



business opportunities and global climate change



**New Zealand Business Council
for Sustainable Development**

What is the NZBCSD?

The New Zealand Business Council for Sustainable Development (NZBCSD) is a coalition of leading New Zealand companies united by a shared commitment to environmental, social and economic development.

Formed in May 1999, the NZBCSD is a partner organisation to the World Business Council for Sustainable Development (WBCSD). The WBCSD is a coalition of 150 international companies with members drawn from more than 30 countries and 20 major industrial sectors. We also benefit from the WBCSD's global network of 30 national and regional business councils and partner organisations, involving some 1,000 business leaders globally.

NZBCSD Mission

Our mission is to provide business leadership as a catalyst for change towards sustainable development, and to promote eco-efficiency, innovation and responsible entrepreneurship. NZBCSD members believe that Sustainable Development is about ensuring a better quality of life for everyone, now and for generations to come.

NZBCSD Aims

The NZBCSD aims to provide:

- **business leadership** – to be the leading business advocate on issues concerned with sustainable development
- **policy development** – to participate in policy development in order to create a framework that allows business to contribute effectively to sustainable development
- **best practice** – to demonstrate business progress in environmental and resource management and corporate social responsibility and share leading edge practices among our members
- **global outreach** – to contribute to a sustainable future for developing nations and nations in transition.

Contacts

For more information contact Dr Rodger Spiller, Executive Director

Phone: 09 363 3308

Email: rodger@nzbcSD.org.nz

Web: www.nzbcSD.org.nz

Note from the authors

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PricewaterhouseCoopers accepts no liability or responsibility whatsoever to any other person or organisation who reads this report and owes no duty of any sort to such person or organisation. Any person or organisation reading this report must do so strictly on this basis.

We would like to take this opportunity to thank all those who were willing to share their experiences and contribute their time to this report. We believe this report will add to the informed debate on climate change in New Zealand, and further the development of the business opportunities that come from operating within a carbon-constrained economy.

For further information, please contact:

Andy Britton
Partner
PricewaterhouseCoopers

Phone: + 64 9 355 8000
e-mail: andy.britton@nz.pwcglobal.com

Raechel Cummins
Senior Manager
PricewaterhouseCoopers

Phone: + 64 4 462 7000
e-mail: raechel.j.cummins@nz.pwcglobal.com

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FOREWORD



Stephen Tindall, Chairman, New Zealand Business Council for Sustainable Development

The Climate Change Business Opportunities report has been released with the objective of leading business towards capturing the significant business opportunities that the climate change challenge presents. The intent is that all businesses will respond to this challenge and use the concepts within the report to assist them.

The report describes 32 potential business opportunities that the six participating companies have identified within their operations. These opportunities range from the provision of knowledge and services, to “climate friendly” branding, to investment in emissions reduction projects at home and in developing countries.

The report also provides high-level quantitative analysis on potential opportunities in five areas that public stakeholders and members were particularly interested in. These areas were commercial building energy efficiency, wood waste to energy, the Clean Development Mechanism (a mechanism where, under the Kyoto Protocol, countries can get credit for investing in emissions reduction projects in developing countries), methane reduction through ruminant efficiency and “climate friendly” branding.

Scenario analysis using high-level assumptions revealed that opportunities in these five areas could be worth in excess of NZ\$350 million per annum and could deliver greenhouse gas savings of around 9 million tonnes of CO₂ per annum. This is estimated to be the emissions reduction equivalent of taking over 2 million average family cars off the road.

For most companies climate change is now a risk management issue with significant opportunities. It therefore makes good business sense for business to understand and work to minimize their greenhouse gas emissions and identify business opportunities that are likely to arise out of a carbon constrained economy, as early as possible.



Dr Rodger Spiller, Executive Director, New Zealand Business Council for Sustainable Development

Climate change, caused by the release of greenhouse gases, is arguably the biggest challenge to sustainable development. Climate change has potentially serious environmental, social and economic consequences for New Zealand and the world as a whole. The NZBCSD seeks to provide business leadership, to inform the debate and influence policy development around climate change. Business activities that respond to the opportunities in climate change represent intelligent entrepreneurship, responsible risk management and good corporate citizenship.

On behalf of the NZBCSD I wish to acknowledge all those who have participated in this project. The leadership example of the six participating members deserves special thanks. These pioneering businesses are BP Oil New Zealand Ltd, Hubbard Foods Limited, Landcare Research, Meridian Energy Limited, Milburn New Zealand Limited and Urgent Couriers. Thanks also to the experts from NIWA and Telecom who provided project input. As the project consultants PricewaterhouseCoopers have demonstrated great commitment and expertise in how business can respond to the climate change challenge. Thanks also to my colleagues on the NZBCSD Executive Team for their substantial contributions to this initiative.

This report has also utilised expertise and resources from the Ministry of Economic Development. Thanks to the Government for their willingness to partner with business in identifying solutions.

This report is the first phase of the project. It will be followed in August by a concise industry guide and website on the “why” and “how” for greenhouse gas accounting and the potential business opportunities. The Climate Change Business Opportunities report is available on the NZBCSD website at www.nzbcscd.org.nz.

EXECUTIVE SUMMARY

The recent release of the New Zealand Government's preferred policy package clearly demonstrates an intention to ratify the Kyoto Protocol – final decisions are due in late July with ratification scheduled for late August 2002. The package invokes value and profitability issues for all businesses and raises opportunities that, if carefully managed, can positively impact on the bottom line and increase stakeholder value. Although these opportunities have initial costs and barriers, case studies have been used throughout this report to illustrate the business case of why organisations should be addressing the issues associated with climate change. These case studies prove that organisations which are beginning to develop and implement a climate change strategy are already benefiting through, for example, new service offerings, improved resource use efficiency or access to new markets. Our analysis confirms that business related climate change opportunities exist for organisations, and New Zealand as a whole. This report discusses some of these key opportunities.

Over the past six months, the New Zealand Business Council for Sustainable Development (NZBCSD), in conjunction with the Ministry for Economic Development (MED), has worked with six NZBCSD members to compile their corporate emissions inventories, using the Greenhouse Gas Protocol, and to identify specific business opportunities that would arise from operating within a carbon constrained economy. In addition, the MED has held a series of public workshops over the past year to identify, among other things, potential opportunities associated with climate change.

This report provides a simple, high level and transparent analysis of the nature and size of five of the business opportunities that were identified by businesses during the case studies and MED workshops, and attempts to quantify the potential size of each opportunity or risk. It is interesting to note that the same five general categories were identified as key opportunities at both the workshops and in the case studies.

The five key business opportunities for New Zealand organisations discussed in this report are:

1. Provision of Knowledge and Services

The information services industry is one of growing potential. It is not practical to attempt to quantify the size of this opportunity because there are too many unknown factors at this stage. However there is widespread acceptance that significant opportunities exist for the provision of climate change related knowledge and services, illustrated by a case from Landcare Research. International examples of managing climate change knowledge and services are examined, such as cdm-connect, and the UK Climate Change Project Offices. To progress this opportunity, the New Zealand Government needs to consider the short and long term needs of organisations wanting access to climate change information.

2. Energy Efficiency

The main benefit from implementing energy efficiency programs is lower operating costs through reduced energy bills over a short period of time. The upfront cost of an energy audit is approximately 5 percent of the annual energy bill, but the resulting savings are often in excess of 30 percent per annum. Based on the conservative assumption that the average commercial building energy efficiency can be economically increased by 15 percent, New Zealand businesses could save approximately:

- NZ\$109m per annum, with a minimum of 20 percent Internal Rate of Return (IRR) on investment, and
- 466,000 tonnes CO₂ equivalent per annum.

However, an additional benefit is that organisations that are able to quantify and report on the reductions in emissions from energy efficiency will in future be able to sell the carbon offset either in New Zealand or to the international carbon market. This ability to participate in international carbon markets will generate an additional revenue stream, making energy efficiency projects even more attractive. A significant barrier in the short-term for generating this additional revenue is the high level of transaction costs. To take advantage of these energy efficiency opportunities, the next step most New Zealand organisations need to take is:

- 1) commission an energy audit and implement the resulting recommendations, and
- 2) begin to understand the carbon markets and the opportunities it may present to individual businesses through energy efficiency projects

3. New technologies and practices

Technology and new business practices combined present a broad opportunity. Therefore within this category, ruminant efficiency and energy from biomass have been selected for further analysis. The results show that New Zealand's export income from sheep, dairy and beef is approximately NZ\$12.7 billion¹ per annum. If we assumed a 1 percent increase in sheep, dairy and beef productivity achieved through ruminant efficiency technology:

- methane emissions would decrease by 15 percent per annum² which equates to greenhouse gas savings of 4,650,000 tonnes CO₂ equivalent per annum.
- New Zealand businesses would increase their income from sheep, dairy and beef by NZ\$127m per annum.

New technologies and practices are making the production of energy from using wood waste (commonly known as biomass) a feasible alternative if certain assumptions and conditions are met. The most significant opportunity for wood waste is to use it to replace conventional fuels for heating, such as coal or gas. The analysis reveals:

- if all feasible wood waste available was utilised for heat, potential cost savings of approximately NZ\$75m per annum exist
- if this heat production displaced coal heating this would lead to a saving of around 6.9 million tonnes of CO₂ equivalent
- if this heat production displaced gas heating this would lead to a saving of around 3.9 tonnes of CO₂ equivalent.

The next steps for this opportunity include investing in research and technology to develop ruminant efficiency, and working together with the Government on a strategy to overcome some of the barriers to energy from biomass.

4. Kyoto Mechanisms

Under the Kyoto Protocol, New Zealand is listed as one of the industrialised countries that has been assigned an emissions target. This means New Zealand, along with other industrialised countries, has the opportunity to participate in the three Kyoto mechanisms that have the potential to dramatically reduce the cost of meeting the Kyoto targets; International Emissions Trading (IET), Joint Implementation (JI), and the Clean Development Mechanism (CDM).

¹ Trade New Zealand www.tradenz.govt.nz/. For the year 2000/2001. Dairy exports estimated at around 9 billion. Meat exports of sheep and beef around 3.7 billion. Wool Board www.woolgroup.co.nz/product_marketing/. Wool exports around 544.9 million

² Derived from Dairy Research Institute, AgResearch, IPCC and Livestock Improvement data – see analysis in Appendix II

New Zealand organisations have an opportunity to participate in the emerging greenhouse gas emissions trading market to generate additional revenue streams from verified emission reductions. However, participation in these markets requires a high level of understanding and compliance to the various schemes. The demand for emission reductions is currently being generated from the World Bank Prototype Carbon Fund (PCF), The Dutch Government's ERUPT and CERPUT programme, BC Hydro in Canada, and finally from national jurisdictions where emissions trading is taking place prior to trading under the Kyoto Protocol from 2002.

CDM is the only mechanism where high level scenario analysis has been performed in this report, as there has been a high level of interest in the CDM opportunity expressed at the MED workshops. The results show that using a range of NZ\$2 to NZ\$7 per tonne of CO₂, the resulting potential revenue for New Zealand could range between NZ\$6m and NZ\$19m per annum respectively.

Further investigation and guidance is needed to ensure New Zealand organisations have a clear idea on how these mechanisms operate and how New Zealand businesses could participate and benefit.

Improved trading opportunities

New Zealand organisations have an opportunity to improve trading opportunities by capitalising on New Zealand's "clean green" image through a branding scheme. However, an eco-brand must mean something to the consumer. For example, at least initially, "climate friendly" energy is likely to mean more to the consumer than a "climate friendly" apple. It would be possible to incorporate renewable energy and low greenhouse gas emissions into a generic clean/green New Zealand brand. The success of an eco-brand depends on consumer awareness and the maintenance of our "clean green" reputation.

The current value of New Zealand exports to the European Union is approximately NZ\$4.77b per annum³. A gain or loss of just one percent as a result of our greenhouse gas performance may mean a gain or a loss of almost NZ\$50m per annum.

More rigorous research on the potential opportunities for New Zealand relating to "climate friendly" branding is required. This should include market research on the domestic and international demand for "climate friendly" products and services, and how these should be developed and marketed, and research on the types of eco-brands that are working - their characteristics and their market value.

Further information

In this report, we have used the term "organisation", because climate change related opportunities are applicable to both the public and private sectors. In many situations, the opportunities to organisations are direct. There are also indirect benefits to be gained by associated organisations. This report does not attempt to quantify flow on effects, but where possible, has made reference to the possibility. All assumptions are stated, and the analysis methodology is transparent so that others with different information can use the same methodology to compare the impacts of different data. The results of these analyses are based on current information but are likely to change as more appropriate information becomes progressively available. This is because some information is likely to develop over time, or key factors are sometimes not currently measured and have therefore have to be estimated.

This report provides a very high level overview of each of the five opportunities identified at the MED workshops and through the case studies. Business opportunities relating to climate change are not necessarily dependent on the New Zealand Government ratifying the Kyoto Protocol, or the Protocol coming into force. For example, in many businesses, there is value in examining

³ Total exports to the EU in 2001 were NZ\$4.77 billion (15.15% of total New Zealand exports to all destinations i.e. NZ\$31.52m). Source: Ministry of Foreign Affairs & Trade/Statistics New Zealand

energy efficiency which will more than likely result in direct cost savings to the bottom line. Further research and analysis is needed for each of the above opportunities to maximise revenues and minimize costs to New Zealand and New Zealand businesses. These actions include providing clear guidance to business on calculating and reporting their emissions using the GHG Protocol.

To conclude, there are four types of impacts resulting from these business related climate change opportunities:

- economic
- financial
- environmental
- social.

Only the economic net benefit will contribute directly to an increase in New Zealand's economic growth on an annual basis. Each of the other categories of benefit will be a form of investment in activities which may eventually contribute to GDP. It is important then, that as well as taking up opportunities, organisations (including the Government) put in place tools for monitoring the, economic, financial, environmental and social impact of climate change and climate change mitigation measures.

I. THE BUSINESS OF CLIMATE CHANGE

For most companies climate change is a risk management issue, whether formally acknowledged or not. A recent report issued by CERES (Coalition for Environmentally Responsible Economies) examines how company directors and investors are responding to the risks associated with climate change. The report states:

“Simply put, the costs of inaction now outweigh the costs of action, and the sooner positive action is taken, the greater the economic benefits. It is now difficult to identify a sector of the economy that would not be affected in some way by climate change. The question is no longer whether any given portfolio contains climate risk, but how much.” The report goes on to conclude “At both company and economy wide levels, the right blend of policies and actions, if skilfully introduced, can not only substantially reduce the costs of climate change itself and climate change mitigation measures, but can frequently produce a net economic benefit”⁴.

Our analysis suggests that there are opportunities for organisations to add stakeholder value by good management of climate change costs and benefits. In this report, we have used the term “organisation”, because the opportunities are applicable to both the public and private sectors.

The Government’s preferred policy package

The recent release of the New Zealand Government’s preferred policy package⁵ clearly demonstrates an intention to ratify the Kyoto Protocol – final decisions are due in late July with ratification scheduled for late August. Business has until the middle of June to provide feedback on the preferred policy package.

The package has value and implications for businesses that will impact on their bottom line and stakeholder value. For those who develop and implement a climate change strategy, there are many opportunities that can be developed. For some, these are opportunities that need to be developed. The package’s key policies include:

- continuation of a range of existing Government policies
- a charge levied on carbon dioxide emissions between 2007 and 2012, which will be based on the international price of carbon, capped at NZ\$25 per tonne
- government incentives for projects that deliver defined reductions in greenhouse gas emissions (subject to certain qualification criteria). Under the Government incentive scheme businesses will have the opportunity to implement projects that were previously marginal. For example, forest planting on previously marginal land may now be economic or projects that did not pass the hurdle rate⁶ may now be economic
- negotiated Greenhouse Agreements for ‘Competitiveness-at-risk’ firms to exempt them from the carbon levy in return for a commitment to achieve ‘best international practice’ in managing emissions
- exemption for the agricultural sector from a charge on non CO₂ emissions, provided the sector invests in research to identify options for reducing emissions
- government retention of sink credits and associated liabilities.

⁴ Innovest Strategic Value Advisors, Inc., *Value at Risk: Climate Change and the Future of Governance*, CERES Sustainable Governance Project Report, (2002), page 9

⁵ For more information, please see Department of the Prime Minister and Cabinet “Climate Change, The Government’s Preferred Policy Package, A Discussion Document, April 2002” at www.climatechange.govt.nz

⁶ A hurdle rate is the rate of return which justifies an investment being made.

The climate change issue has a range of uncertainties. The Pew Center in the United States has been working with leading businesses, including BP plc, to better understand these uncertainties⁷. To assist business to take advantage of potential opportunities, Eileen Claussen, President and founder of the Pew Center on Global Climate Change, suggests policy makers need to provide an environment which allows:

- reasonable targets and timetables
- regulatory certainty
- protection from early action
- consistency in trading markets.⁸

Under the Government's preferred policy package, the policy instruments are applied in different combinations, to different groups within the economy at different times. Even though some of the New Zealand climate change policies will only come into effect in 2007, dealing with the risk can and should be acted on now. Organisations who are preparing for a carbon constrained economy are able to exploit the opportunities this may present.

The business case for a climate change strategy

Business leaders are sometimes unsure of the nature and size of the risk or opportunity that the climate change issue poses to their organisation. To clarify the situation, the following questions should be considered:

- what is the *maximum* value my business and shareholders are likely to gain or lose through climate change and climate change mitigation measures?
- what is the *likely* value my business and shareholders are likely to gain or lose through climate change and climate change mitigation measures?
- how much have I invested in understanding and addressing climate change issues to date?

Many organisations who are already engaged in climate change initiatives are large multinationals or are based overseas. Therefore a lot of the "learning by doing" has already been done by these companies, and many are publicly promoting their case studies to affirm their leadership in this area.

⁷ For more information on the Pew Center, please refer to www.pewclimate.org

⁸ Claussen, Eileen , Speech to PricewaterhouseCoopers Wellington Dinner, May 2002



“BP has proved that reducing greenhouse gas emissions can be good for a company's financial bottom line. Since 1997 BP internationally has reduced its greenhouse gases by 10% from a 1990 base line and at the same time

created \$US650 million in value. Other companies can also achieve these results.” Peter Griffiths, CEO,

BP Oil New Zealand Limited

The first step that organisations need to take when preparing a climate change business case and strategy is to compile a corporate emissions inventory. A robust emissions accounting system is critical to ensure all emissions information is relevant, complete, consistent, transparent and accurate.⁹ A full discussion on measuring and reporting greenhouse gas (GHG) emissions is included in Appendix III.

The business case to address climate change issues is equally applicable to all New Zealand organisations. By taking “first steps” organisations are able to:

- demonstrate leadership
- demonstrate responsibility
- reduce uncertainty through long term scenario planning
- hedge risk by participating in voluntary GHG markets
- reduce costs through improved processes and energy efficiency
- prepare themselves for, and participate in global and domestic regulation
- position themselves for eventual public action
- improve the efficiency and management of international operations
- improve employee recruitment and retention
- improve internal management accounting information
- ensure good public relations and reputation management
- gain experience and expertise through “learning by doing”
- generate additional revenue streams
- pass on a positive legacy to future generations i.e. “it’s the right thing to do”.

KEY LEARNING – THE BUSINESS CASE FOR ADDRESSING CLIMATE CHANGE ISSUES

The business case for climate change is more complex than a simple cost / benefit analysis. Organisations are investing in climate change strategies to:

- understand their issues
- minimise their risks
- maximise their opportunities.

⁹ The World Business Council for Sustainable Development, and the World Resources Institute, “The Greenhouse Gas Protocol, a corporate accounting and reporting standard” available free from www.ghgprotocol.org

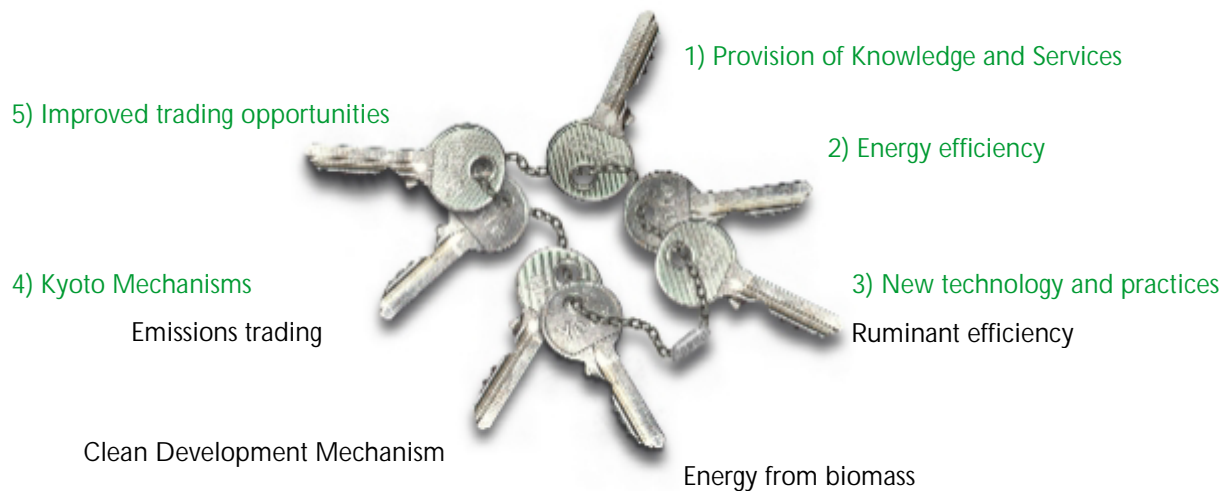
II. KEY BUSINESS OPPORTUNITIES

While the exact legislative framework around climate change is still unclear, it is almost certain that businesses will be operating within a carbon constrained economy during the next few years. Addressing climate change implications as part of an overall business strategy represents:

- intelligent entrepreneurship
- responsible risk management and
- good corporate citizenship.

Over the past six months, the New Zealand Business Council for Sustainable Development (NZBCSD), in conjunction with the Ministry for Economic Development (MED), has worked with six NZBCSD members to compile their corporate emissions inventories and identify specific business opportunities that would arise from operating within a carbon constrained economy. In addition, over the past year the MED has held a series of public workshops to identify, among other things, potential opportunities associated with climate change. It is interesting to note that the same five categories (two have subcategories) were identified as key opportunities at both the workshops and in the case studies.

The five key opportunities which were identified by business during the case studies and MED workshops,¹⁰ and discussed in this report are:



¹⁰ The method for choosing these top five opportunities was based on:

- The total frequency the opportunity was suggested at the MED workshops and by other stakeholders, taking into account who suggested it and how many times that person was likely to have already raised the issue
- Apparent opportunity for volume of emissions reduction
- Apparent opportunity for return on investment and gross revenue
- Relative ease of implementation (“low hanging fruit”)

This report defines “Business Opportunities” as:

1. Opportunities to add business value as a result of a carbon constrained economy (eg. new technologies/practices, research, consultation services, trading of emissions reductions) and
2. Opportunities to reduce costs through eco-efficiency initiatives (eg. energy efficiency).

The New Zealand Government sees a role for this project to assist them develop and implement proposed domestic climate change policy. The viability of these business opportunities is not dependant on the ratification of the Kyoto Protocol by the New Zealand Government or other Government climate change initiatives. For example, significant opportunities already exist for New Zealand organisations to implement energy efficiency practices. The sooner organisations become informed about climate change opportunities, the more prepared they will be to take them up.

The Government has recently announced its preferred policy package relating to the issue of forest sinks. In summary, the Government will retain all sink credits and harvest or deforestation liabilities arising from Kyoto forests.¹¹ Consultation is currently underway with the forestry sector on the mechanisms to establish and enhance both Kyoto and permanent (non harvest) forest sinks. For example, specific business opportunities exist to promote technologies to enhance carbon sinks through sustainable plantation forestry. Further, some sort of incentive structure to reward maximizing the carbon storage from new plantation forestry might encourage investment and innovation in this area. This report has not covered these opportunities relating to sequestration or the use of carbon-sink credits to attract investment because these are specific to the forestry sector rather than business at large in New Zealand.



Andy Pearce
CEO
Manaaki Whenua
Landcare Research

“Many New Zealand businesses have low-cost options to reduce their greenhouse gas emissions, often reducing costs at the same time. Tools to measure and manage emissions are now available, adapted for New Zealand conditions. My recent visit to London has shown that major industries, banking, investing and insurance organisations have an increasingly strong focus on the sustainable development performance of businesses. Reducing greenhouse gas emissions is a key element of that performance. London is setting itself to be the global centre for emissions and credits trading, and there is strong interest in credits from New Zealand.”

¹¹ Forests first established from 1 January 1990 are designated Kyoto forests

1. provision of knowledge and services

Climate change is a subject where expert advice will add value to most public and private sector organisations. A new industry has been created for people experienced in climate change issues to provide knowledge and services to other organisations, both domestically and internationally. However, the pool of experienced consultants at this stage is relatively small, so business opportunities exist for:

- qualified consultants to move into this area and upskill or
- experienced organisations to diversify and sell their “learning by doing” experiences.

The need for expert knowledge and services has arisen because:

- the domestic and international rules surrounding climate change programmes are still under development
- the terminology can be confusing
- many of the concepts are complex
- GHG reporting standards are comprehensive
- emissions related information is often technical
- some of the potential opportunities are hidden
- there may be significant costs if you “get it wrong”
- external independent verification is often required.

The information services industry is one of growing potential. It is not currently practical to attempt to quantify the size of this opportunity because there are too many unknown factors at this stage. However, there is widespread acceptance that significant opportunities exist for the provision of climate change related knowledge and services. Some of these opportunities include developing:

- the intellectual property, services or products regarding ruminant emissions¹²
- services to develop corporate emissions inventory
- services to compile emissions inventories for both businesses and individuals
- practical services to manage corporate inventory emissions, for example energy auditing
- strategic advice on climate change issues
- brokering services to participate in GHG markets¹³
- project development consultants¹⁴
- carbon investment funds and financial instruments¹⁵
- services to develop or maintain our national inventory register
- a competitive edge by providing climate change information
- verification/auditing of emission inventories and/or reductions.

Internationally there are initiatives to promote and facilitate climate change knowledge and services. For example, the Climate Change Project Offices in the United Kingdom aim to assist organisations take advantage of new opportunities in low carbon technology. The Offices were established in late 2001 with a particular mandate to assist firms with developing Joint Implementation (JI) and Clean Development Mechanism (CDM)¹⁶ project opportunities. The New Zealand Government may wish to consider ways that it can provide similar support towards developing private sector capabilities in New Zealand in these areas. Another example is the CDM connect initiative which aims to develop a virtual community of experts working in the CDM field. The tool has been developed by the World Business Council on Sustainable Development (WBCSD) in collaboration with the United Nations Development Programme (UNDP). More information can be found at www.cdm-connect.org.

¹² The Government anticipates funding will be provided for this research in the order of \$20 million per annum

¹³ Rosenzweig, Richard, Varilek, Matthew and Janssen, Josef, (2002) “The Emerging International Greenhouse Gas Market”, Pew Centre on Global Climate Change, Arlington, VA, USA page 19

¹⁴ *ibid*

¹⁵ *ibid*, page 20

¹⁶ For a detailed explanation of these mechanisms please see the Kyoto Mechanisms section

CASE STUDY – MANAAKI WHENUA LANDCARE RESEARCH

Landcare Research have developed the Emissions Biodiversity Exchange (EBEX21[®]) to help organisations offset their greenhouse gas emissions by restoring native forest biodiversity. As part of the process, organisations who participate in EBEX21 are required to develop an emissions inventory to calculate the required offset. The EBEX21 tool is a user friendly, simple and cost effective web based software package to develop this emissions inventory with a full range of services to complement an organisation's offset strategy.

EBEX21 is able to be used in partnership with the Greenhouse Gas Protocol (GHG Protocol), a protocol for greenhouse gas accounting and reporting, developed by the WBCSD and the World Resources Institute (see Appendix III for a full discussion on the GHG Protocol). The GHG Protocol allows organisations to use any tool they wish to calculate emissions, as long as the calculation methodology is consistent with its principles. The advantage of the GHG Protocol is it is comprehensive, credible (through extensive peer review) and internationally well recognised. By combining the EBEX21 tool with the principles and methodology of the GHG Protocol, New Zealand organisations have both international consistency and a user friendly tool.

As a result of their focus on climate change and climate change mitigation strategies, Landcare Research are finding opportunities both domestically and internationally to increase their services relating to climate change.

2. energy efficiency

For many organisations the efficient use of resources, particularly energy, is the first place where direct cost savings as a result of a climate change strategy can be achieved. Energy efficiency opportunities usually arise through:

- changing business processes, or
- examining operational efficiency.

Once a business process or operation is analysed, often an organisation discovers it is less efficient than thought. In each of the case studies, improving energy efficiency was identified as a relatively easy and cost effective strategy to reduce costs, and in some cases, energy audits had already been carried out.

The main benefit from implementing energy efficiency programs is lower operating costs through reduced energy bills over a short period of time. However, an additional benefit is that organisations that are able to quantify and report on the reductions in emissions from energy efficiency will in future be able to sell the carbon offset, either to other firms in New Zealand or to the international carbon market. This will generate an additional revenue stream making energy efficiency projects even more attractive. A significant barrier in the short-term for generating this additional revenue is the high level of transaction costs related to developing project baselines, project registration, monitoring, verification and reporting emissions compared to the current low carbon price and relatively small amount of emissions reductions which result from most energy-efficiency projects. The CDM Executive Board is currently developing streamlined procedures for energy efficiency projects which will in future assist in reducing transactions costs for generating value from carbon offsets from energy efficiency projects.

Rob Bishop is an energy efficiency expert and New Zealand accredited energy auditor. He notes that in his experience energy savings resulting from energy audits are often between 30-50 percent¹⁷. For example, The Warehouse and Auckland University have both saved over 50 percent of their original energy use. HVAC (Heating Ventilation and Air Conditioning) savings have often been missed even in buildings that have already been audited. These savings are harder to find, but often easier to fix than lighting and office equipment savings, which are very visible.

Based on the conservative assumption that the average commercial building energy efficiency can be economically increased by 15 percent¹⁸, New Zealand businesses could save approximately:

- NZ\$109 million per annum, with a minimum of 20 percent Internal Rate of Return (IRR) on investment, and
- 466,000 tonnes CO₂ equivalent per annum.

However, energy efficiency opportunities have three key barriers:

- tenancy issues – a tenant's energy bill is often a fixed component of the building lease. In some of the case studies the company had no control over the construction or the energy efficiency of the building they were leasing
- capital Investment – there is competition for capital for energy efficiency projects
- management Priority – energy efficiency projects often receive low priority from management because of the low awareness of the benefits of energy efficiency (such as cost savings, reduced emissions and better work environment).

¹⁷ Discussions with Rob Bishop, Energysolutions, Wellington May 2002.

¹⁸ The estimate of 15 percent is therefore likely to be conservative and in the bottom quartile of the potential energy savings within commercial buildings

There is also a large saving opportunity through better design of new buildings. Case studies indicate there can often be a large operating cost saving and even a capital cost saving through eliminating or reducing the size of building services equipment. The barriers here are the additional steps in the design process and the fact that the developer does not face the operating costs. It is also worth noting that the principles of energy efficiency apply equally to industrial buildings, resulting in further opportunities.

CASE STUDY – HUBBARD FOODS LIMITED

Hubbard Foods Limited is a manufacturer of breakfast cereal. Their manufacturing process involves an energy intensive cycle, located in two large Auckland factories. Rob Bishop performed a two hour “walk through” energy audit of one of the Hubbards buildings. The main benefit of performing an energy audit is it provides a clear identification of savings opportunities. A typical level 2 energy audit costs approximately 5 percent of the organisation’s annual energy costs (less for larger organisations due to economies of scale).¹⁹ His preliminary results indicate there are approximately 20–30 percent energy efficiency savings immediately available to the company through slightly reformed practices or equipment.

By estimating, registering, measuring, reporting, verifying and certifying the emissions reductions from the energy efficiency activities, Hubbard Foods Limited will have the opportunity to sell these reductions, either within the New Zealand market or internationally through emission reduction units under the Kyoto Protocol.

¹⁹ For more information, please see The Energy Efficiency and Conservation Authority, “Auditing Guide for Building Managers”, available at www.eeca.govt.nz

3. new technology and practices

There are two key areas in New Zealand where new technology and practices were identified as providing major opportunities:

3.1. ruminant efficiency

The agriculture sector remains a key economic driver for New Zealand, generating more than half of New Zealand's merchandise exports. New Zealand is also unique amongst developed countries in that more than half (55 percent) of our GHG emissions are non-carbon dioxide emissions from agriculture (methane and nitrous oxide).²⁰ This means annual emissions from sheep, dairy and beef are approximately 31 million tonnes of CO₂ equivalent.²¹ Because of the significance of methane emissions to New Zealand businesses, further research is required to develop and assess the viability of, ruminant efficiency technology. This area is relatively unexplored globally and New Zealand has a particular impetus to lead as we have the highest proportional agricultural methane emissions of all industrialised countries with emissions targets. Leadership in this area represents a real opportunity in the sale of intellectual property and is directly linked to the opportunity to provide knowledge and services. Related to our clean green image, the moratorium relating to Genetic Modification research may also be relevant to further research into ruminant efficiency.

The export of new technologies related to ruminant efficiency into markets where the New Zealand farming sector has been active could lead to additional revenues from certified emissions reductions from CDM projects in the Asia-Pacific region and Latin America and from emission reduction units from JI projects in Europe and Japan. This is a significant opportunity that is worth exploring further.

Currently, the New Zealand export income from sheep, dairy and beef is approximately \$12.7 billion²² per annum. If we assumed a 1 percent increase in sheep, dairy and beef productivity achieved through ruminant efficiency technology:

- methane emissions would decrease by 15 percent per annum²³ which equates to greenhouse gas savings of 4,650,000 tonnes CO₂ equivalent per annum
- New Zealand businesses would increase their income from sheep, dairy and beef by \$127 million per annum.

If New Zealand organisations require on average a 20 percent Return On Investment (ROI), they can afford to spend up to NZ\$530 million upfront on increasing ruminant efficiency (this assumes no ongoing additional costs) which would help strengthen the local agricultural/bio-tech services industry.

²⁰ Department of the Prime Minister and Cabinet "Climate Change, The Government's Preferred Policy Package, A discussion Document, April 2002" www.climatechange.govt.nz

²¹ Climate Change Programme, www.climatechange.govt.nz/sp/consultation/consultation.htm. In 1999 cows were responsible for 7 million tonnes CO₂ equivalent, Dairy for 7 million tonnes CO₂ equivalent and sheep 17 million tonnes CO₂ equivalent

²² Trade New Zealand www.tradenz.govt.nz/. For the year 2000/2001 dairy exports estimated at around \$9 billion. Meat exports of sheep and beef around \$3.7 billion. Wool Board www.woolgroup.co.nz/product_marketing/. Wool exports around \$544.9 million

²³ Derived from Dairy Research Institute, AgResearch, IPCC and Livestock Improvement data – see analysis in Appendix II

CASE STUDY – METHANE RESEARCH

AgResearch has an extensive programme of methane research, evaluating grasses, legumes and silages fed to cows and sheep to understand their contribution to methane production. Scientists are also looking at ways to minimise energy losses to methane, and identifying the principal microbes for methane production in the rumen to help researchers to manipulate the methanogens to reduce methane emissions. In May 2002, AgResearch announced trials carried out by AgResearch scientists Drs Garry Waghorn and Michael Tavendale at AgResearch Grasslands near Palmerston North have proved for the first time that condensed tannins found in some pasture species can directly reduce methane emissions by as much as 16 percent. The finding has major implications for the management of what is a large greenhouse gas emission problem, particularly for New Zealand, but also worldwide²⁴.

3.2 energy from biomass²⁵

Biofuels provide energy using alternatives to fossil fuels. This energy is known as bioenergy, and may be derived from a variety of sources, termed biomass. Biomass may be produced from purpose-grown crops or forests, or as a byproduct of forestry, saw milling and agriculture. Typically, biomass includes wood waste, agriculture and even food byproducts. Biomass can be utilised directly for heat energy or converted into gas, electricity or liquid fuels. A diverse range of technologies exists to convert woody biomass to useful energy.²⁶ There is a vital difference between energy production from fossil fuels and from biomass. Burning fossil fuels releases CO₂ that has been locked up for millions of years. By contrast, burning biomass simply returns to the atmosphere the CO₂ that was absorbed as the plants grew and there is no net release of CO₂ if the cycle of growth and harvest is sustained²⁷.

Bioenergy utilisation offers significant economic, environmental and social benefits including:

- reduced dependence on imported fossil fuels
- reduced energy supply risks
- reduced greenhouse gas emissions, and
- enhanced opportunity for wealth creation through new industries and enterprises.

Wood waste represents a major potential source of biomass energy in New Zealand, particularly with the projected growth in the harvesting and processing of timber. An increasing proportion of the harvested wood is likely to be processed within New Zealand rather than exported as logs. Added-value processing will produce significant quantities of wood residues and require increased quantities of energy, particularly electricity and process heat for kiln drying. By 2010 it is expected that around 90PJ worth of wood waste will be generated each year.

Using wood waste as a heat source

The most significant opportunity for wood waste is to use it to replace conventional fuels for heating, such as coal or gas. Based on the assumptions and analysis provided in Appendix II:

- if all wood waste available was utilised for heat potential cost savings of approximately NZ\$75 million per annum exist
- if this heat production displaced coal heating this would lead to a saving of around 6.9 million tonnes of CO₂ equivalent
- if this heat production displaced gas heating this would lead to a saving of around 3.9 million tonnes of CO₂ equivalent.

Using wood waste for electricity generation

²⁴ Press Release 01 May 2002 www.agresearch.cri.nz/agr/media/press/35_press.htm

²⁵ Unless otherwise stated all information in this analysis is taken from "Energy from Woody Biomass in New Zealand" published by the Energy Efficiency and Conservation Authority, May 2001 (reference 1)

²⁶ These technologies include combustion, gasification, pyrolysis and hydrolysis / fermentation systems.

²⁷ Matthews, Robert, and Robertson, Kimberly (2001) "IEA Bioenergy Task 38", page 2

The most viable wood waste to electricity option is likely to be via cogeneration (combined heat and power) plants. These plants are very efficient because the waste heat from the electricity generation is utilised for some other purpose (such as kiln drying). New Zealand has several successful cogeneration examples, including the Kinleith 40MW_e plant.

The high level analysis in Appendix II shows that electricity could be generated from wood waste for around 7.5c/kWh. If electricity is generated via an optimally sized cogeneration plant this price could decrease to around 5.7c/kWh.

The current wholesale market prices are around 2-4c/kWh but the mean industry purchase price is around 7c/kWh. This means that it may be viable for some sites to generate their own electricity using wood waste. This option is particularly attractive if the site has a large heat load nearby (making cogeneration viable) and/or it is located in areas where the local price is higher because of electricity transmission constraints (eg, Northland, Gisborne, Nelson and the West Coast). The size of the plant is likely to have to be large and the wood waste supply reasonably close for the plant to be viable.

Using wood waste for transport fuels

The EECA report¹⁸ indicates that the most cost effective technology for converting wood waste to transport fuels is to produce ethanol. The report notes that this costs around US\$0.90/litre (NZ\$2/litre). At the moment, this cannot compete with fossil-fuel-based-transport fuels on pure economic terms.

Summary

Use of wood waste to produce process heat (kiln drying for example) requires relatively low capital investment and is economically attractive. The avoided costs of dumping wood waste makes combustion to produce heat even more attractive. In some situations electricity generation (particularly generation via cogeneration) is also likely to be viable.

The most significant barriers and issues to the utilisation of wood waste energy include:

- high relative capital costs of processes and technology for some options (such as wood waste for transport fuels)
- discharge of other pollutants, using current biomass technology, which can restrict its use in many areas
- poor image and understanding of bio-energy and perceived technology risk
- quality and guaranteed supply of the source of fuel (eg woodchips)
- current pricing and structure of the New Zealand electricity market – hindering the viability of embedded or distributed generation and its ease of implementation
- potential investors require better information on:
 1. the quantity and quality of wood residues derived from their wood processing plant
 2. the technical issues they should address when choosing heat plant (including plant design and technology, fuel supply and quality issues)
 3. conversion plant economics.

CASE STUDY – URGENT COURIERS AND BIOFUELS

Urgent Couriers are involved in testing new technologies to find an alternative to fossil fuels for cars and vans. One of their trials involved biodiesel on a company van. However the trial was discontinued for two reasons. First, although the carbon emissions were lower by 7 percent and the particulates were also lower, the B100 (100 percent biodiesel) was denser and produced slightly more smoke. Second, the particular biodiesel that Urgent Couriers was testing was batch distilled causing inconsistencies between batches. One batch contained a higher than desirable percentage of water, which unfortunately froze in the van's fuel tank on frosty winter mornings.

Although this particular trial was discontinued, Urgent Couriers understands that a commercial fuel supplier is negotiating with the biodiesel supplier to bring a B20 (20 percent biodiesel, 80 percent traditional diesel) to the market. This product, based on USA studies, should provide the desired reduced emissions along with the consistency of performance. Urgent Couriers are continuing to look at alternative fuel systems in an effort to reduce their emissions without compromising performance.



"Reducing Urgent Couriers' CO₂ emissions through fuel use management reduces our impact on the natural environment while improving our contractors' financial sustainability."

Steve Bonnici, Managing Director, Urgent Couriers Ltd

4. kyoto mechanisms

Under the Kyoto Protocol, New Zealand is listed as one of the industrialised countries that has been assigned an emissions target. This means New Zealand, along with other industrialised countries, have the opportunity to participate in the three Kyoto mechanisms that have the potential to dramatically reduce the cost of meeting the Kyoto targets:

- International Emissions Trading (IET) under article 17 of the Protocol, which allows countries with emissions targets to transfer part of their allowed emissions known as *Assigned Amount Units (AAU's)* to other countries with targets.
- Joint Implementation (JI) under article 6 of the Protocol, which allows companies or Governments with emissions targets to fund specific emissions reduction projects in other developed countries with targets in exchange for the transfer of *Emission Reduction Units (ERU's)*.
- Clean Development Mechanism (CDM) under article 12 of the Protocol which allows companies or Governments with emissions targets to fund specific emissions reduction projects that contribute to sustainable development in developing countries and to credit the resulting *certified emission reductions (CERs)* against their obligations²⁸

Similar to the energy efficiency opportunity, organisations that are able to quantify and report on the reductions in emissions from projects will in future be able to sell the carbon offset either to other organisations in New Zealand or to the international carbon market. This will generate an additional revenue stream making projects even more attractive.



“Meridian Energy is committed to exploring business opportunities resulting from the emerging carbon markets with a view to continuing to offer New Zealanders and New Zealand business sustainable energy solutions”, Keith Turner, CEO, Meridian Energy Limited

4.1 emissions trading

In a recent report published by the Pew Center for Global Climate Change, the authors stated:

“Few trades of GHG emissions to date have involved an exchange of emissions permits such as “allowances” or “credits” since these terms refer to government-issued commodities that exist within the context of formal trading systems. Most GHG trades have taken place under a voluntary ad hoc framework involving a commodity defined by the trades participants and known commonly as verified emissions reductions (VERs). These carry only the possibility, but not a guarantee, that governments will allow them to be applied against future emissions reduction requirements.”²⁹

There is currently no single carbon market, but rather multiple markets in different jurisdictions each representing different commodities. Sources of demand for emission reductions (from CDM and JI) are likely in the short-term to come mainly from institutional buyers of which the main two are currently the World Bank’s Prototype Carbon Fund (PCF) and the Dutch Government’s E-RUPT programme. Over time, the source of demand for emission reduction projects is likely to switch from institutional buyers to domestic schemes (such as the UK and Danish emissions trading schemes and the proposed EU Emissions Trading scheme) and to national carbon funds which may be set up by some countries (e.g – Norway,

²⁸ Haites, Erik and Aslam, Malik Amin (2000) “The Kyoto Mechanisms and Global Climate Change, Coordination Issues and Domestic Policies”, Pew Center on Global Climate Change, Arlington, VA, U.S.A.

²⁹ Rosenzweig, Richard, Varilek, Matthew and Janssen, Josef, (2002) “The Emerging International Greenhouse Gas Market”, Pew Centre on Global Climate Change, Arlington, VA, U.S.A page iv

Sweden). However, from now until 2004, GHG emission trading markets are likely to remain separated by national boundaries as the rules for linking between different jurisdictions remain to be worked out. Some sources believe that prices for verified emission reductions (VERs) are likely to remain at or below their current levels of about EUR 3.35 (US\$3) per tonne of carbon dioxide equivalent.³⁰

Large uncertainty exists over time and future market prices will be affected significantly by factors such as whether or when the United States enters into the Kyoto Framework and the extent to which the market is flooded by "hot-air" credits from central and eastern European countries and Russia and the Ukraine. However, most models of plausible general policy assume a GHG price which will rise over time. Natsource (Dec 2001) suggests a market price of US\$8.58 – US\$17.15 per tonne by 2010.

New Zealand organisations have an opportunity to participate in the emerging GHG emissions trading market to generate additional revenue streams from verified emission reductions. However, participation in these markets requires a high level of understanding and compliance to the various schemes. It is estimated approximately 70 GHG trades for quantities above 1,000 tonnes of CO₂ have taken place since 1997 for about 5 million tonnes of CO₂, most of which have been option trades. The figure probably understates actual market activity because not all trades are made public and it excludes small and internal corporate trades³¹.

CASE STUDY – BP EMISSIONS TRADING³²

In 1998, BP voluntarily committed to reducing its GHG emissions 10 percent below 1990 levels by 2010. BP plc launched an emissions trading system initially between selected business units and then eventually to all global operations in January 2000 to:

- lower the cost of delivering its 10 percent GHG emissions reduction target
- incorporate GHG reductions into business thinking
- explore the development of market based emissions trading initiatives
- learn through practical engagement and build capacity
- engage in carbon markets, drive innovation and change.

How does it work?

Each business unit is allocated an assigned emission allowance. For example, if the Australasian operation was allocated 50 units, but actually emitted 60 units, it would have to make up the shortfall of 10 allowances through:

- reducing operating emissions
- making capital modifications
- purchasing additional allowances on the internal market

To date, approximately 5 million tonnes of allowances have been exchanged. The average two year price was US\$12 per tonne of CO₂, but at one stage reached US\$85 per tonne of CO₂³³. This system presents a real cost to business units who have not met their target, but also revenue opportunities to those who have exceeded their allowances.

³⁰ December 2001, Natsource Discussion indicators

³¹ Natsource / World Bank Report "Review and Analysis of the Emerging International Greenhouse Gas Market, December 2001

³² Morecroft, Dave, BP Strategy Presentation in Milan, March 2002

³³ Speech to the NZBCSD dinner, 2002

4.2 the clean development mechanism (CDM)

CDM, rather than JI, has been specifically chosen because a number of New Zealand businesses have expressed interest in the CDM opportunity (at the Ministry of Economic Development workshops and subsequently) and the potential size of the opportunity is unclear. CDM is also a particular area of focus for the World Business Council for Sustainable Development who are facilitating the development of several pilot CDM projects around the world. The rules surrounding CDM are still developing.

Analysis on the potential size of the CDM opportunity has been performed, and continues to be performed³⁴ all over the world. The estimates on the size of CDM opportunity vary widely as the size and nature of CDM markets will depend on a number of factors that are still very uncertain and include:

- The Kyoto Protocol coming into force
- CDM implementation and transaction costs
- The Kyoto Protocol rules on CDM including the baseline and additionality rules
- Relative price of certified emissions reductions (CERs) from CDM versus the relative nature of emission reduction units (ERU's) through joint implementation
- Business-as-usual emissions and abatement costs in OECD Annex B regions
- The value of removal units (RMUs) from credits for sequestration in agricultural soils under article 3.4
- Quota sales of Assigned Amount Units (AAUs) from economies in transition (EIT) countries (hot air)
- US participation in the Kyoto Protocol and other international climate change mechanisms

The analysis of the potential size and range of the CDM opportunities is based on the data in the HWWA³⁵ and Natsource / World Bank³⁶ reports. These reports were chosen because:

- The authors are highly credible
- The reports were both issued after the US announced its policy to withdraw from the Kyoto Protocol
- The results represent a realistic range in the predicted size of the international CDM opportunity that has been presented in the economic analyses available.

Table 1 below summarises:

- The global value of carbon credits predicted by the HWWA and Natsource analyses
- The potential value of the CDM opportunity to New Zealand (this analysis uses a number of key assumptions that are detailed in Appendix II).
- The potential emissions reductions that could be credited to New Zealand (see Appendix II for assumptions).

³⁴ The Asian Development Bank (ADB) is currently identifying and assessing potential projects and building capacity to implement viable projects.

³⁵ The Hamburg Institute of International Economics Analysis (2001) "Estimating the CDM Market under the Bonn Agreement"

³⁶ Natsource / World Bank Report "Review and Analysis of the Emerging International Greenhouse Gas Market, December 2001"

Table 1: The potential size of CDM business opportunities to New Zealand

Size of the CDM Opportunities		HWWA	NATSOURCE/ WORLD BANK
1	Predicted global value of carbon credits (NZ\$ per tonne CO ₂ per annum)	NZ\$2/tonne CO ₂	NZ\$7/tonne CO ₂
2	Potential revenue for New Zealand (New Zealand dollars equivalent – millions per annum)	NZ\$6m	NZ\$19m
3	Emissions reduction from projects NZ “owns” (tonnes CO ₂ per annum)	200,000 tonnes CO ₂	200,000 tonnes CO ₂

This analysis indicates that if the global price of carbon is only NZ\$2 per tonne of CO₂ then the size of the CDM opportunity is likely to be small. However, a cost of NZ\$2 per tonne of CO₂ also means that the cost of meeting the Kyoto targets will be relatively low cost for businesses and national economies. This price would:

- Lead to a less than 1c/litre increase in petrol prices and a less than 1c/kWh increase in domestic electricity prices
- Mean that all greenhouse gas abatement has been achieved for under NZ\$2 per tonne CO₂

The largest area of CDM opportunity for New Zealand businesses is likely to be in the areas of:

- Consultancy (provision of knowledge and services)
 - project design
 - project development and implementation³⁷
- Renewable technology and equipment supply in the areas of forestry and land management.

There are both direct opportunities for organisations which provide these services and for those who benefit from the CDM infrastructure . Renewable energy technology and equipment is likely to be sourced from other countries, but New Zealand has the opportunity to sell the expertise to implement this technology and equipment into renewable energy projects.

Transaction costs for developing CDM projects are currently very high. This means that in the absence of some New Zealand government for support for activities related to CDM project identification and preparation, it is unlikely that over the short-term the vast majority of New Zealand companies will be well positioned to take advantage of emerging CDM opportunities.

CASE STUDY – MILBURN NEW ZEALAND LIMITED

Milburn New Zealand Limited manufactures cement and is a wholly owned subsidiary of Holcim. The New Zealand company has a significant interest in a cement plant located in China. This plant operates at lower energy and emissions efficiency than Milburn’s domestic operations. Under the CDM mechanism of the Kyoto Protocol, Milburn has a potential business opportunity to invest in improving the emissions efficiency of the plant which would create Certified Emission Reductions. As recognised Kyoto compliance instruments, these CERs would have a positive economic value to Milburn New Zealand Limited.

³⁷ For example, consulting revenues in areas such as project management and engineering are likely to be a significant opportunity for NZ and the revenue from these is generally 5%-10% of project capital.

4.3 sources of demand for emission reduction credits

World Bank Prototype Carbon Fund

The US\$145m World Bank Prototype Carbon Fund (PCF) was recently increased to US\$180m for investment in CDM projects in developing countries and JI projects in economies-in-transition. The major emphasis is on renewable energy projects (wind, small hydro, solar pv, solar direct, landfill gas, geothermal, refuse derived fuels and biomass technology). There is a lesser emphasis on energy efficiency projects. The PCF aims to develop a 3:2 ratio renewable energy/energy-efficiency projects.

Over the past 18 months the World Bank PCF has been signing memoranda of understanding in each of the countries in which it is operating, laying out the legal basis through which the fund will make its investments. In each country there is a host focal point agency for PCF activities. New Zealand companies that are interested in seeking World Bank PCF investment in the carbon offset in their potential CDM activities should prepare Project Information Notes (PINs) outlining the specific project idea, discuss with national stakeholders and then submit the required information to the World Bank PCF Team.³⁸

ERUPT and CERUPT Programmes

The Dutch Government's ERUPT programme launched its first round in April 2001 and selected US\$30m of emission reduction units through JI projects in Central and Eastern Europe. The second round of ERUPT is currently evaluating 18 projects for selection and has a budget of US\$30m. The Dutch Government has also launched the CERUPT programme which will invest in certified emission reductions from CDM projects. This may be of more interest to New Zealand companies given that CERUPT will invest in projects in the Asia-Pacific and Latin America regions.³⁹

BC Hydro

BC Hydro in Canada is also currently seeking up to 5.5 million tonnes of GHG offsets in order to fulfil its commitment to offset 50 percent of the increase in GHG emissions at two new natural gas-fired power plants. Carbon Sequestration projects are not being considered. The preference is for renewable energy and energy-efficiency projects delivering at least 50,000 tonnes of reduction per year for 10 years.⁴⁰

Demand for Carbon Offsets within National Jurisdictions

Another source of demand is within national jurisdictions where emissions trading is taking place prior to trading under the Kyoto Protocol from 2002. Compliance markets also exist in both the UK and Denmark, and trading volumes are expected to grow. In the UK Emissions Trading Scheme, 34 companies have entered the scheme (including companies such as BP, Shell, Ford, Rolls Royce, Barclays, Tesco, Budweiser, and Dalkia) with £215m of UK Government incentive money with a target of 4 million tonnes of CO₂ equivalent reductions over the 5 years of the scheme. Firms that are not able to meet targets will need to purchase permits in order to be in compliance at the end of each year. This will create additional demand. The first UK-Danish swap of allowances took place on 7 May 2002 between Shell and Elsam. This was an important step in the development of a global GHG market as it is the first ever carbon trade between companies operating in two national jurisdictions with domestic schemes in place to reduce emissions.

³⁸ More information on the World Bank PCF can be found at www.prototypecarbonfund.org

³⁹ More information can be found about the Dutch Government's ERUPT and CERUPT programmes at www.carboncredits.nl

⁴⁰ Although the deadline for receiving projects was officially 1 May 2002, apparently BC Hydro are still seeking to receive proposals to purchase high quality emission offsets as they have received a shortage of good possible projects. More information can be found at www.bchydro.com

CASE STUDY – RAROTONGA CDM CASE STUDY

The high electricity price in Rarotonga indicates a significant CDM opportunity for a New Zealand company. At NZ\$0.55 per kWh the following renewable energy technologies are likely to be viable:

- solar hot water (some households are using electricity to heat water – in sunny Rarotonga solar hot water heating is likely to be viable)
- wind (the Pacific Islands Development Program is currently seeking funding for a feasibility study into wind power technology as a source of renewable energy for Rarotonga⁴¹)
- biomass (particularly through agricultural wastes from crops such as coconuts or specific energy crops)
- solar electricity in some cases.



A more detailed analysis would be required to identify the most viable renewable energy option.

New Zealand households currently pay around NZ\$0.11 per kWh for electricity. It is reasonable to expect that electricity could be delivered to Rarotongans for at least NZ\$0.20 per kWh cheaper than current prices (ie. for a price of around NZ\$0.35 per kWh). This would represent an annual saving of around \$250,000 for electricity users, provide a local development

opportunity and reduce the island's reliance on imported fuels.

The resulting emissions reductions, based on the assumptions outlined in Appendix II, would be approximately 6,600 tonnes CO₂ per annum. This equates to taking approximately 1,500 average NZ family cars off the road each year.⁴²

The total 2001/02 NZODA (NZ Official Development Assistance) allocation for the Cook Islands is NZ\$6.24m.⁴³ Although aid cannot be used to fund CDM projects, the NZODA may have a future role facilitating CDM projects. If they are done well, projects such as these will contribute to the long-term sustainability of developing countries and reduce their dependence on aid.

The final rules around the CDM mechanism will greatly influence the eligibility of this project as a CDM project (the fact that it could be economically viable without the value of emissions credits could mean that it is ineligible). These "additionality" and "baseline" rules are yet to be finalised.

In addition, the high level of transaction costs for setting up the project compared to the relatively low levels of emissions reduction could make the project unattractive to project developers in the absence of institutional funding available to prepare, register, monitor, report, verify and certify the project.

Photo courtesy of NIWA

Case study illustration:

Most of Rarotonga's power is generated from a 6.8MW diesel driven power station, pictured above.⁴⁴ This meets a peak demand of 3.0MW. Approximately 3,500 customers rely on the power station - the tourist industry is the largest customer sector.

⁴¹ pidp.eastwestcenter.org/pireport/2002/April/04-05-11.htm

⁴² Calculated: 15,000 kms per annum @ 12 kms per litre = 4 tonnes of CO₂ per annum

⁴³ www.mft.govt.nz/nzoda/programmes2001/pacific/cookislands.html

⁴⁴ www.apesma.asn.au/newsviews/professional_update/march_1999/frontline.htm

5. improved trading opportunities

There is evidence internationally that significant numbers of consumers prefer to buy environmentally friendly products and services. The Millennium Poll on Social Responsibility showed 60 percent of consumers in 23 countries stated that they expect businesses to tackle various environmental and social issues such as fair labour practices, business ethics and environmental cleanup, in addition to being profitable and providing jobs. As a result sustainability awareness and information to consumers is increasing. Recent evidence of this includes:

- German advertisements promoting locally grown produce by demonstrating the amount of oil required to transport New Zealand apples to Europe
- American consumers placing value on New Zealand seafood because New Zealand fisheries are perceived to be more sustainable
- in Australia, over the 4-year life of the “GreenPower” program, demand for genuine renewable energy has increased 10-fold. Close to 1 percent of all residential homes have signed up to GreenPower nationwide. While this figure is lower than market research has previously predicted, surveys suggest that 15 percent of customers that are provided with the right information about GreenPower, for example through telemarketing, do sign up – indicating scope for future growth in customer uptake.

A Ministry for the Environment survey in 2001 indicated that New Zealand’s clean green image has a significant export value. The survey suggested that New Zealand’s image is worth hundreds of millions, and possibly billions of dollars per year. This value is in terms of both:

- tourism, where tourists are attracted to NZ because of the “real nature experience” and they would reduce the length of their stay if they perceived the environment as being degraded, and
- products – consumers surveyed overseas indicated that if they perceived New Zealand’s environment as being degraded, they would purchase 54 percent less products (on average).

New Zealand businesses have an opportunity to improve trading opportunities by capitalising on New Zealand’s clean green image through a branding scheme. An eco-brand must mean something to the consumer. For example, at least initially, “climate friendly” energy is likely to mean more to the consumer than a “climate friendly” apple. It would be possible to incorporate renewable energy and low greenhouse gas emissions into a generic clean/green NZ brand. The success of an eco-brand depends on consumer awareness and the maintenance of our clean green reputation. Current climate friendly brands which are operating internationally include:

Table 2: Climate Friendly Branding Programmes

Climate Friendly Branding Programmes	Countries Operating the Brand
Green Power	United States, Australia, Germany, Finland, The Netherlands
Greenhouse Friendly Certification Programme	Australia
Energy Star	United States, Australia and others
Green-e	United States
Greenfleet NZ and Greenfleet Australia	Australia and New Zealand
GEN – Global Ecolabelling Network	Global, including New Zealand through the Environmental Choice Label

For more information on each of these schemes, please refer to Appendix II. More rigorous research on the potential opportunities for NZ relating to “climate friendly” branding is required.

This should include:

- market research on the domestic and international demand for “climate friendly” products and services, and how these should be developed and marketed
- research on the types of eco brands that are working - their characteristics and their market value.

The current value of New Zealand exports to the European Union is approximately NZ\$4.77b per annum.⁴⁵

*Scenario 1 – the risk:*⁴⁶

If New Zealand *loses* 1 percent of the above export value through poor greenhouse performance, for example:

- not ratifying Kyoto
- not meeting Kyoto targets
- high embodied carbon in products and services

then the resulting *cost* to New Zealand is estimated to be approximately NZ\$47.7m per annum.

*Scenario 2 – the opportunity:*⁴⁷

If New Zealand *gains* another 1 percent of the above export value through good greenhouse performance, for example:

- ratifying Kyoto
- meeting Kyoto targets
- low embodied carbon in products and services

then the resulting *benefit* to New Zealand is estimated to be approximately \$47.7m per annum.

CASE STUDY – HUBBARD FOODS LIMITED

Hubbard Foods Limited exported approximately 14 percent of all 2000 / 2001 production to the United Kingdom, Hong Kong, Singapore, Australia and Kenya. Global consumer awareness of sustainability related issues is increasing. Hubbard Foods Limited have an opportunity to secure a greater market share in export markets through highlighting their climate change initiatives through the very popular clipboard newsletter included in each packet of cereal, or potentially through a climate change brand.

⁴⁵ Total exports to the EU in 2001 were NZ\$4.77 billion (15.15% of total NZ exports to all destinations i.e. NZ\$31.52 billion). Source: Ministry of Foreign Affairs & Trade/Statistics New Zealand

⁴⁶ Note that this market loss is likely to come about through individual consumer choice rather than trade embargos at a national level

⁴⁷ Note that this market gain is likely to come about through individual consumer choice rather than trade embargos at a national level

CASE STUDY – BP AUSTRALIA’S ULTIMATE FUEL – BRANDED GHG FRIENDLY FUEL

BP Australia has attached the “Greenhouse Friendly” brand to their “Ultimate” Fuel. This is a high octane, premium fuel. There are three stages in their usage of the brand:

Stage One (operating now):

- BP purchases abatement credits from third parties to offset all emissions that the Ultimate fuel is responsible for throughout its life (from extraction to refining to combustion – 90 percent of the emissions are from the combustion phase). Ultimate competes with the Shell and Mobil premium fuel equivalents. At this stage BP is not passing through the cost of the offset through to consumers. This means that Ultimate is still around the same price as the competing premium fuels. The fuel has been very successful but it is difficult to know if this is a result of the “greenhouse friendly” attribute or the high performance attribute. The fuel’s current promotion is mainly at the point of sale.

Stage Two (will be launched in June 2002):

- this stage will offer “Greenhouse Friendly” to commercial customers at a premium – commercial customers may find this the cheapest way to reduce their transport emissions. They will be able to choose how much of their emissions they want to offset (eg 100%, 50% 10% etc.) no matter which fuel they use (this product will not be limited to Ultimate). This is similar to the way Greenpower is offered to commercial customers. BP thinks that this market will be more receptive than the retail market.

Stage Three (release to be announced):

- stage 3 is to offer the “Greenhouse friendly” offset at all retail sites for all fuels
- customers can simply elect to purchase offset for any percentage of the fuel they buy.

BP notes that the project has been valuable in demonstrating the opportunities available for offsetting emissions – this is effectively an early emissions trading initiative. The company has found that there are offset opportunities available at very reasonable prices (1-2cents/litre), and yet that this cash injection was all that a number of projects have needed to meet their hurdle rate. BP is confident that there are more cost effective emissions reduction available to purchase as offsets.

Offset purchases have been from projects in the areas of:

- energy demand
- energy supply
- forestry and Agriculture
- methane recovery and destruction

Offset from renewable energy projects is more expensive because of the Australian legislation requiring electricity retailers to source 2 percent of their energy from renewable sources. Most renewable credits are being sold to electricity retailers who need to meet their renewable energy obligations. The penalty price for this is around NZ\$40 per tonne CO₂ and the value of renewable credits are approaching that amount. BP is able to buy offsets from non-renewable projects at lower prices.

III. CASE STUDIES

The following six members of the NZBCSD agreed to work with the NZBCSD, MED and PricewaterhouseCoopers as active participants to identify specific business opportunities that may arise from operating within a carbon constrained economy:

- BP Oil New Zealand Limited (BP)
- Hubbard Foods Limited (HF)
- Manaaki Whenua Landcare Research (LR)
- Meridian Energy Limited (ME)
- Milburn New Zealand Limited (MNZ)
- Urgent Couriers (UC)

Summary of Key Findings From The Case Studies

In summary, five main business opportunities were identified through the case studies which are generally consistent with the findings from the MED workshops. Table 3 summarises the business opportunities identified through the case studies. Tables 4 and 5 provide more detail on these opportunities.

Table 3: Summary of Business Opportunities

Nature of the Business Opportunity	BP	Hubbard Foods	Landcare Research	Meridian Energy	Milburn Cement	Urgent Couriers
a) Provision of knowledge and services	√		√	√	√	√
b) Energy efficiency	√	√	√	√	√	√
c) New technology and practices (including research)	√	√	√	√	√	√
d) Kyoto Mechanisms (Emissions Trading, JI, CDM)	√		√	√	√	
f) Improved trading opportunities		√		√		√

Table 4: Description of the Business Opportunities

Nature of activity	Description of opportunity
a. Provision of Knowledge and Services	BP: Carbon accounting BP: Energy & emissions consulting LR: Sale of services to private and public sector LR: Domestic and international research and consulting LR: Carbon sinks facilitation LR: Other research commercialisation ME: Renewable energy generation consulting and marketing ME: Energy management consulting ME: Energy audits and services MNZ: Cement plant consulting UC: Energy efficiency solutions UC: Transport emissions consulting ALL: Energy efficiency solutions ALL: Inventory data collection
b. Energy efficiency	BP: Alternative fuels ME: Sustainable energy and energy efficiency projects MNZ: Fuel substitution MNZ: Materials blending UC: Freight consolidation ALL: Video-conferencing ALL: Energy efficiency solutions (eg energy audits)
c. New technologies	BP: Renewable energy generation HF: Manufacturing technologies LR: Other research commercialisation ME: Renewable energy generation MNZ: Cement production UC: Engine efficiency technology
d. Kyoto Mechanisms Emissions trading CDM	BP: Carbon trading LR: Facilitation of carbon sinks ME: Sustainable energy and energy efficiency projects ME: Carbon trading LR: Facilitation of carbon sinks and offset projects ME: Renewable energy CDMs MNZ: Cement plant CDMs
f. Improved Trading Opportunities	ME: New energy products HF: Climate friendly branding UC: Climate friendly branding

The business opportunities identified through the case studies have been further analysed by product and market into the following four categories:

- existing product or service in existing market
- existing product or service in new market
- new product or service in existing market
- new product or service in new market

Table 5: Business Opportunities analysed by product and market

		Markets	
		Existing	New
Products/Services	New	BP: Carbon accounting BP: Energy & emissions consulting BP: Alternative fuels LR: Other research commercialisation ME: In-house emission reduction project development and trading ME: Renewable energy marketing UC: Freight consolidation ALL: Inventory data collection	BP: Carbon trading ME: Carbon trading LR: Research commercialisation ME: Renewable energy CDMs MNZ: Cement plant CDMs
	Existing	BP: Renewable energy generation LR: Domestic research consulting LR: Sales of services eg EBEX21/Enviromark LR: Facilitation of carbon sinks ME: Renewable energy generation ME: Sustainable energy and energy efficiency projects ME: Energy management consulting MNZ: Fuel substitution MNZ: Materials blending UC: Energy efficiency solutions ALL: Energy efficiency – vehicle maintenance ALL: Energy efficiency solutions ALL: Video-conferencing	LR: International research consulting LR: Sales of services eg EBEX21/Enviromark UC: Transport emissions consulting ME: New energy products MNZ: Cement plant consulting



BP Oil New Zealand Ltd (BP)

BP has long-term established competencies, both in its local operations and by tapping into the international operations, in liquid fuels logistics, refining and marketing and energy product trading. In recent years, BP has also developed international capabilities in renewable energy, energy supply and management consulting, carbon accounting and carbon trading.

It is particularly in these newer areas that BP sees business opportunities to extend its competencies to meet emerging and changing needs under a carbon constrained economy.

- [Renewable energy generation](#)

BP has significant operations in BP Solar and an initial investment in UK wind power. BP New Zealand has installed solar electricity arrays on 11 of its service station sites. Renewable energy is an area in which BP New Zealand sees important business opportunities.

- [Alternative fuels](#)

As an established refiner and supplier of liquid fuels, BP New Zealand sees opportunities to be involved in the development of alternative fuels such as ethanol blending and biodiesel. Overall, New Zealand has a potential advantage in the development of bio-fuels from the waste streams of the dairying industry. (Anchor Ethanol currently produces ethanol from the dairy waste stream. This renewable fuel can be blended with petrol in concentrations of up to 10 percent without any adjustments to vehicle tuning).

- [Carbon accounting](#)

Globally and in New Zealand, BP has significant experience and expertise in emissions accounting and has extended this in Australasia by providing personal emission calculation tools and record-keeping on its intranet for the use of staff.

There is therefore an opportunity for BP New Zealand to provide this expertise to others on a larger scale by, for example, similarly in-sourcing the calculations and data management of emissions and/or advising on the development and use of emissions inventory systems.

- [Emissions and energy consulting](#)

In the same vein as above, overseas operations of BP are providing its large energy customers with advice on energy, and consequently emissions, options and optimisation. The New Zealand operations of BP are well-placed to introduce such services to the New Zealand customer base.

- [Carbon trading](#)

With its internal emissions trading scheme, participation in the UK emissions trading scheme, development of emissions reduction projects and purchases of emission reductions to green-brand BP Ultimate under the Australian Greenhouse Friendly program, BP has well-established and market leading competencies in various aspects of carbon trading.

BP has an opportunity to establish a separate unit specialising in carbon trading.

BP also sees a set of opportunities for the broader New Zealand business community that are not unique or exclusive to BP New Zealand.

- [Alternative emission reduction projects](#)

Beyond what are generally thought of as “traditional” emission reduction projects (such as energy efficiency, renewable energy) BP has opportunities in alternative project types.

These include geological sequestration of CO₂ by injection into oil and gas fields and subterranean aquifers and biomass sequestration in seeding excess ocean plankton growth.

- [Energy efficiency](#)

BP sees a need, and therefore an opportunity, in the significant upskilling of managers and technicians responsible for the identification and delivery of improved energy efficiency outcomes. An important example is the need to upgrade the equipment and skills of vehicle mechanics to ensure that the vehicle fleet is maintained to high levels of operating efficiency.

Hubbard Foods Limited (Hubbards)

Hubbard Foods Limited is primarily a manufacturer of breakfast cereal products. The Hubbard's brand represents approximately 11 percent of New Zealand breakfast cereal sales. The company was established in 1988 and is based at Mangere, South Auckland. At March 2001 the company manufactured 23 products under the Hubbards brand and various other "housebrands" for supermarkets.

Hubbards primary energy consumption comes from the purchase of electricity and gas, purchased from the local energy retailer. Hubbards operate gas fired boilers to produce steam for cooking and drying. In addition, purchased electricity is used in the manufacturing and cooking processes.

- Energy efficiency from a) insulation and b) heat recovery

Hubbards' primary business opportunity comes from energy efficiency. Rob Bishop (energy expert and New Zealand accredited energy auditor) performed a two hour "walk through" at one of their processing plants.

An initial walk through visit may be followed up by a more comprehensive energy audit, which conforms to NZS3598:2000. The more comprehensive the audit (the standard specifies three levels of audits) the more opportunities are identified.

In Hubbards' case, the savings will come from both electricity and gas. Gas is used for drying, steam raising and ovens. Initial findings from the audit indicate the gas savings will result from:

- insulating uninsulated pipes and surfaces, and
- heat recovery.

Electric savings would come from more efficient motors and fans, and switching off equipments that is not in use.

The main benefit of performing an energy audit is that it provides a clear identification of savings opportunities. A typical level 2 energy audit costs approximately 5 percent of the organisation's annual energy costs (less for larger organisations due to economies of scale), but often results in 20 – 30 percent savings, or more.⁴⁸

- Improved Trading Opportunities

Hubbards exported approximately 14 percent of all 2000/2001 production to the United Kingdom, Hong Kong, Singapore, Australia and Kenya. Global consumer awareness of sustainability related issues is increasing. Hubbards have an opportunity to secure a greater market share in export markets through highlighting their climate change initiatives through the very popular "Clipboard" newsletter included in each packet of cereal, or potentially through a climate change brand.

⁴⁸ For more information, please see The Energy Efficiency and Conservation Authority, Auditing Guide for Building Managers, available at www.eeca.govt.nz



Manaaki Whenua Landcare Research (Landcare Research)

Manaaki Whenua Landcare Research (Landcare Research) operates predominately in one industry sector – the provision of scientific services focusing on the sustainable management of land based natural resources. Landcare Research has many opportunities arising from climate change and other sustainability related issues. The opportunities directly related to climate change fall into two main categories; to assist other organisations measure and manage their emissions, and to facilitate the native regeneration of marginal farmland for organisations wishing to invest in native tree offset programmes.

- **Expanded research consultancies (domestic)**

There is an opportunity to meet the information needs of Government and large land-holding organisations with expanded research programmes into:

- a) land-use and land-management research in the areas of Biodiversity and Ecosystem Processes, Biosecurity and Pest Management, Rural Land-use Effects, Urban Environmental Management, Sustainable Business and Communities
- b) Greenhouse Gases and Carbon Sinks. This second area is focussed on fundamental research into emissions from the terrestrial biosphere in order to improve national emission inventories, modelling and forecasting, identify mitigation strategies and improve policy formulation. GHG emissions are also a factor for consideration to various lesser degrees in the other research areas.

- **Expanded research and consultancies (international)**

Landcare Research already exports its locally-developed expertise in consulting and research to a range of international governments and agencies. As Landcare Research continues to develop its emissions research capabilities and experience, there are likely to be increased opportunities to deliver these skills and expertise to a wider international client base.

- **Increased sales of EBEX21 and associated products and services**

The Landcare Research EBEX21 product is a web-based tool for calculating corporate emissions and quantifying the emission offset in terms of hectares of regenerated native vegetation. Through the EBEX21 tool, Landcare Research can assist organisations to measure, manage, report and reduce their emissions. EBEX21 has a growing New Zealand client base and opportunities to expand to international markets. Widespread establishment and maintenance of emission inventories are likely to be a feature of a carbon-constrained world and, consequently, Landcare Research has the opportunity to increase sales of EBEX21 and other related products and services (such as Enviromark or Triple Bottom Line reporting).

- **Commercialisation of other internal products and services**

In addition to EBEX21, Landcare Research has a track record of commercialising products and services that it has originally developed to support its internal needs. Examples include wildlife radio tracking and telemetry, an environmental management system (Enviromark), and software to support field research and environmental management.

Similarly, Landcare Research's other research areas may spawn additional commercial product and service opportunities although no specific greenhouse-related opportunities have been identified to date.

- [Facilitation of carbon sink investments](#)

As an additional service to users of its EBEX21 software, Landcare Research is currently active in facilitating investments by such organisations in the regeneration of native vegetation on Kyoto-compliant lands (ie post-1990 afforestation or reforestation sinks).

In tandem with the potential uptake of EBEX21 services is the business opportunity for increased investment facilitation services.

- [Data collection](#)

Users of EBEX21 report varying degrees of difficulty in accessing appropriate activity data. Data on direct emissions (referred to in the EBEX tool as Level 1 emissions) and electricity consumption are generally readily available.

- [Energy efficiency technologies and services](#)

A key focus area for emission reductions among EBEX21 users is energy consumption, particularly electricity consumption. The imperative to increase energy efficiency is heightened by the added benefit of associated emission reductions, which underpins rising demand for energy efficiency technologies and services.

- [Video-conferencing](#)

The measurement of emissions has highlighted the contribution of air travel to the emissions inventories of EBEX21 users.

Opportunities exist for a deeper and broader substitution of video-conferencing for air travel, which delivers cost-savings, increased productivity and higher employee satisfaction to the organisation. This has a flow on effect of increased revenue to the video-conferencing technology and service providers.

Meridian Energy Limited

Meridian Energy is a state-owned enterprise, owned wholly by the NZ Government. Meridian Energy's core business is the generation, trading and retailing of electricity. It also offers wider complementary energy related products and solutions. The company generates electricity, heat and steam from sustainable resources including water, wind and biomass and operates within both NZ and Australia. Meridian Energy generates about 33% of New Zealand's electricity. The development and operations of hydro-electric generation facilities is a long-term core competency of Meridian Energy. In recent years, Meridian Energy has also developed capabilities in wind and biomass electricity generation, co-generation, energy management consulting and energy trading and marketing. Meridian Energy is also developing capabilities to access emission reduction trading markets.

Meridian Energy sees a number of business opportunities relating to renewable energy generation and other energy and emission services resulting from increased awareness of environmental issues.

- Renewable energy generation

With its expertise in renewable energy facilities development and operations, Meridian Energy sees opportunities to expand its generation assets in New Zealand and overseas.

- Renewable energy marketing

Increased renewable energy generation and awareness of climate change issues creates the opportunity for developing a specific renewable energy market. Currently, electricity in New Zealand has not been explicitly differentially marketed on the basis of its generation source, given the mechanism of pooling in the national market. However, Meridian Energy sees the opportunity to develop the "green brand" value of electricity generated by renewable energy (such as hydro generation).

- Alternative energy development and energy management consulting

Meridian Energy has established a business unit, Meridian Solutions, which provides energy supply solutions and energy management advisory services. In a carbon constrained economy, Meridian anticipates the demand for these services to increase as end-users seek to improve the energy efficiency of their operations and manage emission related risks.

- Emission reduction project development and trading

Meridian Energy has developed knowledge and capabilities to develop specific emission reduction projects in the energy sector and/or identify and capture the potential emission reduction value stream in renewable energy projects.

Meridian Energy sees business opportunities to create marketable emission reductions and participate in emission reduction trading markets. This includes the reductions associated with Meridian Energy's own projects and may include consulting services to the developers of other emission reduction projects.

- Renewable energy generation - consulting

Meridian Energy's expertise in renewable energy project development and operations may provide them with the opportunity to advise other operators on optimising the value of their generation assets. and may include the creation of emission reduction credits.

Milburn New Zealand Limited (Milburn)

Milburn's principal activities are the production, distribution and marketing of cement, concrete, aggregate, lime and related products. Because of the emissions inherent in cement manufacturing, Milburn New Zealand Limited has been measuring its emissions since 1991. The company has more than 600 New Zealand employees and supplies a wide range of products to New Zealand and South Pacific island markets. Milburn is a wholly owned subsidiary of the Swiss based Holcim Ltd (formerly "Holderbank" Financiere Glarus AG), which has an interest in more than 70 cement companies spread over all continents. This makes Milburn part of one of the largest cement-manufacturing groups in the world, with a consolidated annual capacity of over 80 million tonnes of cement.

Continuous improvement in energy and emissions efficiency has been a long-term commercial imperative for the emissions intensive domestic cement and lime operations of Milburn. Consequently, Milburn operates at relatively high levels of efficiency with limited opportunities for further substantial gains in operational performance.

- **Fuel substitution**

Milburn already combusts waste oil in substitution for coal in the cement kilns and reduces emissions by the use of a less emissions intensive fuel. Other cement operators around the world combust a broader range of waste materials, including tyres, plastics, solvents and wood waste.⁴⁹ There are additional public environmental benefits in the use of waste materials to the extent that high-temperature incineration (that also minimises residual non-greenhouse gas emissions) is considered more beneficial than alternative waste disposal or management methods.

Consequently, Milburn sees potential for carbon-constraints to increase the value in alternative management of these waste products and thus increase the availability of supply of such materials. This provides an alternative waste disposal option for originators of relevant waste materials.

- **Materials blending**

Milburn already blends various mineral components with hydraulic properties to produce blended cements. Components such as blast furnace slag and fly ash are waste materials from steel production and coal combustion respectively. This reduces the emissions intensity of the final product by reducing the process emissions per tonne of product.

As with fuel substitution, there is potential for carbon-constraints to increase the value of mineral components and thus increase their supply availability and economic value to Milburn. This also provides an alternative waste disposal option for the originators of such materials

- **Emissions reductions in Chinese plant**

Milburn has a significant interest in a cement plant in China. This plant operates at lower energy and emissions efficiency than Milburn's domestic operations. Under the CDM mechanism of the Kyoto Protocol, Milburn sees a potential business opportunity to invest in improving the emissions efficiency of the plant and thus create CERs. As recognised Kyoto compliance instruments, these CERs would have a positive economic value to Milburn.

⁴⁹ See the discussion in section 3 on the potential for wood waste as a heating fuel

- Emissions-efficiency consulting to other cement producers

Milburn's expertise in efficient cement and lime plant operations may provide them with the opportunity to advise other international operators on efficiency improvements in their operations.

This activity may be on a simple fee-for-service basis and/or may be associated with the development of specific emission reduction projects under the CDM mechanism. In this way, Milburn may participate in the creation of emission reduction credits at third-party plants.



Urgent Couriers

Urgent Couriers is a fossil-fuel intensive business. The company is a privately owned company, offering a specialized one hour courier service throughout the greater Auckland area. Urgent Couriers was formed in 1989 and is well established in the market. At March 2001 there were 20 company personnel, eight part time drivers (3 company drivers, 5 contractors) and 75 contractors. These couriers operate a combination of diesel, petrol and LPG cars, vans and motorbikes. There is also a growing fleet of pedal couriers.

Opportunities in Urgent Couriers' own operations

- [Energy efficiency improvements](#)

In line with their vision of minimising environmental impacts, Urgent Couriers are already pursuing initiatives in fuel conversions and driver education to improve fuel consumption efficiency outcomes.

Urgent Couriers sees further opportunities in new vehicle, fuel and lubricant technologies to improve fuel efficiency, reduce costs, reduce emissions and maintain a market leadership position in environmental management.

- [Expanded services – freight consolidation](#)

An increasing industry and customer focus on energy efficiency presents an opportunity for Urgent Couriers to initiate a new freight consolidation service. There is potential to substitute multiple long-haul services by multiple couriers with multiple short-hauls plus consolidated long-haul. However there are time and independence issues.

In particular, Urgent Couriers sees an opportunity to consolidate Auckland city-to-airport same-day freight deliveries for other courier companies from a centralised depot.

Opportunities in others operations

- [Contractor emissions management](#)

Urgent Couriers take responsibility for their contractor's CO₂ emissions, and have publicly reported these emissions as part of the Urgent Couriers carbon footprint in their 2001 Sustainable Development Report. It is important to note that responsibility does not equate to liability. The liability for those contractor emissions remains with the contractor. However, Urgent Couriers are ideally placed to understand the emissions performance of their contractors.

To the extent that emission reductions acquire monetary value in public or private emissions market, Urgent Couriers sees a business opportunity to aggregate any company and contractors' emission reductions for sale.

- [Energy efficiency consulting to other transport service providers](#)

Having developed increasing energy efficiency capabilities in its own operations, Urgent Couriers sees opportunities to capitalise on this expertise by advising other transport services operators on their own efficiency improvements.

IV NEXT STEPS

This report has provided a very high level overview of each of the five opportunities identified at the MED workshops and through the case studies. These opportunities were identified with organisations who are already engaged in, and aware of, climate change issues. The next critical step is to work together with the New Zealand Government and key business leaders to engage with the wider business community.



“the next step an organisation must take, is to take their first step.”

Andy Britton, Partner, PricewaterhouseCoopers

Action for all New Zealand Businesses

The next steps that New Zealand businesses can take to maximise potential climate change related opportunities include:

- engaging with the Government on the preferred policy package before 14 June 2002
- reading and understanding this report to identify relevant business opportunities and what opportunities competitors may be pursuing
- exploring all other potential business opportunities that could arise out of a carbon constrained economy which this report may not have covered
- developing a business case and strategy to address the risks of climate change and climate change mitigation measures
- working to understand their GHG emissions footprint. To account and report GHG emissions, the GHG Protocol should guide the methodology. To calculate actual emissions, consider using either the GHG Protocol calculation tools, available free from the website, or another credible footprinting tool (such as EBEX21).

Action for the NZBCSD

To follow up on these business opportunities identified in this report, the NZBCSD will, within the next six months:

- publish a user friendly, New Zealand specific industry guide on GHG accounting and reporting, using the GHG Protocol
- summarise the ongoing agricultural research activities and the implications for greenhouse gas accounting and reporting
- work with specific stakeholders to ensure all carbon footprinting tools are compatible with the GHG Protocol to ensure New Zealand organisations develop corporate emissions inventories that are consistent and have international credibility

- participate in the WBCSD GHG Protocol Structured Feedback Process (SFP).⁵⁰ This process will involve:
 1. communicating the results of the GHG Protocol roadtests from the six New Zealand case studies
 2. adapting the relevant parts of the GHG Protocol to the New Zealand context (within the constraints of available data) particularly in the area of agricultural emissions⁵¹
- encourage all NZBCSD members to report any climate change related business opportunities that they have identified or developed
- encourage all NZBCSD members to commit to and report against emissions reduction targets, using the GHG Protocol
- provide detailed case studies to illustrate complex mechanisms (for example a detailed example on how organisations participate in CDM)
- consider the recommendations of the report “Inquiry into the role of Local Government in meeting New Zealand’s climate change target” and co-ordinate with the relevant local government initiatives that emerge as a result of this report.

Action for the Government

The Government is currently consulting on its preferred policy package which will result in a range of actions. In addition to these actions, we recommend the New Zealand Government consider the recommendations relating to each of the opportunities below. In all cases, we recommend the Government invest further time and resources into exploring and communicating these and other business opportunities which will arise in the future.

Provision of Knowledge and Services

- in the short term, it would be helpful if the New Zealand Climate Change Project team prepared a climate change directory so New Zealand businesses are able to contact climate change professionals with different areas of expertise
- in the longer term, the New Zealand Government may consider setting up a New Zealand Greenhouse Office, to administer climate change policy, centrally co-ordinate climate change related initiatives and to act as a point of reference for businesses wanting to explore opportunities such as CDM or emissions trading.

Energy Efficiency

- The National Energy Efficiency and Conservation Strategy, released last year, is one of the Government’s Foundation Policies. It is important that the profile of energy efficiency, particularly in commercial buildings is raised. We recommend:
 - continuing steps to raise the profile of the benefits of energy efficiency, particularly in commercial buildings. This would be co-ordinated by an appropriate central agency (EECA) and would build on existing initiatives for example energy efficiency workshops, information dissemination and media campaigns
 - that EECA partner with business wherever possible to ensure the most effective delivery of win-win outcomes.

⁵⁰ The WBCSD is in the process of developing a revised edition of the GHG Protocol

⁵¹ The GHG Protocol does not cover agricultural emissions to the level of detail that industrial, commercial and transport emissions are covered. Significant New Zealand research is currently underway to allow more accurate measurement and estimation of our agricultural emissions. Within the next six months, the NZBCSD will summarise the ongoing research and outline how it will be relevant to the GHG Protocol once it is available. Wherever possible, this step will use existing data to provide New Zealand specific guidelines for the using the GHG Protocol in the agricultural sector.

New Technology and Products

- Ruminant Efficiency
We recommend continued investment in research and technology to improve ruminant efficiency. The New Zealand Government should specifically investigate the potential revenue streams available from JI or CDM.
- Energy from biomass
We recommend working with industry and business to:
 - improve the poor image and understanding of bioenergy and perceived technology risk
 - consider the quality and guaranteed supply of the source of fuel (such as woodchips)
 - examine the current pricing and structure of the New Zealand electricity market to potentially improve the viability of embedded or distributed generation and its ease of implementation
 - provide potential investors with better information on
 - a) the quantity and quality of wood residues derived from their wood processing plant and
 - b) the technical issues they should address when choosing heat plant (including plant design and technology, fuel supply and quality issues) and
 - c) conversion plant economics.

Kyoto Mechanisms

- Further information needs to be made available to New Zealand businesses by the New Zealand government to give clear guidance on how these Kyoto mechanisms will operate and how New Zealand businesses could participate and benefit.

Improved Trading Opportunities

- We recommend more rigorous research on the potential opportunities for New Zealand relating to “climate friendly” branding which includes:
 - Market research on the domestic and international demand for “climate friendly” products and services, and how these should be developed and marketed, and
 - Research on the types of eco brands that are working, their characteristics and their market value.

General

We recommend the Government:

- use a consistent methodology for the inventory calculation (and emissions factors) when implementing the projects mechanism proposed in the preferred policy package
- provide a national statement on how entity level inventory calculations and emissions factors will influence the national inventory analysis. For example, is the Government interested in taking relevant and potentially more accurate information from entity level inventories (ie information on emissions factors) for use in the national inventory calculations?
- review:
 - the entity level inventory methodologies available (including the GHG Protocol)
 - the Government's likely requirements for entity level inventory information
- provide business with guidance on:
 - the likely Government requirements for entity level reporting
 - how the various inventory methodologies align with these requirements.

Summary

Monitoring the Net Benefit of GHG Opportunities

There are four types of impacts resulting from the above opportunities:

- economic
- financial
- environmental
- social.

Only the economic net benefits will contribute directly to an increase in New Zealand's economic growth on an annual basis. Each of the other categories of benefit will be a form of investment in activities which may eventually contribute to GDP. It is important that as well as taking up opportunities, organisations (including the Government) put in place tools for monitoring the economic, financial, environmental and social impact of climate change and climate change related issues.

APPENDIX I

the source of the business opportunities identified

Table 6: The source of the business opportunities which are discussed in this report

Nature of the Business Opportunity	Case Studies Opportunities	MED Opportunities
a) Provision of knowledge and services	√	
b) Reduced costs through energy efficiency Commercial Building energy efficiency	√	√
c) New technology, practices, product (including research) Biomass Ruminant Efficiency	√	√
d) Kyoto Mechanisms Emissions Trading, JI, CDM	√	√
e) Improved trading opportunities Climate Friendly Brand	√	√

APPENDIX II

assumptions and further analysis

The following data supports the five business opportunities discussed earlier in this report. Except for the Provision of Knowledge and Services, each of the business opportunities has been quantified either in dollars or CO₂ tonnes. The discussion around "Provision of Knowledge and Services" has no quantitative disclosures, and therefore there are no supporting assumptions or analyses included in this appendix.

Energy efficiency

commercial buildings assumptions:

To estimate the size of the opportunities for energy efficiency in commercial buildings, the following assumptions have been made:

1. Average commercial building energy efficiency can be economically increased by 15%.⁵² "Economic" means project delivers a 20% IRR or greater
2. Commercial buildings consume roughly 6945 GWh of electricity per annum
Figure calculated based on:
 - 25 PJ/yr of electricity used by the commercial sector⁵³
 - Conversion factor of 1PJ = 277.8 GWh electricity⁵⁴
3. Average commercial building electricity tariff = 10.5 c/kwh (105,000 \$/GWh)⁵⁵
4. Emissions factor for commercial building electricity = 0.447 tonnes CO₂ equivalent/MWh (447 tonnes CO₂ /GWh)⁵⁶.

⁵² EECA (2001) "Energy Auditing: A guide for building manager", page 3

⁵³ EECA Technical Research Group (2000) "The Dynamics of Energy Efficiency Trends in New Zealand", Energy Efficiency and Conservation Authority, table C28, page 122

⁵⁴ EECA Technical Research Group (2000) "The Dynamics of Energy Efficiency Trends in New Zealand", Energy Efficiency and Conservation Authority, table C59, page 135

⁵⁵ EECA Technical Research Group (2000) "The Dynamics of Energy Efficiency Trends in New Zealand", Energy Efficiency and Conservation Authority, table C10, page 116

⁵⁶ Ministry of Economic Development (2002)

New technology and practices

a) Ruminant Efficiency Assumptions And Analysis

Assumptions:

1. Annual New Zealand export income from sheep, dairy and beef = NZ\$12.7b⁵⁷
2. 1% increase in sheep, dairy and beef productivity is achieved through ruminant efficiency technology
3. All increased production is marketed at same returns as baseline production
4. Annual emissions from sheep, dairy and beef = 31 million tonnes of CO₂ equivalent⁵⁸
5. 1% increase in productivity delivers 15percent³ reduction in methane emissions (see calculation below)

Analysis of productivity increase through methane emissions reduction:

- a. Sheep and beef emit 6.50percent of their energy as methane (on average) (IPCC data)
- b. A cow consumes 207 MJ/day during peak lactation (on average) (DRI data)
- c. Assume average consumption during lactation is 80percent of peak
- d. So a cow consumes 165.6 MJ/day during lactation (on average)
- e. If reduce emissions to 5.50 percent of energy consumed this yields an emissions reduction of 15%
- f. Cow then has an additional 1.656 MJ/day of energy available to it
- g. Average lactation period = 268 days (Livestock Improvement's 2000-2001 dairy statistics)
- h. Cow has an additional 443.808 MJ/year of energy available to it during the lactation period
- i. Average amount of available energy converted to milk = 40 percent (AgResearch)
- j. Amount of additional energy available for milk production = 178 MJ/year
- k. Average amount of energy required for a litre of milk = 5 MJ (AgResearch)
- l. Increase in milk production per cow = 35.50464 litres
- m. Average annual production of a cow = 3600 litres (AgResearch)
- n. Average increase in production = 0.99 percent
- o. Assume the productivity increase for meat and wool is also around 1 percent.

⁵⁷ Trade New Zealand www.tradenz.govt.nz/. For the year 2000/2001, dairy exports estimated at around NZ\$9 billion. Meat exports of sheep and beef around NZ\$3.7 billion. Wool Board www.woolgroup.co.nz/product_marketing/. Wool exports around 544.9 million

⁵⁸ In 1999 cows were responsible for 7 million tonnes CO₂ equivalent, dairy for 7million tonnes CO₂ equivalent and sheep 17 million tonnes CO₂ equivalent. Climate Change Programme www.climatechange.govt.nz/sp/consultation/consultation.htm.

b) Energy From Biomass

There are two major potential sources of wood waste for use in energy production in New Zealand:

- Wood process residues. These are a by-product of log processing and are already extensively used for energy production
- Forest residues. These arise from log extraction and are not currently used for energy production.

Key drivers for the use of bioenergy within New Zealand include:

- Sustained diversification of the energy mix
- Economics of conversion plant relative to fossil fuel plant
- Ability to reduce greenhouse gas emissions by displacing fossil fuels
- Diversification of energy solutions in a deregulated energy market
- Integrating the use of bioenergy plant with industrial processing and residue disposal
- Increased employment opportunities through growing, harvesting, collecting and use of biomass
- Diversion of organic waste from landfills
- Increasing demand for the use of sustainable energy forms; and
- Opportunity to develop "spin off" industries around heat plant manufacturing and servicing

- The cost of wood process residue disposal in landfills creates an opportunity since the fuelwood then has a negative cost. This enhances the profitability of any plant consuming that residue on site

- There are opportunities resulting from energy companies' wider perspective than electricity generation *per se*. As a result, some of these companies may consider investment in cogeneration or heat plant within a forest industry site boundary. This could leave forestry specialists to focus on their core activities whilst energy specialists focus on energy supply

- Advanced biomass conversion technologies are now maturing with increasing numbers of large demonstration projects establishing technical feasibility

- A major incentive for change derives from the negative direction the energy industry is taking with respect to the use of renewables generally, and woody biomass in particular. Since the Kyoto Protocol, which references 1990 emissions as the baseline, energy demand has continued to grow, with the proportional contribution from renewables shrinking. This applies to both electricity generation and industrial heating (particularly timber drying) with gas and coal tending to displace renewables as demand grows

- Constraints on the management of forests under the Resource Management Act will require foresters to dispose of forest residues in an environmentally acceptable manner. This may provide additional opportunities, especially if there are incentives for the installation of small electricity generating plant to be placed in forest areas close to the fuel source and where grid connection is close by.

Currently the wood processing industry is the major consumer of woody biomass with 86 percent of total biomass derived energy consuming approximately 25 PJ. The other significant user is residential wood burners consuming around 5 PJ.

Assumptions and notes supporting the analysis of wood waste as a heat source:

1. The forecast average cost of wood waste for heating is NZ\$2.50/GJ (includes capital, handling and operating costs)¹ in the years 2000 to 2010
2. The average gas price for business published by Contact and Genesis Energy is around NZ\$9.50/GJ (although the negotiated tariff for large users is likely to be significantly less)
3. Solid Energy have informed that the "Average" coal costs to an industrial customer are:

South Island	\$3.96 per GJ
North Island	\$3.86 per GJ

Final costs are very dependant on the cost to transport the coal to the customer
4. If the capital cost of wood waste heating plants are competitive and air quality issues can be addressed, there could be a significant business opportunity in using wood waste for heating energy
5. The expected availability of wood waste energy by 2010 is 89PJ pa¹
6. Assumptions:
 - Conversion efficiency from wood waste to energy = 85%
 - Heat from wood waste can be provided at \$1/GJ less than heat from gas or coal (numbers above indicate that this should be achievable – even if the capital, transport and handling costs for wood are higher than estimated above and the negotiated gas price is lower that the above estimate).

Assumptions and notes supporting the analysis of wood waste for electricity generation:

1. The EECA report¹ indicates that most cost effective technology is likely to be the "Varnamo"-type of plant. This is likely to require a size greater than 20 MWe, and probably greater than 60-70 MWe to be competitive. Ultimately, when the system has been proven and experience gained, then a large 60 MWe plant is expected to have a capital cost of around US\$1700/kWe, and associated operating costs (excluding fuel) of US1.1-1.4c/kWh.
2. Taking the above information and assuming:
 - A plant life of 20 years
 - A 10 percent IRR before the value of any emissions reduction credit
 - Reveals that cost of generation would be around NZ7.5 c/KWh
3. If there is a local heat demand then a cogeneration plant where the waste heat is utilised is likely to deliver an electricity of around NZ5.7 c/KWh.

Assumptions and notes supporting the analysis of wood waste for electricity generation via cogeneration:

1. Assume an optimum cogeneration plant is built where:
 - 33% of the energy is utilised as electricity
 - 67% of the energy is released as heat which is utilised
2. Assume that the same electricity as above is generated and the waste heat is essentially 'free'
3. This means that for every 1MWh of electricity generated 2MWh (or 7.2GJ) of heat is generated for free
4. This heat would otherwise cost NZ\$2.50/GJ (cost of wood waste - which is the cheapest heat source)
5. So the cogeneration plant is essentially providing NZ\$18.00 worth of free heat per MWh of electricity generated
6. Assume the electricity costs NZ\$75/MWh (7.5c/KWh) to generate (as in the analysis above)
7. If the cost saved in heating is offset against the electricity price then the electricity costs NZ\$57/MWh (NZ\$75-NZ\$18) = 5.7c/KWh.

Forecast of resource availability and primary bio-energy (under a "Business as Usual" scenario)

Domestic firewood is not shown in the table 7. However, it provides approximately 5PJ from a range of sources.

Table 7: Energy from Wood Waste Analysis

		Current		2010		2020	
		Potential Available	Actual Use	Potential Available	Likely Use	Potential Available	Likely Use
Wood Process Residue* (solid wood fuel)	Vol. (Mm ³)	2.6		4.0		4.2	
	Energy (PJ)	26	13	40	17	42	21
Wood Process Residue (black liquor)**	Energy (PJ)	13	13	14.7	14.7	16.6	16.6
Forest Arisings (excl cutover)	Vol. (Mm ³)	0.6		1.1		1.2	
	Energy (PJ)	6	0	11	Dependent on demand	12	Dependent on demand
Forest Arisings (cutover)	Vol. (Mm ³)	3.4		3.3		3.4	
	Energy (PJ)	34	0	33	Dependent on demand	34	Dependent on demand
Energy Plantation	Vol. (Mm ³)	0		Dependent on demand		Dependent on demand	
	Energy (PJ)	0	0	Dependent on demand	Dependent on demand	Dependent on demand	Dependent on demand

* Processing residue includes volumes currently used by the forestry sector, assessed as being equal to the volume available for new uses. The energy use predictions are based on a business as usual approach

** Black liquor is a by-product of processing

A key challenge for the deployment of biomass (in particular that sourced from the forest industry) is the sustainable production, management, conversion and delivery of the resource to the marketplace in the form of modern and economically competitive biofuels. In a number of situations, biomass-fuelled energy facilities will supplement their wood residue fuel with forest residues and eventually from purpose-grown-short-rotation forests.

Greenhouse gas balances for bioenergy systems

Biomass produces negligible or zero net CO₂ emissions during its production phase. During other diverse parts of its lifecycle (growing, collection, transport, processing, plant construction, deployment and decommissioning), it can give rise to emissions. If the effects on carbon emissions from bioenergy substitution for fossil fuels are to be evaluated accurately, then emissions from all stages of the life cycles need to be included. A systematic framework is needed to estimate the net effect of GHG emissions on both the full bioenergy system and the fossil fuel energy system it would replace.

Kyoto Mechanisms (CDM)

Assumptions:

- New Zealand organisations are involved in 5% of the renewable energy, forestry and land management projects available in the Asia-Pacific region
- For each of these projects New Zealand captures
 - 30% of the value of the credits for renewable energy projects (10% for consultancy on project design, 20% for consultancy on project development and implementation)
 - 60% of value of credits for forestry and land management projects (10% for consultancy on project design, 20% for consultancy on project development and implementation and 30% for sale of technology/equipment)
- 47% of CDM projects are forestry (1%), land management (11%) or renewable energy projects (35%)⁵⁹
- New Zealand “owns” 10% of projects it is involved in (i.e. invests capex and receives the 15% return on investment and the emissions reduction credits for those projects - for use against own baseline or sale)
- For the remaining 90% of projects it is involved in New Zealand receives 30% of the value of credits for renewable energy projects and 60% of the value of credits for forestry and land management projects – as discussed above
- IRR of projects that New Zealand “owns” (including revenue from trades) = 15%
- Average life of projects that New Zealand “owns” = 15 years
- Average cost of projects that New Zealand “owns” is 7 times the value of the emissions purchase over 5 years (this is the average cost for projects being investigated for the World Bank’s PCF)
- Exchange rate = 0.45 \$US/\$NZ.

⁵⁹ McBurnie, Craig, (2002) “The Carbon Markets”, paper3

Table 8: Detailed Analysis of the potential size of the CDM opportunities to New Zealand

Detailed analysis on the Size of CDM Opportunities		\$US		\$NZ	
		HWWA	UN	HWWA	UN
1	Global CDM Revenue through trades for 1st commitment period (\$ million per annum)	\$267	\$18,000	\$594	\$40,000
2	Average value of trade (\$/tonne CO ₂ eq.)	\$1	\$30	\$2	\$67
3	Global volume of emissions reduction through CDM (tonnes CO ₂ per annum)	297	600	297	600
4	Volume of emissions reduction through CDM in Asia-Pacific (tonnes CO ₂ per annum)	216	337	216	337
5	Total value of Asia-Pacific CDM trades (\$ million)	\$194	\$10,100	\$431	\$22,444
6	Value of Asia-Pacific CDM trades from renewable energy projects (\$ million per annum)	\$68	\$3,535	\$151	\$7,856
7	Value captured by New Zealand from Asia-Pacific renewable energy project CDM trades (\$ million per annum)	\$1.0	\$53	\$2	\$118
8	Value of Asia-Pacific CDM trades from forestry projects (\$ million per annum)	\$21	\$1,111	\$47	\$2,469
9	Value captured by New Zealand from Asia-Pacific forestry project CDM trades (\$ million per annum)	\$0.64	\$33	\$1	\$74
10	Value of Asia-Pacific CDM trades from land management projects (\$ million per annum)	\$1.94	\$101	\$4	\$224
11	Value captured by New Zealand from Asia-Pacific land management project CDM trades (\$ million per annum)	\$0.06	\$3	\$0	\$7
12	Total value captured by New Zealand from Asia-Pacific CDM trades (\$ million per annum)	\$1.72	\$89	\$4	\$199
13	Value of trades from projects "owned" by New Zealand (\$ million per annum)	\$0.2	\$9	\$0	\$20
14	Capital Investment made by New Zealand (\$ million)	\$6	\$322	\$14	\$715
15	Revenue from CDM projects "owned" by New Zealand - before revenue from emissions credits (\$ million per annum)	\$1	\$45	\$2	\$100

Supporting information for the Rarotonga CDM case study

1. Cost of Electricity

Table 9: Schedule of Electricity Prices in Rarotonga⁶⁰

Cost per kilowatt hour		
Demand Level	Domestic	Commercial
0 - 60 units	.23c	.55c
61 - 240 units	.46c	.55c
240 +	.55c	.55c
Service charge	NZ\$5.00	NZ\$5.00

The above schedule indicates that domestic electricity charges are subsidised for low volume domestic users and the actual cost of delivering power to all users is around NZ\$0.55 per kWh.

2. Current electricity generation

Most of the island's generation is from a 6.8MW diesel driven power station.⁶¹ This meets a peak demand of 3.0MW. 3,500 customers rely on the power station - the tourist industry is the largest customer sector.

Assuming that the average load for the diesel power plant = 50% of peak load (1.5 MW), the annual generation = 13,000 MWh pa.

3. Resulting emissions reduction

Assumptions:

- Diesel plant emissions = 0.88 tonnes CO₂ per MWh⁶²
- Diesel plant replaced by 100% renewable generation

Outcomes:

- Emissions reduction = 6,600 tonnes CO₂ per annum

4. Other benefits:

- If they are done well, projects such as these will contribute to the long-term sustainability of developing countries and reduce their dependence on aid.

5. Barriers/issues

- The final rules on the CDM mechanism will greatly influence the eligibility of this project as a CDM project (the fact that it could be economically viable without the value of emissions credits could mean that it is ineligible). These "additionality" and "baseline" rules are yet to be finalised.

⁶⁰ Schedule from www.cookislands-invest.com/english/business/climate.htm#utility

⁶¹ www.apesma.asn.au/newsviews/professional_update/march_1999/frontline.htm

⁶² Estimate from EECA

Improved trading opportunities

From Branding:

Green Power:

Description:

Consumers can choose to buy their electricity from renewable sources (or their supplier agrees to source enough renewable energy to cover all the total electricity consumption of all greenpower consumers).

Percentage Uptake and Market Worth:

In the United States, green power marketers have been active for several years but the market is young and experience is still rather limited. The uptake is about 1% or less. In review, most markets have response rates similar to the US. The only exception to this is the Netherlands and Sweden where the consumer response was 10%. In these countries there were aggressive marketing campaigns and tax exemptions for green power purchases.

In Australia, over the 4-year life of the program, demand for genuine renewable energy has increased 10-fold. Close to 1% of all residential homes have signed up to Green Power nationwide. While this figure is lower than market research has previously predicted, surveys suggest that 15% of customers that are provided with the right information about Green Power, for example through telemarketing, do sign up – indicating scope for future growth in customer uptake. In Australia over 2,000 businesses are using Green Power. Commercial customers now represent almost 50% of all Green Power energy sales.

Tax incentives and subsidies can be important drivers of business behaviour and trading activity. Tax exemptions or credits for Green Power purchases are one of the most direct forms of subsidy for the Green Power market. These have been successful in stimulating supply and demand for Green Power, most notably in the Netherlands.

The cost of Green Power:

Most Green Power products have been offered at modest price premiums. In the US, the range is 0.5c/kWh to 1.5c/kWh. In Germany, Finland and the Netherlands Green Power has been offered at prices below standard electricity services, hence the higher uptake. Some products, such as new wind and solar resources have been offered at a higher price; these resources offer the greatest environmental benefits.

Greenhouse Friendly Certification Program:

The Greenhouse Friendly Certification Programme has just started in Australia, and allows consumers to purchase products and services, which have had their greenhouse gas emissions offset. It is administered by the Australian Greenhouse Office (AGO). Certified products and services will have the emissions offset from all stages of production and distribution. A product is verified by an independent verification panel. Once a product is approved it will be able to display the certification mark. All products and services are eligible for application.

Energy Star:

Energy Star operates in the United States, Australia and other countries. Products with the Energy Star logo have to fit to specifications for the particular product. Consumers can be assured that they are buying a more efficient and therefore more environmentally friendly product.

Green-e:

The Green-e logo is currently in use in the United States. Green-e provides an easy way for consumers to quickly identify environmentally superior electricity products in competitive markets. To obtain a Green-e logo the provider must meet the following specifications:

- 50% or more of the electricity supply comes from one or more of these eligible renewable resources: solar electric, wind, geothermal, biomass, and small or certified low-impact hydro facilities
- If a portion of the electricity is non-renewable, the air emissions are equal to or lower than those produced by conventional electricity
- There are no specific purchases of nuclear power.

Greenfleet NZ and Greenfleet Australia:

Car owners or operators can choose to offset their vehicle emissions by funding the planting of native trees. The program also raises awareness of the greenhouse implications of driving and works to facilitate the fast-tracking of fuel-efficient technologies and cleaner fuels to the marketplace to reduce emissions in the future.

GEN – Global Ecolabelling Network:

The Global Ecolabelling Network (GEN) is a non-profit association of eco-labeling organisations from around the world. These eco-labeling organisations set criteria for and certify products and services with lower environmental burdens and more positive net impacts than comparable products with the same function. Environmental Choice New Zealand is part of this network. Other countries who have their own environmental label include: Australia, Canada, Czech Republic, European Commission, Hungary, Japan, Korea, Spain, Sweden, Taiwan, Thailand and the USA.

APPENDIX III

greenhouse gas accounting and reporting

The Greenhouse Gas Protocol is a corporate GHG accounting and reporting standard jointly developed by the WBCSD and the World Resources Institute. Its mission is to “*develop and promote internationally accepted greenhouse gas (GHG) accounting and reporting standards through an open and inclusive process*”⁶³. The corporate inventory module was developed through extensive stakeholder dialogue, road testing by more than 30 companies in 10 countries including several SMEs and extensive peer review. Increasingly, international organisations are adopting the Greenhouse Gas Protocol as their tool for GHG accounting and reporting.

The GHG Protocol principles state that all GHG accounting and reporting should be:

- Relevant
- Complete
- Consistent
- Transparent
- Accurate.

Companies wishing to compile an emissions inventory should carefully apply these accounting principles to ensure their emissions information:

- Represents a true and fair account of an organisations emissions, and
- Is credible and unbiased in its treatment and presentation of issues⁶⁴.

To understand GHG emissions using the GHG Protocol, companies need to follow three steps:

STEP 1 → PLANNING

STEP 2 → CALCULATING

STEP 3 → REPORTING

STEP 1: PLANNING

Planning involves:

- Setting business goals and inventory design
- Setting organizational boundaries
- Setting operational boundaries
- Accounting for any GHG reductions (not usually relevant in the first year)
- Choosing a base year to measure emissions against over time.

The first question organisations should ask when starting to compile an emissions inventory is “Why are we doing this?” Climate change is an uncertainty, both in terms of science and policy. However, climate change implications certainly present significant risks to many organisations. Therefore it makes good business sense to understand, manage and report your GHG emissions.

⁶³ For further information, please see “The Greenhouse Gas Protocol, a corporate accounting and reporting standard” at www.ghgprotocol.org

⁶⁴ *ibid*, page 6

The GHG Protocol states the four categories of business goals most frequently listed by companies as reasons for compiling a GHG inventory are:

- GHG risk management
- Public reporting / participation in voluntary initiatives
- GHG markets
- Regulatory / Government Reporting.⁶⁵

Good GHG inventory planning will ensure your inventory will provide information for a variety of different uses and users.

The next question organisations should ask is “How should we account for emissions from business units, subsidiaries, joint ventures, or equity investments?” Clear organisational boundaries will ensure your inventory is complete. Businesses vary in their legal and organisational structures. When accounting for GHG emissions from partially-owned entities/facilities, it is important to draw clear organisational boundaries and to apply the concept of “control” and “significant influence”. For example:

- | | |
|---|----------------|
| • A company which you have 100% ownership | Wholly owned |
| • A subsidiary company which you have 100% ownership | Wholly owned |
| • A company which you do not wholly own, but you have control | Wholly owned |
| • A Joint Venture | Equity share |
| • A company where you have significant influence | Equity share |
| • An investment, where you own less than 20% of the shares | Do not include |
| • A personal trust | Do not include |

Where possible, it makes sense to follow company-specific distinctions already in place for financial accounting, provided these are explicitly explained and followed consistently.

After a company has determined its organisational boundaries, it is important to define its operational boundaries. Questions at this stage include “What are my activities? Where are these activities located? What emissions have I directly caused? What emissions are a result of my business, but belong to another entity?”

The GHG Protocol proposes three scopes to help companies categorise their direct and indirect emissions:

- | | |
|-----------|----------|
| • Scope 1 | Direct |
| • Scope 2 | Indirect |
| • Scope 3 | Indirect |

Direct GHG emissions are emissions from sources that are owned or controlled by the reporting company eg company owned vehicles and make up scope 1. Indirect GHG emissions are emissions that are a consequence of the activities of the reporting company, but occur from sources owned or controlled by another company eg emissions from the production of purchased electricity (scope 2⁶⁶) or employee travel on scheduled flights (scope 3).

⁶⁵ *ibid*, page 10

⁶⁶ The purchase of electricity is deemed to be scope 2, as the emissions belong to the generator of that electricity. In most businesses, electricity is a significant and consistent cost. Therefore for improved transparency, electricity has been separated from other indirect emissions

KEY LEARNING – RESPONSIBILITY DOES NOT EQUAL LIABILITY

Both Direct and Indirect emissions contribute to an organisation's carbon footprint, but the split is important. It is only the DIRECT emissions which a company had direct control over. Therefore if a charge is introduced in the future on emissions *at the corporate level*, organisations must clearly show the split in their carbon footprint between their DIRECT emissions, which will carry a liability, and total emissions for which they have a responsibility.

It is important to be transparent about why and how your corporate GHGs are reducing. Questions at this stage include: "Have my absolute emissions changed over time? Have my relative emissions changed over time? Can I participate in any projects, offsets or credit mechanisms?" It is important to clearly account for all reductions in emissions. Focusing on the overall company GHG impact has the advantage of helping companies more effectively manage their aggregate GHG risks and opportunities. It also helps guide the transfer of resources to activities resulting in the most cost effective GHG reductions. The GHG Protocol recommends accounting for GHG reductions, although this does not usually happen until a company has been measuring its emissions for at least one year.

The final step in the planning process is to select a base year to start measuring your emissions, and to compare subsequent measurements against. Questions at this stage include "What sort of comparisons do I need to make over time? Do I need to start at 1990?" Base year emissions can be differentiated from the term baseline, used in the context of project-based accounting under the Kyoto Protocol. The base year emissions concept aims at a broader footprint intended to allow comparison of emissions performance over time.⁶⁷ Emissions performance comparison can be done against the last accounting period as well as against emissions in a selected reference year. However, comparison only against the last accounting period is unlikely to cater for strategic business goals such as establishment of emissions reduction targets and management of risks and opportunities or address the needs of investors and other stakeholders.

KEY LEARNING – PLAN EMISSIONS INVENTORIES WITH A WIDE SCOPE

To plan a relevant, complete, consistent, transparent and accurate GHG inventory:

- Set your GHG business goals
- Understand your company structure, including all its investments
- Understand your operations, including those in other business units or locations
- Establish if you are participating in any projects, or have purchased any emissions reductions
- Choose a base year to measure future emissions against.

To gather the information:

- Review key documentation, such as your annual report or GHG emissions data
- Discuss and confirm issues with key staff (e.g. your accountant, operations manager)
- Understand your internal data collection system.

⁶⁷ GHG Protocol, page 31

STEP 2: CALCULATING

Developing your GHG inventory involves:

- Identifying and calculating GHG emissions
- Discussing or reviewing GHG inventory quality.

Once organisations have a clear strategy around “why” they are calculating their emissions, the next step is “how” to calculate those emissions. Questions often asked includes: “How do I calculate what I emit? What tool should I use?”

Emissions calculation tools have been developed as part of the GHG Protocol. These tools are a series of spreadsheets and are available free of charge from the GHG Protocol website. Use of these tools is encouraged as they have been peer reviewed by experts and industry leaders and are believed to be the best available. The tools, however, are optional. Companies may use their own GHG calculation tools, provided they are consistent with the approaches described⁶⁸.

To measure your emissions:

1. identify your GHG emissions sources⁶⁹ (taking account of your boundaries)
2. select an emissions calculation approach (such as GHG Protocol tools, EBEX21 or your own corporate method)
3. collect activity data (such as from company vehicle log books, electricity bills)
4. choose an emissions factor⁷⁰
5. input the data to estimate your GHG emissions
6. consolidate the results from each subsidiary or site to get an overall corporate emissions inventory.

CASE STUDY – URGENT COURIERS

The exercise to compile the fuel use data for Urgent Courier’s emissions inventory was complex, manual, and very time consuming. As a result, the company switched to one fuel supplier who was able to provide, among other things, fuel use data in a user-friendly format on a monthly basis. The information includes a detailed breakdown of fuel use and kilometres travelled by business unit, or car if necessary. Going forward, Urgent Couriers will now be able to monitor fuel use, and identify any drivers who appear to have inefficient cars or driving techniques, so tune ups or training can be completed, to reduce emissions.

This case study highlights a common problem encountered when gathering information from external parties. Many providers of goods and services (eg travel agents, freight contractors, oil companies) have not needed to provide data that is in a user friendly, summarised format which can be used for emissions calculations. Accurate information from third party sources is vital to ensure a quality and cost effective emissions inventory.

It is vital to input accurate and complete information to avoid the “Rubbish in, Rubbish Out” scenario. A high quality emissions inventory will ensure your calculations have credibility with internal management, external stakeholders and current or future GHG markets.

⁶⁸ GHG Protocol, page 36

⁶⁹ Emissions typically occur from the following four categories:

- Stationary combustion (eg fuels used in stationary equipment such as boilers, engines, turbines or heaters to produce heat or steam)
- Mobile combustion (eg fuels used in mobile equipment such as cars, trucks, trains, aeroplanes and ships)
- Process emissions (eg emissions resulting from chemical or physical processes)
- Fugitive emissions (eg emissions that escape, either intentionally or unintentionally, such as equipment leaks from joints and seals)

⁷⁰ The GHG Protocol uses international emission factors that in some cases are not country specific. Where possible it is more appropriate to use emissions factors which have been developed for the New Zealand environment or for a corporate’s activities. A full discussion of emission factors will be included in the NZ Industry Guide, due for publication in July 2002

The GHG Protocol outlines eleven steps to improve inventory quality:

1. Adopt and apply GHG accounting and reporting principles
2. Use a standardised system for calculation and internal reporting of GHGs across multiple business units/facilities
3. Select an appropriate calculation methodology
4. Set up a robust data collection system
5. Establish appropriate information technology controls
6. Undertake regular accuracy checks for technical errors
7. Conduct periodic internal audits and technical reviews
8. Ensure management review of the GHG information
9. Organise regular training sessions for inventory development team members
10. Perform uncertainty analysis
11. Obtain independent external verification.

KEY LEARNING – CALCULATE EMISSIONS ACCURATELY AND COMPLETELY

To calculate your emissions and achieve an inventory that is relevant, complete, consistent, transparent and accurate:

- identify your GHG emissions sources
- calculate your emissions using appropriate tools and emissions factors
- review the quality of your GHG information.

STEP 3: REPORTING

The third step is to communicate the emissions information to your stakeholders. Questions commonly asked at the reporting stage include: "What should I report? What format should I use?"

The reporting requirements and layout detailed in the GHG Protocol represent current best international practice. Organisations following this standard will have an inventory that is internationally credible and comparable.

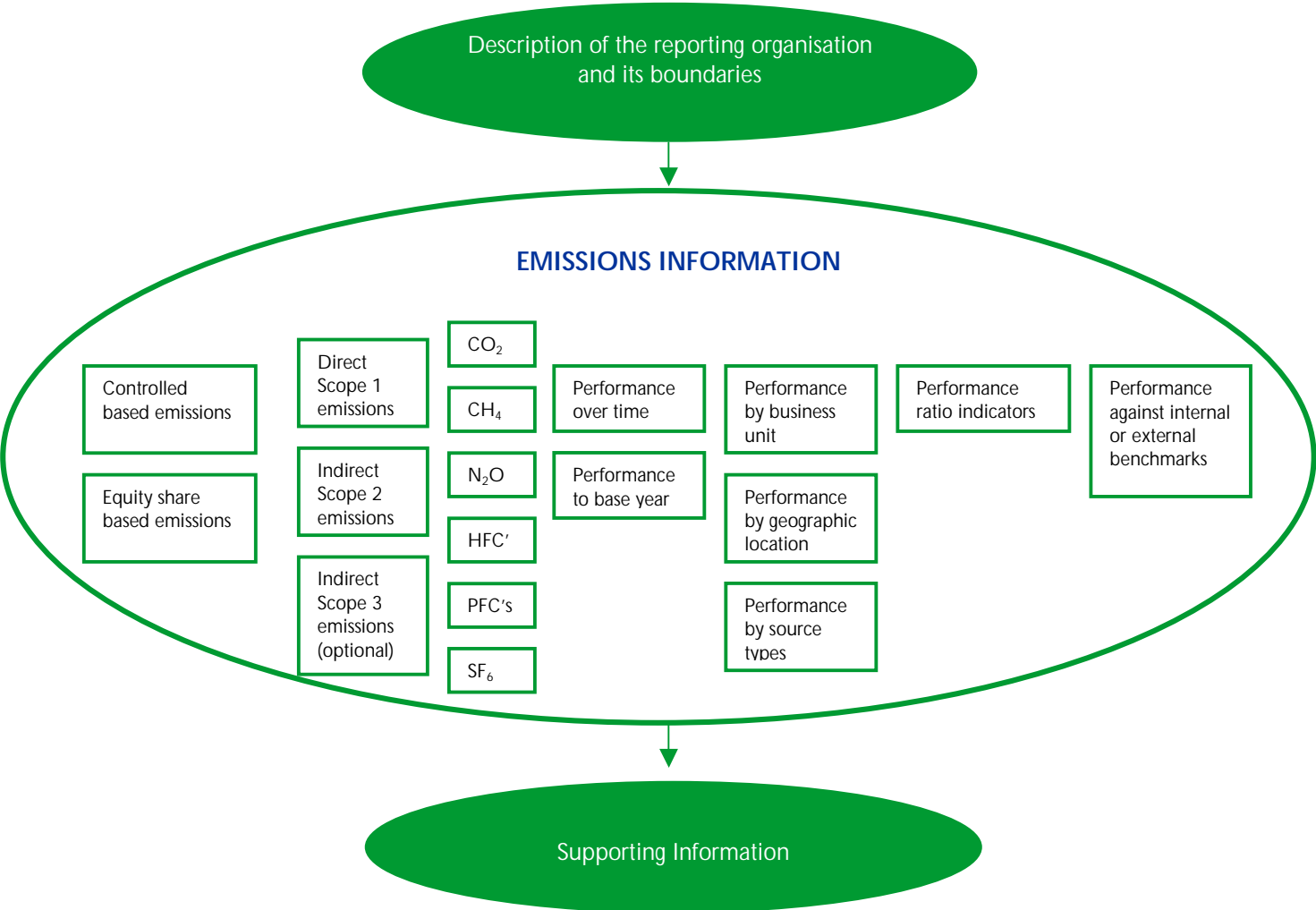
To assist organisations with this reporting stage, an industry guide is being developed which will be published by the NZBCSD. All GHG emissions inventories reports should be based on the best data available at the time of publication. At the outset it is better to be open about any limitations, and over time, correct and communicate any discrepancies identified in subsequent years.

KEY LEARNING – REPORT YOUR EMISSIONS TRANSPARENTLY

Reported information should be relevant, complete, consistent, transparent, accurate and user friendly. Companies should report:

- a description of the reporting organization and its boundaries
- information on emissions and performance (a minimum of scope 1 and 2 is required)
- supporting information.

The GHG Protocol states that a public GHG emissions report should include the following information:



NZBCSD Member Companies

3M New Zealand Ltd

James Marshall

BP Oil NZ Ltd

Peter Griffiths

City Care Ltd

Richard Lauder

Deloitte Touche Tohmatsu

Nick Main

Fletcher Building Ltd

Andrew Reding

Hubbard Foods Ltd

Dick Hubbard

Interface Agencies

Robb Donze

Landcare Research

Andy Pearce

Meridian Energy

Keith Turner

Mighty River Power Ltd

Doug Heffernan

Milburn New Zealand Ltd

Rex Williams

Money Matters NZ Ltd

Rodger Spiller

Morel & Co

Jenny Morel

Natural Gas Corporation

Phil James

Fonterra Co-operative Group Ltd

Craig Norgate

NIWA

Paul Hargreaves

Palliser Estate Wines of Martinborough Ltd

Richard Riddiford

Port of Tauranga Ltd

John Mayson

PricewaterhouseCoopers

Robin Hill

Richmond Ltd

Rod Pearce

Sanford Ltd

Eric Barratt

Shell New Zealand Ltd

Lloyd Taylor

Simpson Grierson

Martin Wylie

Telecom New Zealand Ltd

Theresa Gattung

The Boston Consulting Group

Perry Keenan

The Living Earth Company

Rob Fenwick

The Warehouse Group Ltd

Stephen Tindall

Toyota NZ Ltd

Bob Field

Transpower

Bob Thompson

Trust Power

Keith Tempest

Urgent Couriers Ltd

Steve Bonnici

URS - NZ Ltd

Mark Drury

Waimangu Volcanic Valley

Harvey James

Waste Management N.Z. Ltd

Kim Ellis

Watercare Services Ltd

Mark Ford