on most of the cost of the tax to their customers.
- 3.2 Many aspects of the detailed administration of the tax are based on existing systems, such as those for collecting excise duty, GST and the Energy Resources Levy.

Minimising the number of points of obligation

- 3.3 It is not feasible to measure greenhouse gas emissions directly from their countless individual sources. Instead, quantities of products such as coal, gas and oil¹⁴ will be taxed in place of the emissions they are expected to produce when used. Applying a carbon tax in this way is common practice for similar taxes internationally, and was supported by the McLeod Review.¹⁵
- 3.4 Products will generally be taxed as early in the supply chain as possible, since this will usually result in the smallest number of liable parties, ensure comprehensive coverage and minimise the administration and compliance costs of the tax.
- 3.5 For example, coal will be levied as the miner sells it (other than for export) or uses it, or as it is imported. There are relatively few coal miners and importers compared with the number of users. A user of coal “downstream” from the miner or the importer would see the impact of the tax indirectly, through the price paid to its supplier.
- 3.6 Some products will not be taxed at the first point in the supply chain because of the difficulty of measuring quantities or emission factors at that point, or for administrative reasons. For example, crude oil going to an oil refinery will not be taxed; instead the products made by refining crude oil will be taxed.¹⁶ Jet fuel, discussed later, is the other major exception.
- 3.7 Beyond these administrative benefits, the point of obligation for the tax should generally have little economic effect as long as pricing agreements allow for full or partial pass-through of the price increase to customers.

¹³ This approach to the design of the tax is based on the April 1997 Treasury Working Paper, *The design of a possible low-level carbon tax for New Zealand*.

¹⁴ Appendix 1 lists products likely to be subject to the tax. Biofuels such as wood will not be taxed, but the fossil fuel component of composite fuels will be taxed.

¹⁵ Tax Review 2001, Final Report, October 2001, page 119.

¹⁶ Combustion of crude oil will also be subject to the tax unless an NGA provides an exemption.

Setting the price of emissions

- 3.8 The rate of the tax is intended to approximate the price of carbon dioxide-equivalent emission units on international markets in the first commitment period. This is consistent with Kyoto principles, which aim to promote abatement around the world at least cost.
- 3.9 The international price for the first commitment period is difficult to forecast and, given that the market is relatively “immature”, may be relatively volatile. Further, there are various “markets” (or types of emission units) that could be referred to. It will take some time for these markets to settle down and for reliable trends of prices, price differences and volumes to become evident. For this reason, the government cannot specify at this stage the basis on which prices might be adjusted.
- 3.10 The government is aware that changing the rate frequently would create its own administrative and compliance costs, as well as cause business uncertainty.
- 3.11 The government has decided that the carbon tax legislation will initially set the tax at NZ\$15 a tonne CO₂-equivalent emissions. The rate will be amended only if it diverges significantly and on a sustained basis from the long-term trends in the international price, but it will not exceed \$25 a tonne of CO₂ during the first commitment period.
- 3.12 The government will develop a method for setting and changing the rate of the carbon tax as the various markets and information about those markets develop further. It will be the subject of public consultation once market information is more readily available.

Applying the price consistently

- 3.13 To apply the tax consistently to a given product or stream of production emissions, the quantity of each liable product will be multiplied by an “emission factor” and then by the rate of the tax, according to the formula:

$$(\text{quantity of product}) \times (\text{emission factor}) \times (\text{rate of charge})$$

Example:

(1,000 GJ bituminous coal sold in period) \times (0.09 tonnes of carbon dioxide-equivalent emissions per GJ of coal) \times \$15 = \$1,350

- 3.14 Emission factors are used to calculate the tonnes of carbon dioxide-equivalent (“tCO₂-e”) emissions expected as a result of the use of one unit of the product (such as a litre of petrol). This takes account of the “global warming potential” (GWP) of a product’s greenhouse gas emissions relative to the effect of one tonne of carbon dioxide.
- 3.15 For example, the GWP of methane is 21,¹⁷ meaning that one tonne of methane has a similar impact over 100 years to 21 tonnes of CO₂. If pure methane leaks or is vented without being burned, its emission factor (in terms of mass) is 21 tonnes CO₂-e per tonne of methane. If it is burned, methane reacts with oxygen to form carbon dioxide and water, so methane supplied as fuel has a much lower emission factor than vented methane. The emission factor for a mixture of gases such as natural gas takes account of the GWP of each constituent.
- 3.16 Emission factors can be expressed in terms of any convenient unit of product quantity, and convenience has been the main criterion for the units proposed for the carbon tax (see Appendix 1). For fossil fuels this is often an amount of energy (such as tCO₂-e /GJ) rather than mass (such as tCO₂-e/t).
- 3.17 The necessity of applying the tax consistently with respect to a product’s global warming impact must be balanced against the importance of limiting the associated administrative and compliance costs to an acceptable level. Calculating and verifying emission factors for a large number of products that are sold only in small quantities would be costly relative to the environmental gain achieved.
- 3.18 The Intergovernmental Panel on Climate Change (IPCC) has established default emission factors for a large number of goods in a large number of uses. However, individual nations are encouraged to set their own emission factors when this can improve accuracy. The IPCC sets out methods of doing this, although it has not developed them for all products.
- 3.19 An emission factor for each product will be specified in New Zealand’s carbon tax legislation, based on the emission factors used by the New Zealand Inventory Agency (as named by the Climate Change Response Act) where suitable. Changes to reflect new knowledge of emissions or new products or uses can be made by regulation.
- 3.20 Some products, such as refined oil products and standard gas products, have relatively little variation in their carbon content and, for practical purposes, have a constant emission factor.

¹⁷ This is the Intergovernmental Panel on Climate Change (IPCC) 1995 100 year GWP for CH₄. Parties to the UNFCCC used the IPCC 1995 GWPs in 1997 when establishing national emission targets for the first commitment period. They are therefore used for determining compliance with those targets, and will be used for calculating the carbon tax. Increased scientific understanding suggests that the “true” global warming potential of methane in the atmosphere is higher than 21, and this may lead to a higher number being used in agreements relating to later periods.

- 3.21 In the consultation carried out to date, industry representatives have highlighted that precise emission factors for fossil fuels depend on a product's physical source. Most fossil fuels are expected to be charged using a default emission factor, but there will also be provision for "specific" emission factors to be used in certain cases. For example, a specific emission factor could be used for coal from a particular mine if a laboratory approved by the Climate Change Office verified that it was more than 2% below that indicated by the relevant default emission factor. Any independent laboratory recognised by the industry as having the expertise for this task would be likely to be approved. Some firms will already be aware of specific emission factors that will still be relevant in 2007.
- 3.22 In some cases, laboratory testing of products with specific emission factors may not be required. For example, firms sometimes blend products with known emission factors, or products that are to be subject to the tax with products that are not. Firms paying the tax would be permitted to calculate the emission factor for the blended product without verification, provided that they took reasonable care to do so accurately. Alternatively, they could account separately for the components of the blend.
- 3.23 In cases of separation of a product into two other products, appropriately qualified experts would be able to calculate a specific emission factor. It could be based on the known emission factor of the source (say, a gas stream), the quantity and emission factor of a product removed from that stream (say, carbon dioxide), or the quantity of the remaining product.
- 3.24 Default emission factors for products for which specific emission factors can be used would generally be set towards the upper end of the range of emission factors observed for each product type. Setting the default emission factor at an average of the actual emission factors for a product would tend to result in undertaxing emissions.
- 3.25 The likely default emission factors for a number of products are shown in Appendix 2. It lists products for which firms will be able to seek a specific emission factor.

Pass-through of the tax

- 3.26 The intended effect of the tax on relative prices will generally flow through the supply chain, depending on supply and demand elasticities at the time.
- 3.27 If the New Zealand price of the product does not tend to increase when New Zealand demand increases (as is likely to be the case for liquid petroleum products) there will generally be a presumption that the carbon tax has passed in full through the supply chain to the emitter. There is some uncertainty as to whether there will be 100 percent pass-through of the carbon tax on natural gas and some coal, and the impact on the electricity price of taxing fossil fuel and geothermal energy used in electricity generation is particularly difficult to predict.

- 3.28 Further analysis of these issues is being carried out and affected parties will have further opportunities for consultation on the matter.

Existing contracts

- 3.29 Given that a carbon tax has been contemplated since at least 1997, it is expected that most energy supply contracts applying in 2007 will allow the tax to be reflected in the energy price. However, it is possible that some, particularly older, contracts have not taken account of the likelihood that the carbon tax will be introduced.
- 3.30 Re-negotiating contracts before they are due for review or renewal is costly. Until these contracts run their course or are renegotiated, they will restrict the ability of suppliers to pass on the tax to energy consumers. In some cases, this could delay the intended effect of the carbon tax on fossil fuel consumption and be costly for suppliers. A number of industry participants have expressed concerns about this.
- 3.31 As a general principle, the government is reluctant to override commercial contracts negotiated in good faith between willing parties. However, given the concerns of some industry participants, the government will consider any submissions that the carbon tax legislation should include a provision similar to section 78 of the Goods and Services Tax Act 1985, to allow the pass-through of the tax, and any changes in its rate, in certain cases. Another precedent for such an override can be found in the Energy Resources Levy Act 1975.
- 3.32 Any override would not affect contracts that allow pass-through or expressly deal with the impact of the tax.

Stockpiles of coal and petroleum products

- 3.33 There are two potential problems in applying the carbon tax to stockpiles. One relates to the transition on introduction, and the other to the carrying cost of the tax on some of the very large stockpiles that consumers hold (as opposed to producers).

Transitional stockpiles

- 3.34 Some firms, particularly some electricity generators, are able to store large stocks of untaxed fuel at the introduction date. This is most likely to happen in the case of coal users, because of the ease of storage, and least likely for gas users, because there is little available storage for gas. Storage capacity for liquid petroleum products is limited, but some stockpiling is possible.

- 3.35 Given that the carbon tax will apply from 1 April 2007, and there is a risk of unintended disparities of the initial impact of the tax on the different fuels, it follows that users' coal and liquid fuel stockpiles that would otherwise not be taxed should be taxed on that date. Obviously, there is a question of scale here, and it would be sensible to limit the tax to larger stockpiles.

Carrying cost of the tax on large stockpiles

- 3.36 One firm has raised the question of the carrying cost of the carbon tax on its potentially very large stockpile of coal. It correctly pointed out that greenhouse gases will be released only when the stockpile is used.
- 3.37 For reasons of compliance and administrative simplicity, the tax will be levied at the earliest practical point in the supply chain. In the government's view, the mere existence of a stockpile is not sufficient reason to overturn the principle. However, if the stockpile is very large and therefore the carrying cost of the carbon tax is also large, relief could be offered by some form of stock-on-hand adjustment. The government is interested in hearing from those who might have very large stockpiles that may be held for longer periods of time about whether some form of relief would be necessary.

Submission points

The government welcomes submissions on the issues discussed in this chapter and, in particular:

- To what extent, if any, should the carbon tax legislation override existing contracts for the supply of energy resources to allow pass-through of the tax, and what would the consequences of this be?
- For what energy sources might a contractual override be necessary?
- Is there a need to tax transitional stockpiles if they are very large?
- Is there a need to consider the carrying cost of the tax on very large users' stockpiles?

Chapter 4

HOW THE TAX WILL WORK

- 4.1 The administration of the carbon tax, exemptions, rebates and refunds will largely be modelled on existing systems for tariffs, excise duties and GST.

Administrative roles of government agencies

Inland Revenue Department

- 4.2 Inland Revenue will be the lead administrative agency for the carbon tax. It will administer all points of obligation to pay the tax other than imports and removals from oil refineries, and all rebates except those administered by the Customs Service.
- 4.3 The standard Inland Revenue rules for handling tax will apply to its carbon tax mechanisms.

New Zealand Customs Service

- 4.4 The New Zealand Customs Service will collect the tax on products that are subject to the tax at the point of importation or when removed from a refinery, except for jet fuel – discussed later. The tax will be integrated with existing revenue collection systems.
- 4.5 Customs will also pay rebates to exporters of liquid petroleum products, except for those derived from compressing gas.
- 4.6 The standard Customs rules for payment of excise duty, excise-equivalent duty, tariff duty and GST will apply to the carbon tax.
- 4.7 As happens with GST, the Customs Service and Inland Revenue will exchange information to support the administration of the tax. For example, before the tax is implemented, Inland Revenue and the Customs Service will identify and contact firms that are likely to be required to register.

The New Zealand Climate Change Office

- 4.8 The New Zealand Climate Change Office (CCO), based in the Ministry for the Environment, is the lead agency with respect to climate change policy and technical matters. On many policy and technical issues CCO works collaboratively with other government agencies that have a major interest or relevant expertise – such as the Treasury, Inland Revenue, Customs Service, Ministry of Agriculture and Forests, and Ministry of Economic Development.

- 4.9 The CCO will be involved in non-collection aspects of the administration of the tax where appropriate. For example, it is responsible for negotiating NGAs, is the lead agency with respect to setting emission factors, and works with the Treasury and other agencies on setting the rate of the tax. It will keep Inland Revenue and the Customs Service informed of any details needed to enforce the carbon tax and to deliver rebates and exemptions.
- 4.10 Appropriate information exchange protocols will be set up between the CCO and Inland Revenue so that each agency can properly fulfil its carbon tax obligations.

Inland Revenue registration and filing requirements

- 4.11 Because the tax must be paid at the point of supply, many aspects of the administration of the tax will be modelled on existing GST legislation. Indeed, the carbon tax legislation is likely to use the term “supply”, as used in this paper, rather than “sale”.
- 4.12 The “time of supply (or sale)” will generally mean the earlier of the date of payment and the date of invoice. There will be a transitional rule on introduction to modify the more usual time-of-supply rule – the time of supply for product invoiced or paid for, but not delivered at the introduction date, will be the actual delivery date.
- 4.13 Firms liable to pay the tax directly and NGA firms will be required to file regular returns to Inland Revenue. Other firms claiming rebates of the tax (for example, a firm that buys coal and then exports it, becoming eligible for an export rebate) will do so in relation to one or more tax periods, but will not have to file regular returns. One-off returns are necessary to allow for casual exports.
- 4.14 Return filing will generally be electronic. Liable firms’ filing obligations will fall due when their GST return filing obligations fall due, albeit in a separate return. A firm required to file a carbon tax return but not registered for GST will be required to file six-monthly, unless it has elected to file two-monthly or monthly.
- 4.15 The administrative rules for amounts payable and for refunds will generally be the same as for GST, including rules for when payments are due and use-of-money interest on late payments. Firms eligible for a refund will be able to elect to transfer any payment due to them from Inland Revenue to meet tax obligations such as GST, and Inland Revenue will be able to use such amounts to reduce any amount the firm owes, such as outstanding income tax.

- 4.16 Normal rules for dealing with errors in GST returns and payments and for failures to meet GST obligations will apply to the tax. The disputes process with respect to obligations to Inland Revenue will be largely the same as for GST and income tax, but some technical issues, notably relating to product classifications and emission factors, will be determined by the CCO.

Estimation issues

- 4.17 The amount of the tax payable, and the amount of any rebates, will depend on the quantities and emission factors of each taxable product.
- 4.18 The CCO will provide guidance on what constitutes a “reasonable” level of accuracy, and declarations by independent experts may be needed in certain situations.
- 4.19 The units of measurement for each broad category of products and emissions (such as “liquid fuels”) will be defined in legislation. The likely emission factors for some key products are presented in Appendix 2. They are intended to be expressed in units widely used by the industry paying the tax.
- 4.20 When specific emission factors are used the cost of any scientific tests that are required will be at the expense of the firms involved, except when commissioned by Inland Revenue or the Customs Service, as part of an audit.

Exemptions, rebates and refunds

- 4.21 Relief from the tax, in the form of a rebate or exemption, will be provided:
- under the terms of Negotiated Greenhouse Agreements;
 - on export of fossil fuels; and
 - when carbon is permanently embedded or sequestered, other than in biomass.
- 4.22 Exemptions mean that a firm that would otherwise have an obligation to pay the carbon tax is not required to pay it for a particular product or activity. Rebates are subtracted from any carbon tax on the firm’s outputs to determine whether it is eligible for a net refund from the Crown (which will generally be the case for an NGA firm) or has a net liability to pay the tax.
- 4.23 The administrative and compliance costs of measuring emissions from some sources mean that it is not likely to be cost-effective to apply the tax to all producers.

- 4.24 A minimum threshold of \$2,000 worth of emissions a year, calculated as if the charge was being applied, is proposed for application of the carbon tax to any taxpayer. A firm will be required to register to pay tax only if its carbon tax liability for the past year, had the carbon tax applied, or its expected carbon tax for the coming year, had the carbon tax applied, exceeded this amount. This rule will be modelled on the GST minimum threshold for registration.
- 4.25 Coal miners will not be required to pay the carbon tax on coal if the value of the coal they supplied or used in the past 12 months, and the expected value of the coal in the next 12 months, is less than \$2,000. This is intended to provide a simple way of excluding from the carbon tax a number of landowners for whom coal production is a minor incidental activity, avoiding the need to calculate their potential carbon tax liability.
- 4.26 The standard Customs Service \$50 minimum threshold will apply to total Customs Service levies and taxes, including the carbon tax on imported products.

Calculating rebates and refunds

- 4.27 Amounts of rebates will be calculated using the same formula as amounts of the tax, subject to a weighting reflecting an assessment of how much of the tax has been passed through¹⁸ to the firm claiming the rebate, and reflecting any “partial rebate” agreed in an NGA:

$$(\text{quantity of product}) \times (\text{emission factor}) \times (\text{rate of charge}) \times (\text{weighting})$$

Example: Firm that buys and exports bituminous coal (assumes 100% pass-through)

$$(1,000 \text{ GJ bituminous coal purchased and exported in period}) \times (0.09 \text{ tonnes of carbon dioxide-equivalent emissions per GJ}) \times \$15 \times 100\% \\ = \text{Rebate of } \$1,350$$

The refund is the sum of the rebates in this case because the firm has no direct liability for the tax.

- 4.28 The emission factor used to calculate rebates will generally be the one that applied to the input when the tax was levied on it. For products with only one emission factor, such as “spec gas”, this will be straightforward. However, determining the “rebate” emission factor will be more complex when a “specific emission factor” is required. This will arise for export of coal other than by the miner, for embedding of carbon from coal, and for rebates to NGA firms.

¹⁸ As noted in chapter 3, work on a method to determine how much of the tax will be passed downstream from fossil fuel producers and importers is in progress.

- 4.29 It would be unusual for firms to be able to gain a rebate for fossil fuel purchases as well as be liable for the tax on their use or sale of fossil fuel. Even so, some will be in this position, and their net liability or refund will be calculated as shown in the example below.

Example: Firm that mines lignite for local use and buys and exports bituminous coal (assumes 100% pass-through)

Amount of tax

$[(600 \text{ GJ lignite from own mine sold within New Zealand in period}) \times (0.095 \text{ GJ of carbon dioxide-equivalent emissions}) \times \$15 = \$855]$

- Amount of rebates

$[(1,000 \text{ GJ bituminous coal purchased and exported in period}) \times (0.09 \text{ GJ of carbon dioxide-equivalent emissions}) \times \$15 \times 100\% = \$1,350]$

= [Refund of \$495]

Timing of rebates and refunds

- 4.30 The timing of refunds of the tax to registered firms will be the same as that of refunds of excess GST input tax credits. Inland Revenue must refund any excess GST input tax by the fifteenth working day after the return is furnished (but typically makes the refund sooner), or the working day after a determination by the Commissioner of the amount payable. If the refund is not paid within this timeframe, interest is payable by Inland Revenue (subject to a right to withhold payment under certain circumstances).
- 4.31 The tax period in which eligibility for a rebate arises as a result of purchase of a product will be the date of “supply” of the product to the eligible firm.
- 4.32 As with GST input credits, rebates will be claimed at the end of each charging period. In particular, it is anticipated that occasional exporters will file as required, and “nil” returns will not be required from them.
- 4.33 Rebates administered by the Customs Service will be subject to the standard conditions that apply to duty drawback under the Customs and Excise Act 1996.

Evidence of emission factors

- 4.34 Firms seeking a rebate of the carbon tax will often be able to apply a standard emission factor. This will apply to standard products such as “spec gas”, but for products with many possible emission factors, such as coal, will require a different treatment. In these cases, firms will have to be able to support any claim for a rebate with information from the supplier to verify the emission factor used to calculate the rebate.¹⁹

¹⁹ If this is impossible for some reason (for example, because the supplier is unknown) there may also be an option to have the product tested, or use a standard emission factor.

- 4.35 An option being considered is whether suppliers of fossil fuels should be required to supply emission factors if requested to do so by customers.

Negotiated Greenhouse Agreements

- 4.36 NGAs provide relief from the carbon tax on emissions arising from a firm's production activities. NGAs do not affect obligations to pay the tax on fossil fuels sold by NGA firms. NGA firms will have both exemptions from obligations to pay the carbon tax directly, and rebates of the tax as reflected in the prices of their inputs.
- 4.37 The Climate Change Office is analysing the likely price pass-through for electricity, natural gas, and coal, to identify a standard pass-through weighting for each relevant source of emissions. NGA firms have been and will be consulted as part of this process. It is anticipated that standard weightings for each product will be set in the legislation or by regulation.
- 4.38 Other than for electricity, NGA rebates will not cover a "second-round price increase". For the purposes of calculating NGA rebates, the phrase "second round price increase" refers to an increase in the price of a product or service that does not result from application of the tax to the input itself, but rather from application of the carbon tax to a substitute product. (For example, charcoal made from wood is a renewable substitute for coal and may increase in value as a result of the tax on coal.)
- 4.39 Although Inland Revenue is responsible for administering relief under NGAs, the scope and level of relief will be determined as a part of the agreement.

Exported products

- 4.40 Exporters of emitting products will be entitled to relief from the impact of the tax because the emissions will occur outside New Zealand. The required documentation will be the same as currently required to justify zero-rating for GST on exported goods or for claiming duty drawback under the Customs and Excise Act 1996.
- 4.41 For some exported emitting products, exemption will be achieved automatically because the product will not pass the point of obligation – first sale or use in New Zealand.

Embedded or sequestered carbon

- 4.42 When carbon that has been or would normally be subject to the tax is embedded in a product or permanently contained (for example, in a spent gas field) so that it will not be released into the atmosphere, relief from the tax will normally be available. Sequestration of CO₂ in forests or other biomass will not qualify for this form of relief.

- 4.43 Embedding of fossil fuel into products that emit greenhouse gases only in very small amounts, very slowly or in exceptional circumstances will generally be treated as permanent embedding. Examples include tyres, tar and plastic. This reflects both the small quantity of these emissions and the cost of charging for them. However, if it becomes the norm for the product to be used as a fuel the tax may be applied at some point. (See discussion of the burning of embedded carbon from fossil sources in chapter 5.)
- 4.44 When possible, uses of fossil fuels that do not result in emissions will be dealt with by not imposing the tax at the normal point of obligation. For example, a New Zealand refinery will not be taxed for the sale of tar, which does not release CO₂ (and releases only minimal amounts of other greenhouse gases) during its normal lifetime.
- 4.45 To ensure that the scale of embedding by a firm justifies the administrative costs of providing a rebate, the Climate Change Office will approve the firms entitled to receive rebates for embedding and the rebates available to each approved firm. Once the approval is in place, a rebate can be claimed from Inland Revenue.

On-selling of rebated products

- 4.46 A firm that has claimed a rebate for a product will be required to pay carbon tax if it on-sells the product in New Zealand or uses it for a purpose outside the scope of the firm's NGA. The emission factor to be applied will generally be the one that applied when the rebate was calculated.

Other tax consequences

- 4.47 As with fringe benefit tax and excise and tariff duties, normal income tax rules will determine when the tax is deductible from income. The treatment of refunds (for example, in relation to an NGA or an exported product) will follow normal income tax principles in that the expenditure it relates to will be reduced by the amount of the refund. Thus the tax will generally be deductible for businesses, and any rebates will reduce the deduction.
- 4.48 Final consumers bear the cost of GST and, to ensure this, GST must apply at all points of the supply chain. The tax is expected to increase the price at which affected products are sold by producers and importers, and GST is taxable on the full value of the goods and services supplied. Therefore GST will apply to the part of that value attributable to the tax. Payment of the carbon tax itself will not be treated as payment for a supply.

Submission points

The government welcomes submissions on the issues discussed in this chapter and, in particular:

- How can the cost of filing returns be kept to a minimum while ensuring the integrity and fairness of the tax?
- Are the proposed units for product quantities and emission factors convenient and sufficiently precise?
- Are the proposed timing rules for payment and rebates of the tax reasonable?
- Would firms claiming rebates face difficulties obtaining evidence of specific emission factors?
- Under what circumstances should a firm in your industry be required or permitted to re-assess a specific emission factor (for example, because of changes in the product being mined)?
- What evidence that the tax has been paid on a product should a firm claiming a rebate be required to have?

Chapter 5

ISSUES FOR SPECIFIC INDUSTRIES

- 5.1 Points of obligation to pay the carbon tax, as well as some of the rules relating to emission factors will vary from industry to industry.

Petroleum oil and oil products

- 5.2 The tax will apply to imported oil products other than those delivered directly to a New Zealand refinery, and to most emitting products of New Zealand oil refineries. It will be collected at these points by the Customs Service, as part of the existing excise system. Process emissions from a refinery will also be subject to the tax, which will be payable to Inland Revenue.²⁰
- 5.3 This approach is intended to minimise the compliance and administration costs of the tax, using relatively few points of obligation and relatively few emission factors for the bulk of the oil product sold.
- 5.4 Emission factors for crude oil vary with each shipment, and even within the hold of an oil tanker. Determining emission factors for crude oil could therefore be imprecise, costly or a poor compromise, so the focus is on the refined products produced from it.
- 5.5 It is possible to burn unrefined crude oil to produce useful energy, although this does not appear to be occurring in New Zealand at present. In such cases the carbon tax would be applied, so appropriate emission factors would be needed.

Fossil-derived lubricating oils

- 5.6 In contrast to oil used as fuel, there are many varieties of lubricating oil, some of which are imported in small quantities. It is unlikely to be cost-effective to calculate emission factors for all of these products. However, lubricating oils contribute to greenhouse gas emissions and should, in principle, be subject to the tax.
- 5.7 Emissions from lubricating oil arise in a number of different situations, such as when oil used to lubricate an engine is burned, or when used oil is collected and burned as a fuel. This happens on a reasonably large scale, notably in greenhouses and in cement plants. Most lubricating oils that are not burned for fuel break down within a relatively short period of time, ultimately increasing greenhouse gasses in the atmosphere.

²⁰ As with other emission sources, this is subject to any exemption applicable as a result of an NGA or export of the product.

- 5.8 Applying the tax to lubricating oils when they are burned would risk creating an incentive for illegal disposal. Such disposal would create additional environmental problems. Furthermore, there are a large number of locations where burning might occur. Therefore, to ensure full coverage, minimise administrative and compliance costs and avoid unwanted environmental effects, the carbon tax should apply to lubricating oils when they are removed from a refinery or imported.
- 5.9 Because there are many lubricating oils²¹ with many emission factors, new products are introduced frequently, and lubricating oils make a relatively small contribution to New Zealand's greenhouse gas emissions, it would not be cost-effective to apply a different emission factor to every product. Therefore the government intends to establish default emission factors for, say, three broad categories of lubricating oil, such as "heavy engine oil", "light engine oil" and "other lubricating oils".
- 5.10 Specific emission factors will not be permitted for lubricating oils, as this would add significantly to the costs of administering and complying with the tax. Competing firms would face pressures to identify specific emission factors for each of their products adding costs to the industry as a whole.
- 5.11 As discussed later with respect to jet and marine fuels, special constraints affect the application of the tax to the use of lubricating oils in these industries. The government is considering how to deal with these applications of lubricating fuels, and whether an exemption or rebate approach would be appropriate for lubricating oils used on international journeys.

Aviation fuel sold for domestic use

- 5.12 Individual nations are not responsible, under the Kyoto Protocol, for emissions from international transport. Therefore jet fuel used on international flights is outside the scope of the tax. About 90 percent of jet fuel sold in New Zealand is used on international flights.
- 5.13 A potential constraint on applying the tax to fuel used on domestic flights is that New Zealand is bound by international air services agreements that do not allow taxation of consumables used on domestic legs of international flights by airlines claiming "cabotage"²² rights. However, the government understands that no airline is currently exercising such rights.
- 5.14 Because of the small proportion of the jet fuel sold in New Zealand that will be covered by the tax, it will apply to jet fuel further down the supply chain than it will for most other fossil fuel products. Jet fuel will therefore not be taxed when removed from New Zealand oil refineries or imported.

²¹ According to an industry source, there are over 1,000 different lubricating oils on the New Zealand market.

²² The term "cabotage" is used to refer to the carriage of cargo or passengers on a domestic leg of an international service.

- 5.15 Instead, the tax will be payable by a firm, generally an oil company, when it supplies jet fuel to “domestic airlines”, including foreign-owned domestic airlines, for domestic flights. International airlines and international flights by domestic airlines will not be taxed.
- 5.16 Domestic and international flights can be distinguished by their flight numbers. Moreover, it is rare for an aircraft to carry more fuel than is required to reach its next destination safely, owing to the cost of carrying excess fuel. Therefore the proposed treatment of jet fuel will be unlikely to result in charging fuel used outside New Zealand airspace.
- 5.17 The government is considering what unintended risks the proposed approach might pose and how such risks might be mitigated.
- 5.18 The government understands that most “avgas” sold in New Zealand is used domestically. Therefore avgas will be subject to the tax when imported or removed from a refinery, and a rebate will be available if it is used on an international flight.

Transport by sea

- 5.19 New Zealand is not treated under the Kyoto Protocol as being responsible for emissions from international transport, although these emissions are noted as a memorandum item in the national inventory.
- 5.20 New Zealand’s national inventory includes emissions from fuel supplied to ships in New Zealand, except when supplied for international transport.
- 5.21 Most fuel purchased in New Zealand is used in New Zealand. Therefore the tax will apply to fuel used in shipping when it is imported or removed from a refinery. A rebate will be available to a ship purchasing fuel for international transport.
- 5.22 Where fuel is sold to a ship carrying coastal cargo while transiting between New Zealand ports as part of an international journey, the domestic leg uses a small proportion of the total fuel used on the journey. It is proposed that the whole trip be considered international. This would slightly increase the cost margin between domestic operators of coastal shipping services and international operators carrying coastal cargo while in transit. There would, however, be similar treatment of domestic shipping operators and other domestic transport modes.

Fishing

- 5.23 Under the Kyoto Protocol, New Zealand is responsible for emissions from fishing operations when vessels refuel in New Zealand, regardless of where the fishing occurs. The tax will be applied to all fuel used in fishing when it is imported or removed from a refinery, with no rebate available to fishing vessels except if available under a Negotiated Greenhouse Agreement.

Gas and gas products

- 5.24 The carbon tax will be applied to gas when first sold or used by the holder of the petroleum permit under which the gas was produced. Flaring or venting by the permit holder will be treated as “own-use”. Oil products removed from the gas stream before the first point of sale (the point at which the product is first supplied by a producer to another person) will be taxed under the rules for oil products (for example, taxed when refined, if sent to a refinery).
- 5.25 At the first point of sale, a standard emission factor based on energy content (but assuming a standard carbon dioxide content) will apply to each standard gas product, such as “spec gas”, LPG and LNG. If such products were burned rather than sold, the same emission factors will apply.
- 5.26 If the gas sold or burned is not a standard product and does not meet specification, a specific emission factor, verified by an approved laboratory, will be required. Specific emission factors could also be calculated by the firm for gas streams that are blended in fixed proportions from other gases with approved emission factors.
- 5.27 If a petroleum permit holder sells or vents carbon dioxide in a gas stream containing too little hydrocarbon content to be burned, the tax will apply to the tonnage of carbon dioxide. This will avoid applying an energy-based emission factor to a gas stream with only a trace amount of combustible gas.
- 5.28 Except in the case of venting by the petroleum permit holder, emission factors will be based on the assumption that the hydrocarbons in the gas, when used, will be burned and thereby converted into carbon dioxide.
- 5.29 Natural gas leaking from transmission and distribution pipelines is primarily in the form of methane (CH₄). The 2004 national inventory²³ estimated that less than two percent of the gas entering the distribution system is leaked in this way. This estimate is based on assumptions about the metering error component of distribution companies’ unaccounted-for gas.
- 5.30 Given the technical difficulty of measuring these emissions and the existing incentives to minimise leakage, no adjustment will be made with respect to the methane that is leaked from gas lines rather than burned after being supplied, despite methane having a higher emission factor than carbon dioxide.
- 5.31 The tax will also apply to imported gas products and be collected by the Customs Service. Emissions from imported gas will be calculated on the same basis as emissions from gas produced by petroleum permit holders.

²³ Page 18, *New Zealand’s Greenhouse Gas Inventory*, Ministry for the Environment/New Zealand Climate Change Office, April 2004.

Coal and coal products

- 5.32 Coal will be subject to the tax when first imported, or sold or used by the coal miner, including in the manufacture of briquettes or other energy products.
- 5.33 Processed coal products such as briquettes will be subject to the tax when imported, but the tax will already have applied to the coal used in making coal products in New Zealand.
- 5.34 A default emission factor will be provided for each coal rank. It will be a rounded average of the range within that coal rank. Emission factors are likely to be close to those indicated in the table of products in Appendix 1, but require some further research.
- 5.35 Using an “energy-based” emission factor eliminates much of the natural variation that is found in emission factors based on product weight. However, coal from some mines may have unusually high or low emissions relative to energy – for example, owing to differences in hydrogen content. The government is likely to accept the risk that some coal will have above average emissions, but allow coal miners and importers to obtain and use a specific emission factor. This would need to be verified by a laboratory approved by the New Zealand Climate Change Office and, to avoid adding to administrative and compliance costs in relation to very small differences, to be at least two percent less than the relevant default emission factor.
- 5.36 Coal miners and importers will also be permitted to calculate specific emission factors from the default or specific emission factors of coal blended in fixed proportions, or when proportions of particular consignments are adequately recorded.

Coal-seam gas emissions

- 5.37 Coal-seam gas can either be vented or burned. It must be reduced to a safe level in the course of underground coal mining, but it quickly escapes to the open air from open-cast mines. Although some emissions of coal-seam gas occur naturally, the emissions increase as a result of human activity (mining or extraction). The increase in emissions should, in principle, be subject to the tax.
- 5.38 The National Inventory records coal-seam gas (CH₄) emissions as 315 kt CO₂-e for 2003, or 0.86% of New Zealand’s total emissions from energy. This is less than 0.5% of New Zealand's total greenhouse gas emissions. These estimates are based on measurements of coal production and assumed emission factors; the emissions are not measured directly.

- 5.39 If coal-seam gas is extracted for use as a source of energy (generally before the coal is mined), the carbon tax will apply to the petroleum permit holder,²⁴ using the same rules as for petroleum permit holders generally. (See paragraph 5.24 on gas and gas products.) This is intended to ensure that the tax applies equitably to all fossil sources of gas used for energy.
- 5.40 The impact of coal mining on coal-seam gas emissions varies significantly between coal fields, locations within coalfields, and over time. For the purpose of reporting emissions in the National Inventory, the Ministry of Economic Development has chosen two “release factors” for all underground mines, one for bituminous coal and one for sub-bituminous coal. These indicate an average level of coal-seam gas emissions for a given quantity of coal removed from these mines, and are useful for the purpose of calculating New Zealand’s overall greenhouse gas emissions. However, these average release factors would not be sufficiently accurate for the carbon tax: they would result in over-taxing some mines and under-taxing others relative to the true level of coal-seam gas emissions. On the other hand, attempting to accurately measure the increased emissions associated with the mining of coal from each location within each mine would be costly.
- 5.41 The quantity of coal-seam gas that is vented during the course of coal mining is a very small proportion of New Zealand’s total emissions from energy. There is no straightforward way of applying the tax accurately to coal-seam gas, and some of the gas must be vented for health and safety reasons. For these reasons it is proposed that coal-seam gas that is vented during the course of coal mining not be included within the scope of the tax. If it is collected and burned for energy, sold, or converted to another energy product, the tax will be applied.

Geothermal energy

- 5.42 Geothermal resources are used for electricity generation, industrial process heat and various other commercial and domestic applications. CO₂ and CH₄ are released from developed geothermal fields into the atmosphere at a much faster rate than would occur naturally. The National Inventory records emissions from this source as 367 kt CO₂-e for 2002, or about one percent of New Zealand’s total emissions from energy.
- 5.43 This percentage is expected to increase in the medium term as more geothermal development takes place. To ensure that the incentives are correct, the sector should be subject to the carbon tax, even though the current take from geothermal resources is not large.

²⁴ Under Crown Minerals rules, only a petroleum permit holder can make full commercial use of this gas.

- 5.44 Application of the tax to geothermal emissions is complicated by variations in emissions between fields, within fields over time – particularly in the first five years of using a new well, and according to the technology used. However, large geothermal field operators do carry out routine measurements that provide a basis for calculating greenhouse gas emissions. Their estimates, based on monitored levels of geothermal fluid flows and sampled gas concentrations, are provided annually to the Ministry of Economic Development.
- 5.45 The government proposes to use this data as the basis for levying the tax on major geothermal energy users. Normal requirements for taxpayers to take reasonable care in calculating their tax liabilities will apply. The possibility of an Inland Revenue audit will also ensure that there are clear incentives to revise the estimated gas concentration – for example, if there is reason to believe that it is no longer accurate – say, because a new well has been introduced to the system.
- 5.46 Because the cost of measurement would be excessive for small users, it is proposed that the tax apply only to firms using geothermal energy for electricity generation or industrial process heat, and not to retail operations such as motels or public baths. (This could change if a company supplied such operations with energy from a geothermal source on a large scale.) Emissions from down-hole heat exchangers are minimal, so these, too, will be excluded from the tax.
- 5.47 Further work is needed to establish the precise point of obligation, but it is anticipated that the large geothermal field operators or users, rather than owners, will be the appropriate place.

Industrial process emissions

- 5.48 Emissions from limestone during calcination and gold processing are examples of “industrial process emissions”.

Limestone

- 5.49 Limestone (calcium carbonate) differs from fossil fuels in that a significant proportion of it is used in ways that do not emit greenhouse gases. Rather than levy the tax on all limestone and provide relief for non-emitting uses,²⁵ the government intends to levy the tax only when the use of the limestone results in emissions.

²⁵ Non-emitting uses include any use of limestone in its natural state, such as a building or roading material or when applied to the soil without undergoing calcination.

- 5.50 The major industrial process that causes limestone to emit carbon dioxide is calcination. This process is a key part of manufacturing cement and burnt (quick) and hydrated (slaked) lime. Burnt lime is used in gold processing, steel manufacture, road stabilisation and paper manufacture, while hydrated lime is used primarily for water treatment, building materials, sugar refining and leather tanning.
- 5.51 “Clinker” is an intermediate product that is created when limestone is calcinated for the purposes of making cement. Further processing of clinker is required to make cement. The tax would be imposed on the amount of clinker made by cement manufacturers.
- 5.52 Lime fertiliser manufacturers will not be liable for the tax. Although application of lime fertiliser does result in emissions, applying the tax to lime might encourage farmers to increase use of nitrogenous fertilisers, emissions of which are not covered by the tax. The tax is not intended to apply to nitrous oxide emissions from agriculture, and nitrous oxide is a more potent greenhouse gas than carbon dioxide. Furthermore, nitrogenous fertilisers have other detrimental environmental effects.
- 5.53 As with coal and gas, the legislation will set a default emission factor, and cement manufacturers will be able to use a specific emission factor verified by an approved laboratory. Specific emission factors will need to be re-verified if the manufacturer changes its processes or input in a manner likely to increase the emissions per tonne of clinker produced.
- 5.54 Limestone also emits carbon dioxide when used as a catalyst in the processing of fine metal ores. These emissions will be subject to the tax according to the amount of limestone used in this way.
- 5.55 Emissions from limestone for purely educational or scientific purposes will not be subject to the tax, since the wide dispersion and small quantity of these emissions means that it is not cost-effective to apply the tax to them.

Soda ash

- 5.56 Soda ash (sodium carbonate) is used in the manufacture of glass, and carbon dioxide is emitted as part of that process. The tax will be applied to soda ash used in glass manufacture. The legislation will set a default emission factor, and manufacturers will be able to use a different emission factor if they obtain a figure verified by an approved laboratory.

Synthetic greenhouse gases

- 5.57 The “synthetic greenhouse gases”, or SGGs, include sulphur hexafluoride (SF₆) and the groups of chemicals known collectively as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

- 5.58 PFCs are emitted during the production of aluminium and are also used in the refrigeration industry as refrigerant gases, usually as part of mixtures also containing HFCs.
- 5.59 SF₆ is used in New Zealand primarily in the electricity industry as an insulating gas in high-voltage electrical equipment. HFCs are used in a wide range of applications where the ozone-depleting CFCs were once used – mainly in the refrigeration and air-conditioning industry, although there are many other uses.
- 5.60 The tax will apply to the emissions of PFCs during the production of aluminium. Other policy mechanisms will apply to emissions from SGGs that are imported into New Zealand.

Carbon pitch and carbon black

- 5.61 Carbon pitch, carbon black and related products release CO₂ when used in metal production. These products will be subject to the tax when imported or when removed from a refinery using mass-based emission factors.

Petroleum products used as feedstock

- 5.62 There are a number of processes in which petroleum products are used as a feedstock and CO₂ is emitted – such as the manufacture of methanol, hydrogen, hydrogen peroxide and steel. Complexity could arise in charging some of these products because some of the carbon in the petroleum product may be embedded in a final product that does not emit greenhouse gases covered by the tax.
- 5.63 Natural gas is the feedstock for the production of ammonia-urea. Some of the carbon from the gas is embedded in ammonia-urea but is released when the ammonia-urea is applied as a fertiliser. Nitrous oxide, another and more potent greenhouse gas, is also released, but nitrous oxide from agriculture is not within the scope of the tax in the first commitment period. Nitrous oxide is also released from other fertilisers, along with other detrimental environmental effects, and applying the tax to ammonia-urea alone could increase the use of these alternatives.
- 5.64 In the absence of comprehensive and consistent application of the tax to fertilisers, the government proposes that it not be applied to the emissions from ammonia-urea. The natural gas used as a feedstock in the manufacture of ammonia-urea will not be subject to the tax: the manufacturer will therefore be eligible for a rebate of the tax on this gas, as if it were being embedded in a non-emitting product.

Burning of embedded carbon from fossil sources

- 5.65 Products such as tyres and plastics contain embedded carbon from fossil sources. Such products can be used as a source of energy, either by burning them directly or, in the case of plastics, converting them to diesel first. If they are used as a source of energy they will release CO₂ to the atmosphere. Whether to apply the tax in such cases, and how to do so, will need to be considered if serious proposals of this kind emerge.
- 5.66 At present, there is interest in New Zealand in burning end-of-life tyres, in a suitably controlled environment, as a source of energy. This could play a role in reducing the scale of another environmental problem – that of disposing of waste tyres, and may displace other fuels with higher greenhouse gas emissions per unit of useful energy.
- 5.67 If there is a proposal to burn tyres on a significant scale, the government will then decide whether to apply the tax to new tyres and provide rebates for non-emitting uses of used tyres; apply the tax to used tyres burned for energy in controlled settings; or exclude tyres from the tax.

Products from biological sources

- 5.68 Biofuels and other products made purely from biomass will not be subject to the tax. They include wood, charcoal made from wood, ethanol made from dairy products, and diesel made from tallow or sugar. Carbon dioxide from these sources is considered carbon-neutral because it is renewable. (Carbon is re-absorbed within a relatively short period of time.)
- 5.69 Fossil fuels blended with bio-fuels will be subject to the tax in the usual way and at the usual point of obligation, since blending with a bio-fuel does not reduce the emissions from the fossil fuel when it is burned.

Submission points

- Do the proposed methods for establishing emission factors achieve an appropriate balance between accuracy and simplicity?
- Does the proposed approach make appropriate use of existing information flows in your industry?
- What would be the most convenient and appropriate unit on which to base the emission factor for each product? For example, should coal emission factors be based on energy content or on mass?
- What easily identified categories of lubricating oils would provide adequate precision in terms of applying appropriate emission factors but not lead to undue costs in calculating emission factors?
- What impacts would the proposed approach have on airlines?

- What impacts would the proposed approach have on the domestic shipping and fishing industries?
- The proposal is to have four default emission factors for coal – one for each rank. Is this too many, too few, or about right?
- Does the proposal not to apply the tax to coal-seam gas appropriately balance the interests involved?
- How can the tax be collected from geothermal energy users to a reasonable degree of accuracy but without imposing excessive compliance costs?
- What would be the best way of applying the tax to industrial process emissions, particularly those where some carbon is embedded, or providing relief from the tax where appropriate?

Appendix 1

GLOSSARY

Many of the definitions have been sourced from the GHG Protocol Initiative's glossary, which can be found at: <http://www.ghgprotocol.org/glossary.htm>.

Abatement An activity that results in the reduction of gross greenhouse emissions.

Anthropogenic Resulting from or produced by human beings.

Biofuel Fuels made from plant or animal material, e.g. wood, straw and ethanol from plant matter.

Biomass Biological matter or material. Living animals and plants.

CO₂ equivalent The quantity of a given GHG multiplied by its global warming potential. This is the standard unit for comparing the degree of warming which can be caused by emissions of different GHGs.

Carbon leakage The effect when an industry facing increased costs at home due to an emissions price, chooses to reduce production, close or relocate production to a country with less stringent climate change policies.

Carbon tax A tax applied to every tonne of CO₂-equivalent emissions of certain major greenhouse gases imposed by the Crown by, or in accordance with, relevant legislation.

Commitment period A range of years within which Parties to the Kyoto Protocol are required to meet their greenhouse gas emissions target, which is averaged over the years of the commitment period. The first commitment period is 2008-2012. The targets are set relative to greenhouse gas emissions in the year 1990, multiplied by 5.

Competitiveness-at-risk group This group includes sectors of the economy and particular industries that would find adjustment difficult if expected to make the transition to a direct price on emissions in the first commitment period. For these companies, it may be a choice of closing, changing location to a country with no or weaker controls on emissions ('carbon leakage'), or reducing staff or production in the short-term to compensate for the increased costs. NGA eligibility criteria include financial proxies to identify if a firm is considered to be competitiveness at risk for the purposes of NGA eligibility.²⁶

Embedded carbon Carbon that would have otherwise been released to the atmosphere, but is instead contained for the long term.

Emissions The intentional and unintentional release of GHGs into the atmosphere.

Emission factor A factor relating activity data (such as tonnes of fuel consumed, tonnes of product produced) and absolute GHG emissions.

Emissions permit A commodity giving its holder the right to emit a certain quantity of GHGs. Emissions permits will, in the future, be tradable between countries and other legal entities.

Emissions unit A unit representing one tonne of CO₂ equivalent emissions. See Climate Change Response Act for definition.

Energy Resources Levy (ERL) A levy applied, under the Energy Resources Levy Act 1976, to a range of fossil fuel products mined in New Zealand.

Exemption An exemption from an obligation to pay the tax – for example, as provided for under an NGA.

Excise duty Duty payable on domestic manufacture of goods listed in the third schedule to Customs and Excise Act 1996.

Excise equivalent-duty Duty payable on imported goods equivalent to the excise duty payable on locally manufactured goods.

First sale Generally, the first time something is supplied to a customer – for example by a mining firm. A "second sale" would occur if the customer on-sold the product. Special rules are needed to define the point of first sale in certain situations, such as when the supply and payment occur at different times.

Fixed-price contract A contract between a buyer and a seller agreeing the price at which a supply of goods or services will be made for a specified period.

Forest sinks See Sinks.

Fossil fuel A fuel that is sourced from fossilised biomass, such as oil and gas.

Foundation policies Actions that the government is already taking, or has already approved, regardless of its Kyoto Protocol commitments, which will assist New Zealand to achieve emission reductions.

Fugitive emissions Intentional and unintentional releases of GHGs from oil and gas wells and coal mines, joints, seals, packing, gaskets, etc.

Global warming potential (GWP) A factor describing the radiative forcing impact (amount of warming) of one unit of a given GHG relative to one unit of CO₂. For example, under the Kyoto Protocol, the GWP of methane is 21.

²⁶ See the Climate Change Office website for more details. Look for the NGA application guidelines. www.climatechange.govt.nz

Greenhouse gas (GHG) For the purposes of the carbon tax, GHGs are the six gases listed in the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).

GST Goods and Services Tax, a value-added tax levied under the Goods and Services Tax Act 1985.

Hydrofluorocarbons (HFCs) A group of greenhouse gases used in a range of industrial applications. The GWPs of these gases range from 1,300 to 11,700.

Industrial process emissions See process emissions.

Intergovernmental Panel on Climate Change (IPCC) Intergovernmental body that addresses climate change science. The role of the IPCC is to assess the scientific, technical and socio-economic information relevant to the understanding of the risk of human-induced climate change (www.ipcc.ch).

Inventory A list of an organisation's or a country's GHG emissions and sources.

Kyoto Protocol A protocol to the United Nations Framework Convention on Climate Change that will require countries listed in its Annex B (developed nations) to meet reduction targets of GHG emissions relative to their 1990 levels during the period 2008-12. For a country to be in compliance with its Kyoto Protocol commitment, it must retire Emission Units equal in number to its total greenhouse gas emissions during the commitment period. A country is assigned a number of units equal to its target (in New Zealand's case, five times its 1990 level of emissions). These are Assigned Amount Units. See definition of Emission Units for further explanation.

LPG Liquid Petroleum Gas, which, when burned, produces the greenhouse gas carbon dioxide.

Methane A greenhouse gas with emissions coming from ruminant livestock, landfills, coal mining and other sources. For the purposes of the Kyoto Protocol it has a GWP of 21.

National Inventory A quantitative list that estimates anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol.

Negotiated Greenhouse Agreements (NGAs) A contractual agreement between the government and a competitiveness-at-risk firm or sector to reduce greenhouse gas emissions in return for partial or full exemption from the carbon tax. The agreed emissions path would have the overall objective of achieving world best practice on emissions per unit of production. More information is available on the Climate Change Office website, including the Model NGA and application guidelines.

Pass-through In this document, means the increase in the price for which a product is sold, resulting from the application of the carbon tax.

Perfluorocarbons (PFCs) A group of greenhouse gases used in a range of industrial applications. PFCs are also produced during aluminium smelting. The GWPs of these gases range from 6,500 to 9,200.

Process emissions (or industrial process emissions) Emissions generated from manufacturing processes, such as cement or ammonia production.

Rebate An amount intended to offset any liability to pay the carbon tax or to compensate for the cost of the carbon tax in accordance with an NGA.

Refund A net amount owed to a taxpayer because the taxpayer's rebates exceed any amount of the tax for which the taxpayer is liable.

Relief Exemptions and rebates designed to offset the cost of the tax.

Renewables Energy sources that are constantly renewed by natural processes. These include solar, hydropower and wind, as well as technologies based on biomass.

Revenue recycling The return to the economy of revenue derived from the carbon tax.

Second-round price increase An increase in the price of a product or service that could be attributed to the carbon tax or other climate change policies but does not result from payment of the tax itself (meaning no one has paid the tax on the product or service at any stage in the supply chain), such as an increase in the price of wood waste that is due to increased demand for wood waste. NGAs do not cover second round price increases.

Sequestration The uptake and storage of CO₂. CO₂ can be sequestered by plants and in underground/deep sea reservoirs. (The latter is also called geological sequestration.)

Sink A "sink" actively removes a greenhouse gas from the atmosphere, such as a growing forest. A sink is distinct from a place where greenhouse gases can be stored ("sequestered"), such as an underground reservoir.

Sulphur Hexafluoride (SF₆) A greenhouse gas used in electrical switchgear and other industrial applications. Its GWP is 23,900.

Synthetic greenhouse gas Refers to HFCs, PFCs and SF₆.

Tariff duty Duty payable on imported goods for the purposes of providing assistance to local industry or the maintenance of international trade commitments.

UNFCCC United Nations Framework Convention on Climate Change negotiated by the world's nations in 1992. It aims to stabilise greenhouse gas concentrations at a level that avoids dangerous human interference with the climate system.

Appendix 2

PRODUCTS AND EMISSIONS SUBJECT TO THE TAX

Emissions from energy				
Product	Greenhouse gas emitted	Default emission factor²⁷		Specific emission factor permitted
Solid fuels				
<i>Coal²⁸</i>	CO ₂			
Anthracite		0.106	tCO ₂ -e/GJ	Yes ²⁹
Bituminous		0.090	tCO ₂ -e/GJ	Yes
Sub-bituminous		0.092	tCO ₂ -e/GJ	Yes
Lignite		0.095	tCO ₂ -e/GJ	Yes
Liquid fuels				
	CO ₂			
Diesel		0.00271	tCO ₂ -e/L	No
Petrol premium		0.00240	tCO ₂ -e/L	No
Petrol regular		0.00232	tCO ₂ -e/L	No
Light fuel oil		0.00294	tCO ₂ -e/L	No
Heavy fuel oil		0.00303	tCO ₂ -e/L	No
Lubricating oils		To be determined	tCO ₂ -e/L	No
Aviation gasoline (“avgas”)		0.00217	tCO ₂ -e/L	No
Jet kerosene (“jet fuel”)		0.00254	tCO ₂ -e/L	No
Crude ³⁰		To be determined	tCO ₂ -e/L	Yes
Naptha		0.00259	tCO ₂ -e/L	No
LPG		0.00303	tCO ₂ -e/kg ³¹	No
Gaseous fuels				
<i>First sale, own use, and importation</i>				
Natural gas to specification ³²	CO ₂	0.05239	tCO ₂ -e/GJ	No
Natural gas Kapuni	CO ₂	0.08410	tCO ₂ -e/GJ	No
Other natural gas	CO ₂	Specific emission factor		Yes
Propane	CO ₂	0.05960	tCO ₂ -e/GJ	No
Butane	CO ₂	0.06140	tCO ₂ -e/GJ	No
CO ₂ stripped from natural gas prior to first point of sale	CO ₂	1.00	tCO ₂	No
<i>Natural gasoline liquids</i>				
Synthetic methanol		0.00109	tCO ₂ -e/L	Yes

²⁷ These emission factors are indicative of those to be used for charging. Rebate emission factors will sometimes differ.

²⁸ Further work is being undertaken to establish suitably representative coal emission factors.

²⁹ Specific emission factors would be allowed for all coal types only where the default emission factor is more than 2% inaccurate.

³⁰ If burned.

³¹ According to industry sources, quantities of LPG are usually measured in kilograms.

³² The emission factor to be used for gas that, when sold by the petroleum permit holder, meets the specification for gas distributed through the main distribution network.

Product	Greenhouse gas emitted	Default emission factor ³³		Specific emission factor permitted
<i>Fugitive emissions</i>				
Natural gas to specification that is flared (as above)				
Geothermal	CO ₂ /CH ₄			
Geothermal power and heat emissions		To be determined in each case	tCO ₂ -e/t _{fluid}	Yes
Emissions from industrial processes				
Product	Emission	Default emission factor		Specific emission factor permitted
Coke	CO ₂			Yes
Coke default		2.85	tCO ₂ /t _{coke}	
Domestic coke		3.10	tCO ₂ /t _{coke}	
Coke for iron and steel manufacture		3.08	tCO ₂ /t _{coke}	
General industrial coke		2.99	tCO ₂ /t _{coke}	
Petro-coke		3.03	tCO ₂ /t _{coke}	
Pitch			To be determined	
Other				
PFCs emitted during aluminium production	PFCs	0.00018	tCO ₂ -e/t _{aluminium}	Yes
Lime products (produced from calcinating limestone)	CO ₂	0.00079	tCO ₂ -e/t _{lime}	Yes
Dolomitic lime	CO ₂	0.00091	tCO ₂ -e/t _{dolomitic lime}	Yes
Clinker production	CO ₂	0.00079	tCO ₂ -e/t _{clinker}	Yes
Soda ash	CO ₂	0.00042	tCO ₂ -e/t _{soda ash used}	No
Limestone used in an industrial process	CO ₂		To be determined	Yes

³³ These emission factors are indicative of those to be used for charging. Rebate emission factors will sometimes differ.

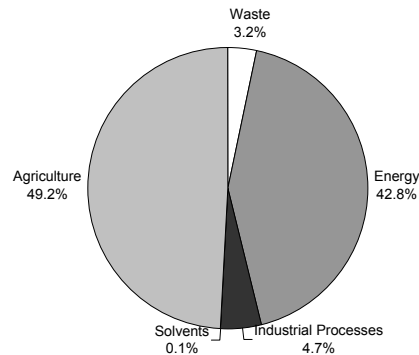
Appendix 3

NEW ZEALAND'S GREENHOUSE GAS EMISSIONS

The New Zealand Greenhouse Gas Inventory for 2002 reported two principal sources of emissions: the energy sector (primarily carbon dioxide emissions) and the agricultural sector (primarily methane emissions). New Zealand is unusual for an OECD country in having such a large portion of its emissions associated with agriculture. The energy sector had the fastest growth in emissions, with transport and electricity generation being the sub-sectors of highest growth.

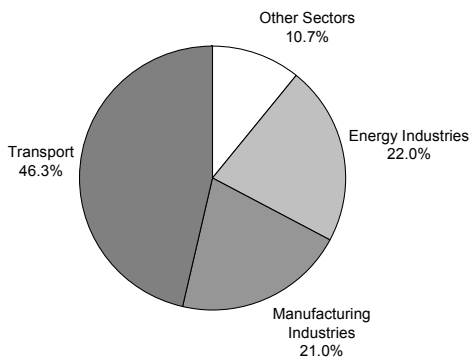
Figure 1 does not include the effects of land use change.

**FIGURE 1:
NZ's sectoral emissions in 2002
(all figures in GgCO₂ equivalent)**

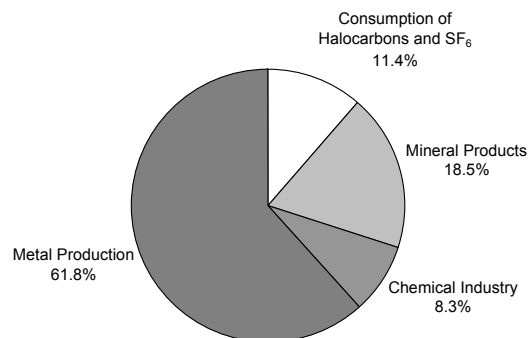


The carbon tax will not apply to the agriculture, waste or solvents sectors. ("Agriculture" excludes energy and transport emissions from agriculture.) Within the energy sector, the breakdown shown in figure 2 applies.

**FIGURE 2:
Emissions from the energy sector: fuel
combustion category in 2002
(all figures GgCO₂ equivalent)**



**FIGURE 3:
Industrial processes sector emissions in 2002
(all figures GgCO₂ equivalent)**



Within the industrial sector,³⁴ the breakdown shown in figure 3 applies.

³⁴ Does not include industrial heat and energy generation, which are included in the energy sector above.