

2 International context

2.1 International framework and institutions

2.1.1 The United Nations Framework Convention on Climate Change (UNFCCC)

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty with the long-term objective of stabilising greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (man-made) interference with the climate system.

The UNFCCC was adopted at the Earth Summit in Rio de Janeiro in May 1992. It was the culmination of a series of meetings convened by the United Nations General Assembly in response to the First Assessment Report of the Intergovernmental Panel on Climate Change.

The UNFCCC sets out broad principles for responding to climate change and sets up a process through which governments can meet regularly. It encourages scientific research, sharing and exchange of technology and know-how, and education about the effects of climate change and how we must deal with them. The UNFCCC took effect on 21 March 1994. It has been ratified by 189 parties.

Parties to the UNFCCC are organised and grouped in different ways depending on the context: convention status, UNFCCC procedures, and negotiating groups.

Convention status

The UNFCCC divides countries into three main groups according to differing commitments: Annex I Parties, Annex II Parties and Non-Annex I Parties.

- **Annex I Parties** include the industrialised countries that were members of the Organisation for Economic Co-operation and Development (OECD) in 1992, which includes New Zealand, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States and several Central and Eastern European States. The membership of Annex I may be amended by a decision of the Conference of the Parties, or by parties to the Convention that are not part of Annex I declaring that they intend to be bound by the rules for Annex I Parties
- **Annex II Parties** consist of the OECD members of Annex I, but not the EIT Parties. They are required to provide financial resources to enable developing countries to undertake emissions-reduction activities under the Convention and to help them adapt to adverse effects of climate change. In addition, they have to "take all practicable steps" to promote the development and transfer of environmentally friendly technologies to EIT Parties and developing countries. Funding provided by Annex II Parties is channelled mostly through the Convention's financial mechanisms

- **Non-Annex I Parties** are mostly developing countries. Certain groups of developing countries are recognised by the Convention as being especially vulnerable to the adverse impacts of climate change, including countries with low-lying coastal areas and those prone to desertification and drought. Least Developed Countries and Small Island Developing States are examples (see below). Others, such as countries that rely heavily on income from fossil fuel production and commerce, consider themselves vulnerable to the potential economic impacts of climate change response measures. The Convention emphasises activities that promise to answer the special needs and concerns of vulnerable countries, through provisions such as investment, insurance and technology transfer.

UNFCCC procedures

Parties to the UNFCCC are organised into five regional groups, in line with normal United Nations practice: the African Group, the Asian Group, the Eastern European Group, the Latin American and Caribbean Group, and the Western European and Other Group of States (WEOG; the "Other States" include New Zealand, Australia, Canada, Iceland, Norway, Switzerland and the United States of America). The five regional groups are used in the context of UNFCCC procedures; eg, nominations for election to positions.

Negotiating groups

Developing countries generally work through the Group of 77 (G-77) and China to establish and represent common negotiating positions. The G-77 was founded in 1964 in the context of the United Nations Conference on Trade and Development and now functions throughout the United Nations system. It has over 130 members. China is not officially a member of the G-77 but works closely with the group, and positions are often put forward jointly in the name of G-77 and China. The country holding the Chair of the G-77 (which rotates every year) often speaks for the G-77 and China as a whole in meetings. However, because the G-77 and China is a diverse group with differing interests on climate change issues, individual developing countries also intervene in discussions, as do other groupings within the G-77, including:

- the African Group
- the Alliance of Small Island States (AOSIS). This is a coalition of some 43 low-lying and small island countries, most of which are members of the G-77, that are particularly vulnerable to sea-level rise. AOSIS countries are united by the threat that climate change poses to their survival and frequently adopt a common stance in negotiations
- the group of Least Developed Countries (LDCs). This comprises the 48 parties classified as least developed countries by the United Nations. LDCs are given special consideration under the Convention on account of their limited capacity to respond to climate change and adapt to its adverse effects. Parties are urged to take full account of the special situation of LDCs when considering funding and technology-transfer activities
- oil-producing states. While not labelled as a group in the same way as those above, oil-producing states often support one another in discussions. Saudi Arabia often takes the lead.

The 25 members of the European Union and the European Commission agree on common negotiating positions in advance. The country that holds the European Union presidency (which rotates every six months) then speaks for the group in meetings. The European Union is itself a party to the Convention and is represented by the European Commission, although it does not have a separate vote from its members.

The Umbrella Group is an informal grouping of non-European Union developed countries that cooperate within the UNFCCC process. The group was formed following negotiation of the Kyoto Protocol and has nine members: New Zealand, Australia, Japan, Canada, the United States, Iceland, Norway, the Russian Federation and the Ukraine. The informal nature of the grouping enables cooperation and common positions where possible, while also allowing for divergence of views to be fully respected. The informal motto of the group “working together, not bound together” reflects this flexibility. The group meets daily during UNFCCC meetings and has met intersessionally at times.

2.1.2 New Zealand obligations under the Convention

The UNFCCC, as originally framed, set no mandatory limits on greenhouse gas emissions for individual nations and contained no enforcement provisions. It is therefore considered legally non-binding.

Countries that have ratified the UNFCCC must take measures to address climate change, including:

- developing greenhouse gas inventories
- undertaking national or regional programmes
- preparing for adaptation to the impacts of climate change
- encouraging the development and diffusion of climate change technologies
- protecting and enhancing areas that remove carbon dioxide from the atmosphere (such as forest sinks)
- promoting, and cooperating in, education, training and public awareness related to climate change.

Developed countries, including New Zealand, are required to take the lead in modifying longer-term trends in anthropogenic greenhouse gas emissions. They must:

- put in place policies and measures to reduce the emission of greenhouse gases, with the aim of reducing greenhouse gas emissions to 1990 levels
- periodically communicate detailed information on their policies and measures to the secretariat of the UNFCCC, including projections of future greenhouse gas emissions and removals by sinks
- monitor and report on greenhouse gas emissions and sinks
- help developing countries address climate change through financial assistance and technology transfer.

Parties to the UNFCCC are also required to consider actions to mitigate the impacts of climate change on small island countries, countries with low-lying coastal areas and countries with areas prone to natural disasters. New Zealand has a particular interest in advocating on behalf of vulnerable Pacific Island nations in this regard.

2.1.3 The Kyoto Protocol

When governments adopted the UNFCCC, they knew that its commitments would not be sufficient to seriously tackle climate change. At the first Conference of the Parties to the UNFCCC in March 1995, parties therefore launched a new round of talks to decide on stronger and more detailed commitments for industrialised countries. In 1997, the text of the Kyoto Protocol was adopted unanimously by the UNFCCC parties.

The Protocol sets targets for reductions in greenhouse gas emissions of Annex I Parties for CP1, which is 2008 to 2012. The combined emissions of Annex I Parties must be reduced to 5% below the level they were at in 1990. Developing countries are not required to reduce their emissions. The Protocol establishes an international emissions trading regime using emission units, requires Annex I Parties to adopt domestic measures to reduce emissions, and establishes reporting and compliance arrangements.

The Kyoto Protocol had to be signed and ratified by 55 countries (including those responsible for at least 55% of the developed world's 1990 carbon dioxide emissions) before it could enter into force. This was achieved after Russia ratified in late 2004, and the Protocol entered into force on 16 February 2005. A total of 156 countries and regional economic integration organisations have ratified the agreement, the United States and Australia being notable exceptions. New Zealand ratified on 19 December 2002. Only countries that ratify the Protocol are bound by it.

2.1.4 New Zealand obligations under the Protocol

Different countries have different emissions-reduction targets to achieve under CP1; ie, the period between 2008 and 2012 inclusive. New Zealand's CP1 target is to reduce its greenhouse gas emissions to the level they were at in 1990.

The Protocol establishes three "flexible mechanisms": Joint Implementation, Clean Development Mechanism and International Emissions Trading. They are designed to assist developed countries in meeting their emissions targets at least cost. Under these flexible mechanisms, New Zealand has the opportunity to reduce emissions or increase greenhouse gas removals in other countries at a lower cost than might be possible through domestic measures in New Zealand, and use those emissions savings towards compliance with its target.

If New Zealand fails to reduce emissions to the target level, it will have a further opportunity to acquire sufficient Kyoto units through these flexible mechanisms to make up the shortfall. Otherwise, the difference (plus a penalty) will be added to New Zealand's targets in the second commitment period. The Kyoto Protocol envisages that consideration of subsequent commitments for Annex 1 Parties should begin in 2005.

As a party to the Protocol, New Zealand is also required to establish an emissions unit register for holding and transferring emission units, a national system for estimating anthropogenic emissions, and a means of estimating current domestic carbon stocks (such as in forests) and future carbon stock changes.

2.1.5 International plurilateral and bilateral agreements

A number of multi-party international agreements are seeking to address climate change outside the UNFCCC framework.

Group of 8

The G8 is made up of the governments of Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States, plus the European Union. The United Kingdom has nominated climate change as a key issue for focus during its presidency term of the G8 in the second half of 2005.

At the Gleneagles Summit in July 2005, the G8 plus five major developing countries issued a statement setting out their common purpose in tackling climate change, promoting clean energy and achieving sustainable development. All the G8 leaders agreed that climate change is happening now, that human activity is contributing to it, and that it could affect every part of the globe. They recognised that, globally, greenhouse gas emissions must slow, peak and then decline. They acknowledged that this will require leadership from the developed world and resolved to take urgent action to meet the challenges faced.

A Plan of Action on climate change was developed and involved a commitment to action in several areas, including:

- promoting energy-efficient buildings and appliances
- encouraging the development of cleaner and more efficient vehicles
- supporting efforts to make the use of coal and other fossil fuels for electricity generation cleaner and accelerate the development of carbon sequestration technologies
- promoting the continued development and commercialisation of renewable energy
- supporting efforts to manage the impacts of climate change.

Asia-Pacific Partnership on Clean Development and Climate

Unveiled in July 2005, the Asia-Pacific Partnership on Clean Development and Climate is an agreement between the United States, Japan, Australia, China, India and South Korea to promote and enable the development, diffusion, deployment and transfer of existing and emerging cost-effective, cleaner technologies and practices. Unlike the Kyoto Protocol, the pact does not contain specific timeframes or enforcement provisions, but will aim to "promote economic growth while enabling significant reductions in greenhouse gas intensities". Further details are expected to be fleshed out at a first ministerial meeting of the six founding members.

New Zealand/Australia and New Zealand/United States bilateral agreements

New Zealand has established climate change partnerships with Australia and the United States to enhance dialogue and practical cooperation on climate change issues. The partnerships predominantly involve collaboration at an implementation level. Key areas of cooperation with Australia include agricultural emissions abatement, energy efficiency, engagement with business and local government and working with Pacific Island countries to address regional challenges posed by climate change. Key areas of cooperation with the United States include technology development, carbon accounting registries, climate change research in Antarctica and product and process standards.

2.1.6 The science of climate change and the role of the Intergovernmental Panel on Climate Change

Recognising the issue of potential global climate change, the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988. It is open to all members of the United Nations and WMO.

The role of the IPCC is to assess the scientific, technical and socio-economic information relevant to understanding human-induced climate change, its potential impacts and options for adaptation and mitigation. It aims to provide comprehensive and unbiased scientific information to all governments as a basis for decision-making. Since its establishment, the IPCC has produced a series of scientific reports and technical guidance documents on greenhouse gas inventories, including a Summary for Policy Makers, which have become standard works of reference by policymakers, scientists, other experts and students.

One of the main outputs of the IPCC is a regular five- to six-yearly comprehensive assessment of current knowledge on the science of climate change, its impacts and adaptation options, and options to reduce net greenhouse gas emissions. The reports have tended to precede major international political decisions: the first assessment report in 1990 was followed by the signing of the UNFCCC in 1992, the second assessment report in 1995 was followed by agreement of the Kyoto Protocol in 1997, and the third assessment report in 2001 was followed by finalisation of the Kyoto Protocol rules and widespread ratification of the Protocol in 2002.

The fourth assessment report of the IPCC is currently in preparation and is due for completion and release in 2007.

In addition to regular assessment reports, the IPCC also produces so-called Special Reports on topics of scientific or technological interest, and Technical Papers that summarise specific issues. It further provides guidance on greenhouse gas inventory reporting and accounting at the request of the parties to the UNFCCC and Kyoto Protocol. The IPCC's guidance and best-practice reports usually become binding methodologies for greenhouse gas reporting once they have been accepted by the Conference of the Parties of the UNFCCC and/or the meeting of the Parties under the Kyoto Protocol.

Scientific information on climate change impacts and related greenhouse gas emissions and concentrations

The IPCC assessment reports have shown an increasing certainty about the occurrence of climate change and its attribution to human activities and the impacts of climate

change. The scientific and economic analysis of the likelihood of climate change and the potential impacts is extremely complex. It involves three key elements:

- assumptions about future global greenhouse gas emissions
- modelling of climate processes, which capture the relationship between greenhouse gas emissions, the concentration of gases in the atmosphere and the resulting changes in temperature, climate and sea level
- the assessment of the impact of these changes on natural and human systems.

The IPCC has approached the issue of assumptions about future greenhouse gas emissions by projecting “business-as-usual emissions”⁵ through the use of global scenarios of socio-economic, political and technological change over the next 100 years, which are described in its Special Report on Emission Scenarios (SRES) (IPCC, 2000b). The emission projections are based on models from a number of independent research groups with a common set of drivers for population growth, economic development in industrialised and developing countries, and development and transfer of technologies. The scenarios describe the possible development of the world along four story lines towards either economic or environmental sustainability goals, and with a focus on either globalisation or regional identification. The IPCC has not associated probabilities with any of these scenarios or temperature increases, but described the complete set of scenarios as spanning the **plausible** range of future emissions, excluding only “disaster” or “surprise” business-as-usual scenarios.

An alternative approach is to explicitly model the effect of stabilising greenhouse gas concentrations on the global climate. The UNFCCC does not specify any level at which greenhouse gas concentrations should be stabilised. The IPCC therefore used, in addition to business-as-usual scenarios, a range of possible stabilisation scenarios ranging from CO₂ concentrations from 450ppm to 1000ppm and also considering the effect of other greenhouse gases.⁶

The IPCC explored the implications of these various emission scenarios for climate change and the associated risks in its Third Assessment Report (IPCC, 2001a-d), along with options and costs of reducing greenhouse gas emissions to achieve stabilisation of greenhouse gas concentrations at a range of levels.

The estimated temperature increase by the year 2100 associated with business-as-usual scenarios ranged from 1.4°C to 5.8°C above average temperatures in 1990.⁷ For business-as-usual scenarios, substantial further warming above these levels would be expected beyond 2100 (IPCC, 2001a, d; Hansen, 2005).

The IPCC identified five reasons for concern associated with the climate changes accompanying such projected temperature rises (IPCC, 2001b):

- risks to unique and threatened systems, such as coral reefs and individual species

⁵ Business-as-usual means that no policies are implemented specifically to reduce greenhouse gas emissions. However, the scenarios do include policies that would result in emissions reductions as co-benefit to addressing other environmental, economic or social concerns (eg, reducing air pollution for health reasons, or developing renewable energy to reduce dependence on foreign oil).

⁶ The presence of other greenhouse gases leads to additional warming that also needs to be taken into account when modelling the total effect of stabilising greenhouse gas concentrations on the climate.

⁷ The lowest and highest temperature projections are for the lowest emission scenario and the climate model with the weakest response, and the highest emission scenario and the climate model with the strongest response, respectively.

- extreme climate events, such as changes in the frequency and intensity of droughts, heat waves, floods and storms
- global distribution of impacts; ie, whether only some or most regions of the world would be negatively affected by warming
- aggregate impacts; ie, the overall economic and/or social impacts, and the total number of people negatively affected
- the risk of large-scale and possibly irreversible shifts in the climate system, such as a sudden shift in ocean circulations or melting of ice sheets.

In light of the subjective judgements required to define “dangerous” climate change, the IPCC did not suggest a specific level of warming that might need to be avoided, but limited itself to outlining the identified risks for different levels of climate change that could occur during the 21st century under different emission scenarios. The risks generally increase with higher levels of global warming and with the rate of the warming (IPCC, 2001a, b, d).

Recent additional scientific studies and findings

Substantial scientific work over the past five to six years, following on from the IPCC’s last major report, has focused on providing a clearer sense of possible thresholds, to associate major changes in particular ecosystems such as coral reefs to specific degrees of warming, and to better quantify the risk of large-scale changes for any given amount of warming.

A number of recent studies suggest that warming of a few degrees above current levels would lead to clearly identifiable negative impacts for specific ecosystems or regions, including increasing risks of globally significant and possibly irreversible impacts such as changes in ocean circulations and melting of polar ice caps. Examples of such larger-scale and high-impact events with non-negligible probability are outlined below:

- current evidence suggests that a shut-down of the thermohaline circulation during the 21st century may have a probability of between about 5% and 60%, depending on the rate and magnitude of warming and the ocean circulation model. A rapid reduction or even shut-down of the thermohaline circulation would affect the climate and ecosystems in northern Europe, particularly during winter (Vellinga and Wood, 2002; NRC, 2002; ISSC, 2005)
- there is increasing evidence about the vulnerability of the Greenland ice sheet to even modest amounts of warming. A number of studies suggest that irreversible melting, albeit over hundreds to thousands of years, may occur for global warming levels of about 1.5°C to 2°C or more above 1990 levels. Melting of the Greenland ice cap would lead to an additional global sea-level rise of up to 7 metres (IPCC, 2001a; Gregory *et al*, 2004; Hadley, 2005; ISSC, 2005)
- a study of the current and projected impacts of climate change on the Arctic region, supported by the eight countries with Arctic territories, found that the climate changes already being observed in the Arctic are among the largest on Earth, and are projected to become much greater in future. The changes are expected to have a profound impact on unique individual species, ecosystems, and human societies in

the Arctic region. Major changes in the Arctic climate, and resulting changes in snow and ice cover, are also expected to have global effects (ACIA, 2004).

A recent expert symposium summarised that “surveys of the literature suggest increasing damage if the globe warms about 1°C to 3°C above current levels. Serious risk of large scale, irreversible system disruption, such as reversal of the land carbon sink and possible destabilisation of the Antarctic ice sheets, is more likely above 3°C.” (ISSC, 2005).

Stabilisation of greenhouse gas concentrations to meet possible temperature targets

Given such possible effects of different levels of warming, a key scientific question is what concentrations of greenhouse gases would lead to what degrees of warming in the long term. Answers to this question are complicated by two factors:

- climate models cannot predict with certainty how much the world will warm for a given level of greenhouse gas concentrations, but can only give a range of probabilities for a range of temperature outcomes
- temperature and, in particular, sea level will continue to rise for hundreds to thousands of years after greenhouse gas concentrations have stabilised due to the inertia of the climate system.

Current climate model studies suggest that if CO₂ concentrations were stabilised during the 21st century at 450ppm, the world would warm by about 1.2°C to 2.4°C above current levels by 2100, but could warm between 1.5°C and 3.9°C above current levels over the next several hundred years. Higher concentrations of greenhouse gases would lead to a higher probability that any given temperature level may be exceeded (IPCC, 2001d; den Elzen and Meinshausen, 2005; ISSC, 2005).

Issues around the analysis of climate change and its impacts

There is growing international consensus around the science of climate change, with the IPCC reports and methodologies generally deemed to be the most authoritative and comprehensive summaries of current knowledge. A large number of independent scientific bodies have expressed their confidence and support for the processes and scientific findings of the IPCC, including the Royal Society of New Zealand and the United States National Academy of Sciences (*Science*, 2001; NAS, 2001). The IPCC's peer review processes and the balance of representation of experts across countries and relevant areas of expertise contribute to the credibility of its work. In areas where there is no clear scientific agreement, the IPCC generally describes the different approaches or models and their differing answers, or describes the range of uncertainty associated with specific projections.

In some areas, there is ongoing debate within both the scientific and policy communities about the extent to which sound conclusions can be drawn from the currently available scientific evidence. These areas include the extent to which the full impacts of climate change and their costs can currently be estimated and the extent to which the IPCC's business-as-usual emission scenarios span the full range of possible and plausible future emissions. In particular, in recent years there has been significant international discussion on whether the assumptions and methodologies underlying the scenarios for population and economic growth, especially in developing countries, and technology development and transfer are robust.

Aspects of these issues were recently considered as part of an inquiry by the House of Lords in the United Kingdom on the economics of climate change. In its report, the House of Lords highlighted the continued elements of debate around aspects of climate change and expressed concern about a number of aspects of the IPCC analysis and processes, including identifying the need for the links between projected economic change in the world economy and climate change to be more rigorously explored and the need for more rigorous assessment of particular impacts.

The continued debate around scientific and economic analysis of climate change points to the need for New Zealand to continue to engage in international processes to encourage objective and robust assessment of climate change, its impacts and adaptation and mitigation options, and to ensure the New Zealand-specific expertise and information is reflected in IPCC reports. New Zealand scientists are routinely contributing to IPCC reports as authors and reviewers. In addition, the New Zealand Treasury, along with a number of OECD countries, is sponsoring a workshop to be held by the OECD in January 2006, which will consider aspects of economic methodologies underpinning business-as-usual emission scenarios.

Advances in climate science and their impacts, and economic modelling of the costs of impacts and mitigation options, can be expected to reduce the uncertainties associated with climate change projections and responses. However, for the foreseeable future, policy choices will need to continue to be made in a risk management framework that deals with uncertainties and probabilities, rather than absolute predictions about concrete climate events.⁸

2.2 Emissions trends and mitigation responses in selected countries

2.2.1 New Zealand's unique set of challenges

New Zealand faces a unique set of challenges with respect to domestic emissions mitigation. Both the composition and concentration of our emissions differs quite markedly from those of other Annex I countries, and this impacts on the range of available mitigation options.

⁸ This situation can be compared with managing the risk of, for example, aircraft engine failure. Engineering cannot predict a specific date and time at which a plane's engines will fail. It can only provide probabilities for a failure to occur at any given time. Governments, airlines and passengers have to decide at what point the risk of failure outweighs the benefits of operating planes and of more stringent safety controls.

Methane emissions from enteric fermentation, combined with nitrous oxide emissions from agricultural soils, account for almost half of New Zealand's total gross emissions. The comparable figure for the European Union is just 12%. The significance of agriculture in our emissions profile reflects our traditional comparative economic advantage in pastoral land-use activities. This stems from both our resource endowments (temperate climate) and historical trade policies. Agriculture alone contributes around 4.5% of GDP, and total primary-sector produce accounts for around two-thirds of our total exports. The significance of these emissions presents a particular challenge, as cost-effective mitigation options are currently limited.

Other countries with similar emissions contributions from agriculture (such as Argentina) are not only Non-Annex I countries (and hence not facing binding commitments over CP1), but represent some of our key export competitors. Given that New Zealand is a price-taker on the international market, mitigation policies and measures that increase costs to our agricultural producers therefore raise competitiveness and profitability issues for our domestic producers.

For most Annex I countries, carbon dioxide accounts for over 75% of gross emissions. In New Zealand, it accounts for just 46%. This reflects the significant contribution of renewable energy sources (in particular, hydro) to our electricity generation. While the contribution of new renewables (in particular, wind) is projected to increase, the fact that our electricity supply is already relatively low in emissions intensity by world standards means that the scope for mitigation from fuel switching is more limited than for many other countries.

New Zealand's energy use has been shaped by our resource endowments and associated policy background. Our natural energy resources (abundant hydro and coal resources) have contributed to our low electricity prices to date. Combined with historical policies directed at encouraging the manufacturing sector, this has, in turn, attracted energy-intensive industries such as steel and aluminium. Our primary sector also relies heavily on energy for processing and transportation. As a result, our economic structure is focused on producing high energy-intensity commodities. So, while the contribution of CO₂ to our total emissions is low by world standards, our scope for reducing these emissions through structural change appears to be more limited, or at least more gradual, than that of other countries.

The unique profile of our emissions and the high concentration of these in difficult areas has implications for the range of mitigation options available, and the associated costs of domestic mitigation. Together with the particular structure of our economy, this has ramifications for the trade-off between securing domestic emissions reductions and other objectives such as economic growth. While these tensions are becoming increasingly apparent in a number of other Annex I countries, this trade-off is possibly more stark for New Zealand.

In regard to our Kyoto obligations, these challenges are compounded by the 1990 baseline. In 1990, New Zealand was emerging from a period of low growth, associated with significant economic reforms and restructuring. Since then, our growth has been higher than many other Annex I countries, and indeed higher than expected when we ratified the Kyoto Protocol. The 1990 baseline therefore means we begin at a trough and span a period of strong growth – from New Zealand's perspective, an unfortunate confluence of factors.

A further unique feature of New Zealand is the significance of plantation forestry as a land use. New Zealand's liability under the Kyoto Protocol is potentially vulnerable to changes in land use; specifically, the conversion to other land uses post-2008 of tracts of land that were forested in 1990. At the same time, under the Kyoto sink mechanism the afforestation of new areas since 1990 can be credited as sinks to offset emissions during the period of tree growth. However, when the forest is harvested, under the current rules there is a requirement to "pay back" these credits. Therefore, while plantation forestry is expected to assist New Zealand in meeting its Kyoto obligation, the importance of this land use pre-1990, the changing relative economic returns to forestry and the temporary nature of sinks present particular complexities for New Zealand climate change policy over the longer term.

2.2.2 Annex I countries

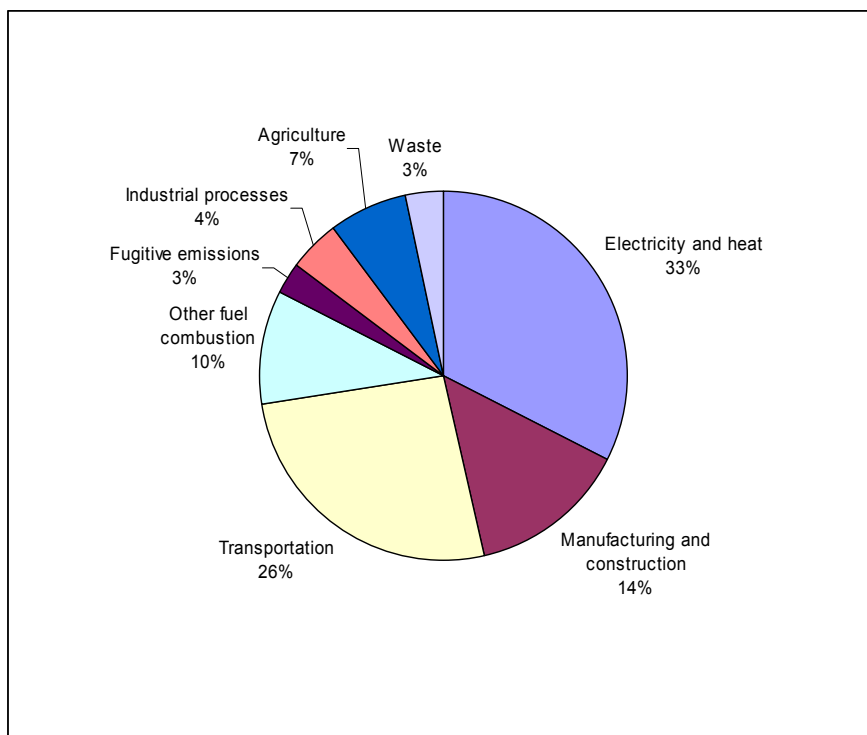
This section describes emissions profiles and projections and climate change policies in selected Annex I countries. Annex I countries are broadly industrialised economies. Those Annex I countries that have ratified the Kyoto Protocol have emissions reduction obligations under the Protocol to the UNFCCC. These issues are described in more detail in Section 2.1.1.

United States

Emissions profile and trends

The United States is the world's largest economy, accounting for over one-quarter of the global economy. The United States is also the world's largest energy consumer and the largest greenhouse gas emitter. In 2002, the United States emitted over 6,900Mt CO₂e of greenhouse gas emissions, approximately one-fifth of global emissions. The United States' emissions profile is shown in the graph below. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 85.3% of overall emissions.

Figure 1 - Greenhouse Gas Emissions by Sector in the United States 2002



Source: World Resources Institute (<http://cait.wri.org/>)

Between 1990 and 2002, the growth of the United States economy meant that emissions grew by 1.0% per year even though emissions intensity declined. Approximately 85% of United States energy is produced through fossil fuel combustion. The remaining 15% comes from renewable sources such as hydropower, biomass and nuclear energy.

Total United States greenhouse gas emissions are projected to increase by 43% between 2000 and 2020, reflecting continued growth in the economy, while emissions intensity (emissions per unit of GDP) is projected to continue to decline during this period. From 2000 to 2020, energy-related CO₂ emissions are projected to increase by 37%, compared with cumulative projected economic growth of 80%. It is anticipated that oil will remain the most used fuel, continuing to account for around 40% of total primary energy consumption over the projection period.

Mitigation responses

While the United States has not ratified the Kyoto Protocol, its Government has placed a strong emphasis on research and development of new technologies to reduce emissions. Energy efficiency is also considered a priority. Key actions to reduce emissions, as reported in the United States' third national communication to the UNFCCC in 2002, include:

- promoting greenhouse gas reductions through the development of cleaner, more efficient technologies for electricity generation and transmission, including supporting the development of renewable resources such as solar energy, wind power, geothermal energy, hydropower, bioenergy and hydrogen fuels
- promoting the development of fuel-efficient motor vehicles and trucks, research and development options for producing cleaner fuels, and implementation of programmes to reduce the number of vehicle miles travelled

- implementing partnership programmes with industry to reduce emissions of carbon dioxide, including through use of combined heat and power
- voluntary partnership programmes promoting energy efficiency in commercial, residential and government buildings through technical assistance, as well as the labelling of efficient products, new homes and office buildings
- conservation programmes aiming to reduce agricultural emissions, sequester carbon in soils, and offset overall greenhouse gas emissions
- reducing greenhouse gas emissions from energy use in federal buildings and the federal transportation fleet.

The United States is seeking to work with other countries to share and disseminate information on technologies internationally, and has established the International Partnership on the Hydrogen Economy and the Carbon Sequestration Leadership Forum to coordinate international efforts in these areas.

The 2006 Budget proposed \$US5.5 billion for climate change programmes, including the Climate Change Technology Program, the Climate Change Science Program, and climate change-related international assistance programmes. The Budget also proposed energy tax incentives that promote greenhouse gas emissions reductions totaling \$US3.6 billion over five years. The incentives are designed to spur the use of cleaner, renewable energy and more energy-efficient technologies that reduce greenhouse gas emissions. The tax incentives include credits for the purchase of hybrid and fuel-cell vehicles, residential solar heating systems, energy produced from landfill gas, electricity produced from alternative energy sources such as wind and biomass, and combined heat and power systems.

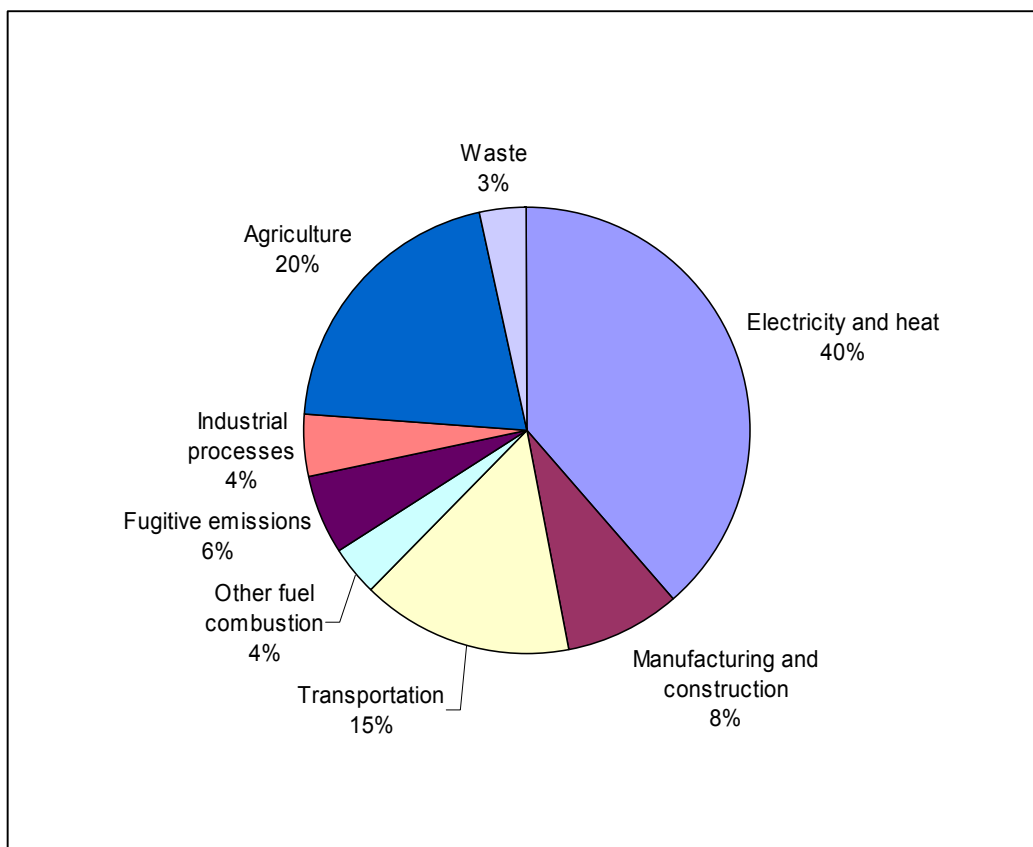
Targeted incentives are also provided to encourage wider use of land management practices that remove carbon from the atmosphere or reduce emissions of greenhouse gases.

Australia

Emissions profile and trends

Australia's greenhouse gas emissions are shown in the graph below. Total emissions in 2002 equated to 517Mt CO₂e. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 71.8% of overall emissions.

Figure 2 - Greenhouse Gas Emissions by Sector in Australia 2002



Source: World Resources Institute (<http://cait.wri.org/>)

Livestock are the principal source of emissions within the agricultural sector. Land-use change and the forestry sector are a net source of emissions in Australia rather than a net sink (although this is not represented in the graph above).

Australia is very dependent on fossil fuels for energy – they account for nearly 94% of Australia's energy inputs. Australia has an abundant coal resource and, consequently, its reliance on coal for energy (in particular, brown coals or lignites) is double the OECD average. This is exacerbated by limited hydro-resources, and public and environmental concerns preventing the use of nuclear energy.

Between 1990 and 2002, Australia's emissions grew by 1.7% per annum. Based on projections reported in Australia's third national communication to the UNFCCC in 2002, emissions across all sectors are estimated to reach 580Mt CO₂e in 2010 – a 16% increase over 1990 levels. The projection of emissions includes greenhouse gas abatement from policy measures that are projected to deliver, in aggregate, a reduction of 59Mt CO₂e in 2010.

Australia has not ratified the Kyoto Protocol and therefore is not bound by its emissions targets. Nevertheless, an assessment of Australia's emissions projections according to Kyoto target rules shows that over the period 2008 to 2012, emissions will be 11% above 1990 levels on average, indicating that Australia would exceed its Kyoto target of 8% above 1990 levels.

Mitigation responses

Australia has established a whole-of-government Commonwealth agency – the Australian Greenhouse Office – to coordinate climate change policy and deliver greenhouse programmes. It has developed a strategic framework of policies and measures for advancing its domestic greenhouse action across all sectors of the economy – the National Greenhouse Strategy. Under the National Greenhouse Strategy, 86 individual measures are grouped into eight sectoral “modules” and reflect a broad range of policy approaches, from voluntary action and strategic investment to regulation and market measures.

Mitigation programmes include:

- the \$AU400 million Greenhouse Gas Abatement Program (GGAP) established in 1999, which supports large-scale, cost-effective and sustained abatement by industry and the community
- the Greenhouse Friendly Program, a voluntary certification and labelling initiative designed to engage consumers on climate change issues and greenhouse gas abatement
- strategies to improve the efficiency of energy supply and use, including efficiency standards to move fossil-fuel electricity generators toward best practice, an Energy Efficiency Best Practice Program for key sectors, minimum energy-efficiency standards in the Building Code of Australia, and comparative energy labelling and minimum energy-performance standards for domestic appliances, commercial products and industrial equipment
- the Mandatory Renewable Energy Target, which was introduced in 2000 and requires wholesale energy purchasers to purchase increasing amounts of electricity generated from renewable sources, towards a target more than 50% above 1997 levels of renewable energy generation by 2010
- a National Green Power Accreditation Program established by a number of state and territory governments, under which electricity customers can elect to pay a premium to their energy retailers for the supply of electricity generated from renewable sources
- rebate programmes for solar hot water heaters, implemented by several states and territories
- a fuel consumption labelling scheme introduced by the Commonwealth in January 2001, under which all new cars sold in Australia are required by law to carry a fuel consumption label on the windscreen at the point of sale
- Commonwealth programmes (costing \$AU83 million) aimed at increasing the use of alternative fuels, especially CNG and LPG, especially in medium-to-heavy road vehicles

- a strategic framework for greenhouse and agriculture, being prepared under the auspices of the Commonwealth's Greenhouse and Agriculture Taskforce, which will identify priority actions, information needs and abatement options for key agricultural industries.

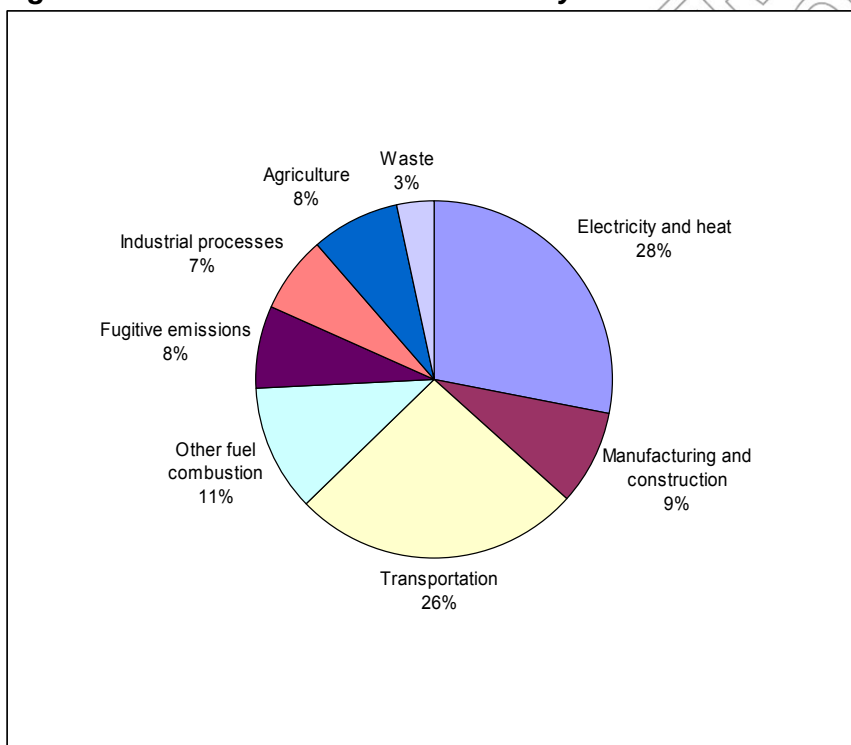
Significant resources are dedicated domestically to developing emissions-reducing technologies. The Cooperative Research Centre for Greenhouse Gas Technologies researches the logistic, technical, financial and environmental issues of storing industrial carbon dioxide emissions in deep geological formations. The Cooperative Research Centre for Clean Power from Lignite aims to develop technologies to reduce greenhouse gas emissions from lignite-fired power stations while enhancing Australia's international competitiveness from low-cost energy.

Canada

Emissions profile and trends

Canada's greenhouse gas emissions are shown in the graph below. Total emissions in 2002 equated to 725.2Mt CO₂e. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 81.7% of overall emissions.

Figure 3 - Greenhouse Gas Emissions by Sector in Canada 2002



Source: World Resources Institute (<http://cait.wri.org/>)

On a *per capita* basis, Canada ranks ninth in the world for carbon dioxide emissions due to a variety of factors, in particular its energy-intensive economy. Between 1990 and 2002, Canada's emissions grew by 1.5% per annum. Significant economic and population growth played major roles in this emissions growth.

Based on projections reported in Canada's third national communication to the UNFCCC in 2002, emissions across all sectors are estimated to reach 705Mt CO_{2e} in 2010 – a 16% increase over 1990 levels. Canada's commitment under the Kyoto Protocol is to reduce anthropogenic greenhouse gas emissions to 6% below 1990 levels during the 2008 to 2012 commitment period.

Mitigation responses

In April 2005, Canada's Government released a new national climate change plan, *Moving Forward on Climate Change: A Plan for Honouring our Kyoto Commitment*. The plan combines regulatory, negotiated, and incentive-based approaches. It anticipates mandatory emission intensity caps for major greenhouse gas-producing sectors, but also relies heavily on government-funded purchases of emissions reductions, both domestically and through the Kyoto Protocol's flexibility mechanisms. Key elements of the plan are described below:

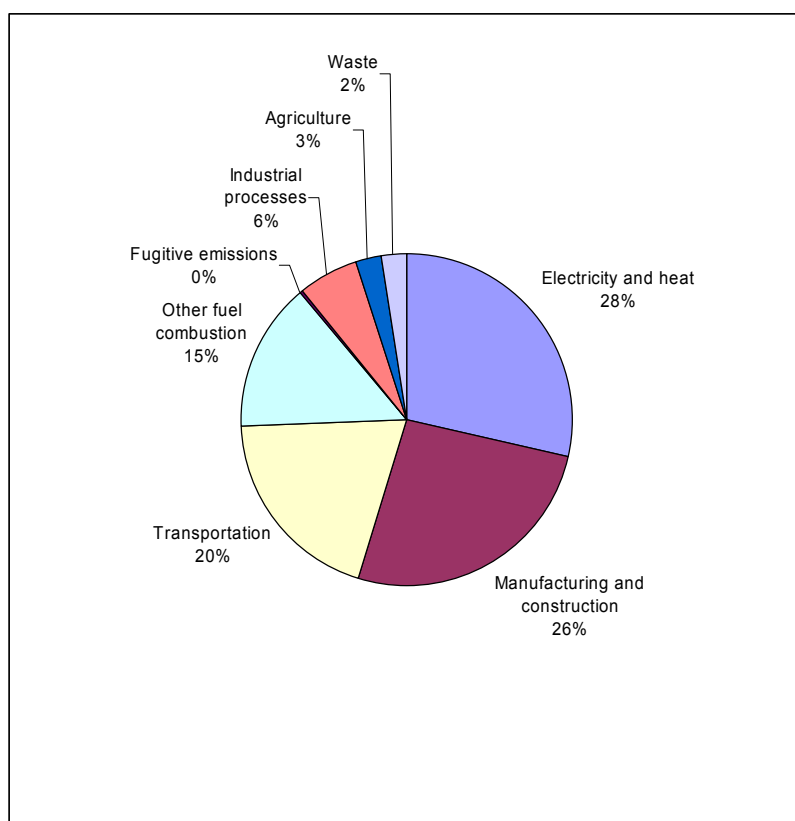
- the Large Final Emitters System is a mandatory market-based programme aiming to reduce emissions to 45Mt below business-as-usual in the mining, manufacturing, oil, gas and thermal electricity sectors, which account for roughly half of national emissions. The cost of compliance is capped at \$CA15 per tonne of CO_{2e} (approximately \$US13). Specifics, including emissions allocation among sectors and companies, are still to be determined. Companies investing in technological research and development through a new GHG Technology Investment Fund will be eligible for emission credits (up to 9Mt total), which can be used to meet their targets
- in a memorandum of understanding with the Auto Sector, auto manufacturers agreed to reduce carbon dioxide, methane, nitrous oxide, and hydrofluorocarbon emissions from light-duty passenger cars and trucks by 5.3Mt or 6% below business-as-usual by 2010 (in line with a previous government pledge to achieve a 25% efficiency improvement)
- through a new Climate Fund, the Government intends to purchase 75Mt to 115Mt of reduction credits a year, up to 40% of the total reduction needed in CP1. Priority will be given to domestic reductions from farmers, forestry companies, municipalities, and other sources (including Large Final Emitters that do better than their targets). Purchases will be made on a competitive basis. Reductions also will be purchased through the Kyoto mechanisms, with safeguards against the purchase of so-called "hot air". The Government agreed to allocate \$CA1 billion per year over the next five years and projects funding of \$CA4 billion to \$CA5 billion during 2008 to 2012
- a new Partnership Fund will support government-to-government agreements at the federal, provincial and territorial levels to jointly pursue emissions-reduction projects, including short- and long-term climate change technology investments and infrastructure development. The Government has agreed to allocate \$CA500 million per year over the next five years and anticipates that this funding of \$CA2 billion to \$CA3 billion could result in 55Mt to 85Mt annual reductions in 2008 to 2012
- a quadrupling of the Wind Power Production Incentive will provide \$CA200 million over the next five years to achieve a projected 4,000 MW increase in wind generating capacity. The Renewable Power Production Incentive will provide \$CA97 million over the next five years to increase capacity from small hydroelectric, biomass, tidal, and other renewable sources by a projected 1,000 MW. Other incentives include increasing the capital cost allowance to 50% for highly efficient cogeneration equipment and other renewable technologies. Incentives, tax measures, and related provincial measures are expected to result in a 15Mt annual reduction in 2008 to 2012.

Japan

Emissions profile and trends

Japan's greenhouse gas emissions are shown in the graph below. Total emissions in 2002 equated to 1,330.8Mt CO₂e. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 89% of overall emissions.

Figure 4 - Greenhouse Gas Emissions by Sector in Japan 2002



Source: World Resources Institute <<http://cait.wri.org/>>

Between 1990 and 2002, Japan's emissions grew by 1.0% per annum. Based on projections reported in Japan's third national communication to the UNFCCC in 2002, emissions across all sectors are estimated to decrease to 1,317Mt CO₂e in 2010 – a total increase of less than 1% over 1990 levels. Under the Kyoto Protocol, Japan is required to reduce emissions by 6% from 1990 levels during CP1.

Mitigation responses

The Global Warming Prevention Headquarters was established in Japan in 1997. A new strategy *Guideline for Measures to Prevent Global Warming* was concluded in March 2002. The guideline stipulates more than 100 policies and measures designed to help Japan meet its Kyoto commitment. Measures include:

- promoting technology development in the industrial sector and distributing results
- promoting the introduction of high-performance industrial furnaces
- promoting energy-management systems in large-scale office buildings, through regulatory measures

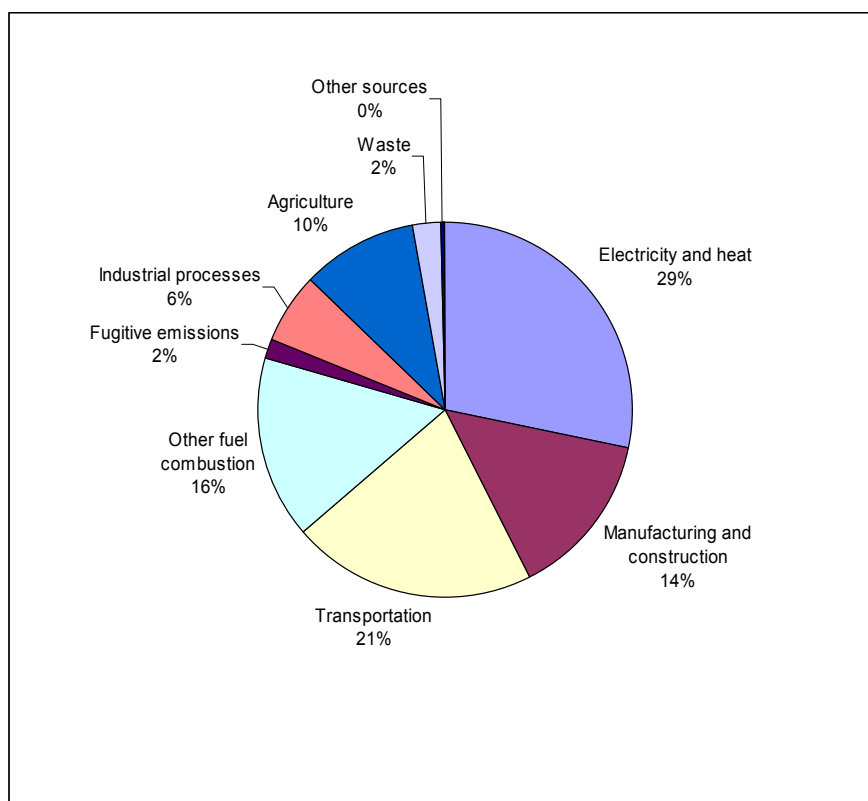
- promoting high-efficiency water heating in residential and commercial premises
- accelerating the development and distribution of low-emission vehicles, including clean-energy vehicles
- improving traffic flow by introducing Intelligent Transport Systems
- improving the efficiency of freight services, including the promotion of modal shift to shipping
- promoting the use of public transportation
- supporting market introduction of photovoltaic power generation, solar thermal utilisation, wind power generation, waste power generation and biomass energy
- subsidising the cost of converting old coal-fired power generation to natural gas generation
- promoting nuclear power generation
- aiming to halve the volume of waste disposed in landfills
- promoting research and development in energy-efficient steel production processes and chemical processes, energy-efficient electric appliances, and a high efficiency electricity distribution system
- promoting a range of energy-efficient measures, including changing incandescent lighting to fluorescent lighting, efficient refrigerator use, and other general behaviour change.

European Union

Emissions profile and trends

The European Union consists of 25 individual countries (the EU-25). Under the Kyoto Protocol, the European Union has elected to receive an overarching emissions target for CP1 and distribute emissions allowances under this target among member countries. The European Union's greenhouse gas emissions are shown in the graph below. Total emissions in 2002 equated to 4,123.3Mt CO₂e. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 81.2% of overall emissions.

Figure 5 - Greenhouse Gas Emissions by Sector in the European Union 2002



Source: World Resources Institute (<http://cait.wri.org/>)

Between 1990 and 2002, the European Union's emissions decreased by 0.2% per annum. Large increases of CO₂ emissions from transport were outweighed by reductions from fossil-fuel combustion in energy and manufacturing industries. CH₄ emissions account for 9% of total European Union greenhouse gas emissions and decreased by 17% between 1990 and 1999. The main reasons for declining CH₄ emissions were reductions in solid waste disposal on land, the decline of coal mining and falling cattle numbers.

Based on projections reported in the European Union's third national communication to the UNFCCC in 2002, emissions across all sectors are estimated to reach 4,190Mt CO₂e in 2010 – almost no change from 1990 levels. The European Union's aggregate target under the Kyoto Protocol is to achieve average annual emissions 8% below 1990 levels for 2008 to 2012.

Mitigation responses

Key points agreed by the European Union Council on future action include:

- a commitment to limiting temperature increases to 2°C
- supporting continued use of market mechanisms (eg, the European Union Emissions Trading Scheme) in a future regime
- identifying the reduction of greenhouse gases from bunker fuels as urgent
- recognising the UNFCCC as the vehicle for moving forward on a future framework.

Since the launch of the European Climate Change Programme, a considerable number of European Union measures have been adopted. Most importantly, the European Union has implemented an emissions-trading scheme covering approximately 50% of CO₂ emissions in the EU-25, notably of the energy-intensive sectors, so as to achieve emissions reductions in the most cost-effective and flexible way. In addition, the “linking directive” establishes the provisions and rules for enabling economic operators to use credits from JI and CDMs for compliance within the emissions-trading scheme.

Further actions on climate change include:

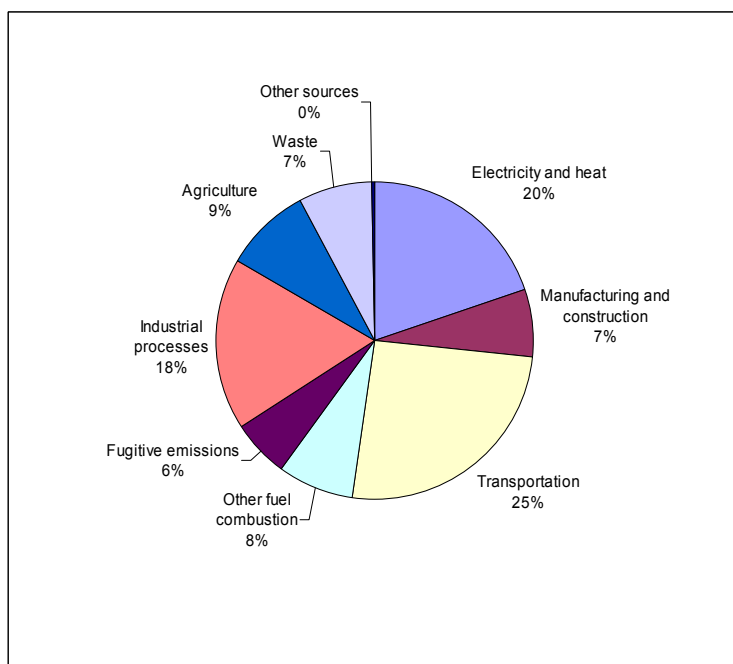
- undertaking an inventory and review of energy subsidies in the member states, with consideration to compatibility with climate change objectives
- supporting renewable energy sources through the new directive and by ensuring adequate support in the liberalised energy market
- using market instruments; eg, through the adoption of proposals for energy taxation
- promoting energy saving on heating and cooling in buildings
- environmental agreement with industry on energy efficiency and reducing specific emissions
- proposing a comprehensive approach to aviation emissions, including research into cleaner air transport, better air-traffic management, the removal of legal barriers to taxing aircraft fuel, and including aviation in the European Union Emissions Trading Scheme
- highlighting climate change as a major theme of European Union policy for research and technological development and in the coordination of research in the member states.

Norway

Emissions profile and trends

Norway's greenhouse gas emissions are shown in the graph below. Total emissions in 2002 equated to 55.3Mt CO₂e. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 66% of overall emissions.

Figure 6 - Greenhouse Gas Emissions by Sector in Norway 2002



Source: World Resources Institute (<http://cait.wri.org/>)

In 2002, petroleum and other fossil fuels accounted for 37% of Norway's domestic energy use (including transport), hydropower accounted for 56% and other renewable energy sources accounted for about 7%.

Between 1990 and 2002, Norway's emissions increased by 0.5% per annum. The increase is mainly explained by general economic growth, which has resulted in higher CO₂ emissions from most sectors. Since electricity is generated almost exclusively from hydropower, emissions from stationary combustion are dominated by industrial sources.

Based on projections reported in Norway's third national communication to the UNFCCC in 2002, emissions across all sectors are estimated to reach 63.2Mt CO₂e in 2010 – an increase of 22% over 1990 levels. Norway's target under the Kyoto Protocol is to achieve average annual emissions 1% above 1990 levels for 2008 to 2012. The increase in greenhouse gas emissions from 1990 to 2010 is mostly driven by an increase in CO₂ emissions, which alone are expected to rise by 36%. Consumption of petroleum products is expected to grow at about 0.5% per year from 1999 to 2010. Consumption of electricity is assumed to grow at about 1% per year during this period. The rate of energy efficiency improvement varies between sectors but is assumed to average about 1% per year.

Mitigation responses

The first Norwegian measure that directly addressed greenhouse gas emissions, a tax on CO₂, was introduced in 1991. This tax is still in force and covers about 65% of CO₂ emissions at various rates up to NOK315 per tonne (\$US35). High rates apply to petrol and activities on the continental shelf, and lower rates on the use of mineral oils. Exemptions apply mainly to emissions from energy- and emissions-intensive industries that are exposed to international competition. A tax on final waste treatment was introduced in 1999. One reason for this was climate change concerns. The tax discourages landfilling and encourages energy recovery from waste.

Discharge permits pursuant to the *Pollution Control Act* are required for major industrial developments. Permits have been granted for three combined-cycle gas-fired power plants, but the developers have still not decided whether to make the investments. The Government has stated that it wishes to create a framework that would promote a “CO₂-free” solution for these plants, and incentives are provided through exemption from the electricity tax. No further permits will be granted for the development of fossil-fuelled power plants before CP1 under the Kyoto Protocol.

An electricity tax offers incentives for most users to use less electricity and thus discourages the installation of new capacity based on fossil fuels. Wind power is subject to the electricity tax at half the normal rate and, like other new renewables, it is exempted from the investment tax. There are also grant schemes for new renewables and for energy-efficiency measures. In the 2002 supplementary white paper on climate policy, the Government introduced a target of a 25% reduction of the use of mineral oils for heating in 2008 to 2012 compared with 1996 to 2000.

In the transport sector, fiscal and CO₂ taxes on fuels provide the strongest incentive to limit emissions. The purchase tax also provides an incentive to buy lighter, more energy-efficient vehicles. There are extensive subsidies for public transport. From July 2002, car producers have been obliged to include information on fuel efficiency and CO₂ emissions in their marketing. The Government plans to expand this to other types of vehicles. Funds have been allocated to encourage research, development and testing into alternative fuels, electric and hybrid vehicles.

Most greenhouse gas emissions from energy- and emissions-intensive industries are not subject to the CO₂ tax. However, measures have been taken that have significantly reduced emissions from aluminium, magnesium and fertiliser production. The Government has proposed that emissions from these industries that are currently not subject to the CO₂ tax should be included in a mandatory domestic emissions-trading scheme from 2005.

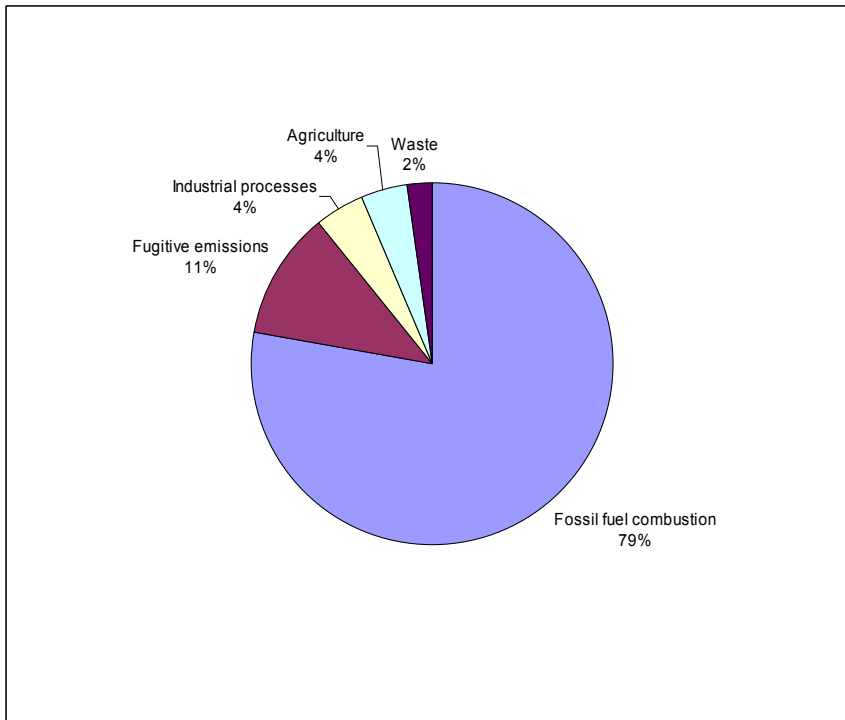
One of Norway’s objectives is to increase the use of new renewable energy sources, and the Government will develop a strategy for the use of renewable energy sources instead of petroleum for heating.

Russia

Emissions profile and trends

Russia’s greenhouse gas emissions are shown in the graph below. Total emissions in 1999 equated to 1873.5Mt CO₂e. More recent data on Russian emissions is not yet available. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 90% of overall emissions.

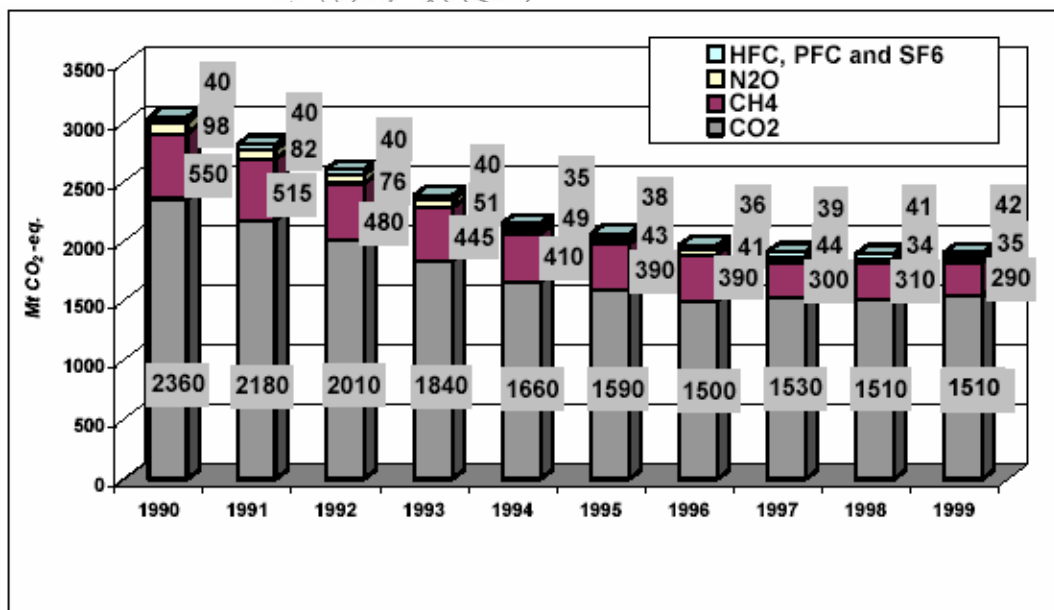
Figure 7 - Greenhouse Gas Emissions by Sector in Russia 1999



Source: Third national communication of the Russian Federation

Between 1990 and 1999, Russia's emissions decreased by over 1,100Mt CO₂e, largely due to the closure of emissions-intensive heavy industries over this period. Emissions trends between 1990 and 1999 are illustrated below. While CO₂ emissions have fallen, the carbon intensity of the Russian economy remains high [withheld under OIA s6(a)]

Figure 8 - Absolute Change in Russian Greenhouse Gas Emissions 1990-1999



Source: Third national communication of the Russian Federation

Based on Russia's third national communication to the UNFCCC, Russia's CO₂ emissions are projected to equal between 75% and 89% of 1990 levels at 2010. Projections of other fossil fuels have not been undertaken. Russia's target under the Kyoto Protocol is to achieve average annual emissions equivalent to 1990 levels for 2008 to 2012.

Mitigation responses

Russia's programme for mitigating greenhouse gas emissions is at a formative stage. Due to the dominance of CO₂ emissions from fossil fuels in Russia's emissions profile, it has stated a focus of its strategies will be on reducing CO₂ from electricity generation. In 2000, the *Basic Provisions of the Energy Strategy for Russia for the Period to 2020* was approved by the Government. The key aim for the strategy is to seek the most efficient utilisation of natural resources and energy for improving the quality of life of the population. More generally, substantial increases in the energy efficiency of the economy is considered among the core tasks in achieving social and economic recovery for Russia. Russia is also seeking opportunities to mitigate emissions in the agriculture and forestry sectors, including improving soil fertility in Russia, and improving systems for the collection, storage and use of animal manure.

2.2.3 Assessment

In reviewing the emissions profiles of Annex I countries, it is evident that emissions are generally energy-based. Among the countries reviewed, energy emissions accounted for between 66% (Norway) and 90% (Russia) of total emissions. New Zealand, and to a lesser extent Australia, vary from this trend with significant contributions coming from agricultural emissions (as is the case with many Non-Annex I countries).

Looking across Annex I and Non-Annex I countries, it is clear that the emission of greenhouse gases is distributed unevenly across the world. A dozen countries (including both developed and developing) account for around three-quarters of the world's carbon emissions. Global emissions are also projected to continue to grow. The World Energy Outlook predicts carbon dioxide emissions will increase internationally by 63% between 2002 and 2030. This emphasises the importance of a few large emitting countries in moving towards a global climate change solution.

The United States is the world's largest emitter, accounting for approximately one-fifth of global emissions. United States emissions are projected to increase by 43% between 2000 and 2020 - consistent with anticipated emissions trends in many other Annex I countries. Engaging the United States and other Annex I countries in international climate change efforts will continue to be vital.

While carbon dioxide emissions in Russia are likely to grow during CP1, emissions will remain below 1990 levels due to the heavy economic recession of the 1990s. Aggregate emissions from the European Union are projected to remain steady through to 2010, although this will still exceed the Kyoto target of an 8% reduction on 1990 levels. Increased emissions are likely in several individual European Union countries.

[withheld under OIA s6(a), s9(2)(g)(i)]

In some countries, including Canada and New Zealand, this position has prompted reviews of domestic measures. A number of countries are also developing strategies for purchasing emission units to make up their anticipated Kyoto shortfall.

Policies targeting emissions reductions in Annex I countries cover a broad range, including:

- price-based measures (including international emissions trading)
- regulations
- grants
- researching and adopting new technologies
- labelling and promoting energy savings among households and the transport sector
- voluntary industry targets.

While the United States and Australia have not ratified the Kyoto Protocol, they are directing significant domestic resources to a climate change solutions. Policies are focused on energy-efficiency improvements and energy-technology developments.

The United States and Australia were founding members of the *Asia-Pacific Partnership on Clean Development and Climate*, which aims to promote the use of technology development in achieving a global solution to climate change, while protecting economic growth. The United States also leads the *International Partnership on the Hydrogen Economy* and the *Carbon Sequestration Leadership Forum*, coordinating international efforts in developing and diffusing these technologies.

2.2.4 Non-Annex I countries

Emissions information collection and reporting present very significant challenges for Non-Annex I countries. Many Non-Annex I countries have only recently submitted their first national communication to the UNFCCC, and some of these communications report only on 1994 data. Authorities have noted particular difficulties in collecting reliable estimates of agricultural and land-use change emissions. This issue affects the feasibility of applying any kind of quantitative target and reporting requirement on developing countries. Establishing the domestic knowledge and reporting systems that would allow this would be a significant undertaking.

To date, the focus of developing countries' mitigation measures has been on non-price measures, including:

- education and awareness raising, sometimes through the formal education system
- the creation of standards, including vehicle emissions performance standards and building-efficiency standards
- the use of energy-efficiency labelling, such as of appliances.

Some developing countries have emphasised the importance of technology development in achieving future emissions mitigation. China and India are forecast to continue to rely on coal for energy generation, while the contribution of renewable energy to their total energy supplies is expected to decline through to 2030. Although overall energy intensity in both countries is also forecast to decline by around 2.3% a year, this will not be sufficient to significantly curb emissions growth. Developing and transferring technologies that allow more efficient use of fossil fuels, or the offsetting of emissions through the sequestering of carbon, are therefore likely to be critical factors in curbing emissions growth.

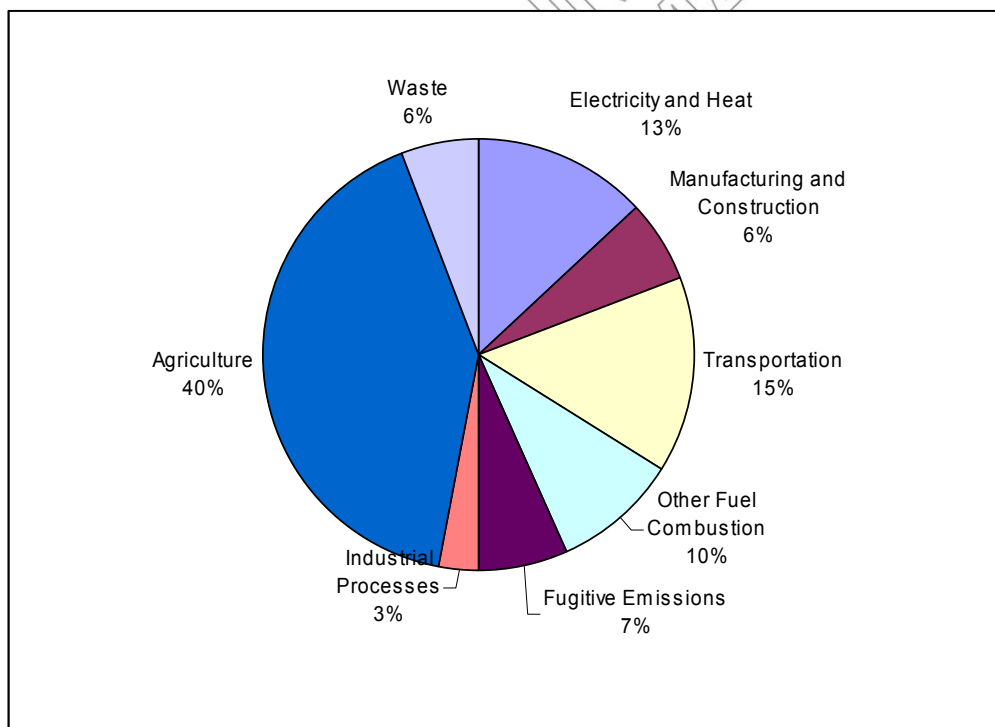
This section presents information on emissions and climate change responses in selected Non-Annex I countries.

Argentina

Emissions profile and trends

Argentina has a similar sectoral emissions profile to New Zealand, as shown in the graph below. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions⁹) add up to 50% of overall emissions.

Figure 9 - Greenhouse Gas Emissions by Sector in Argentina 1997



Source: World Resources Institute (<http://cait.wri.org/>)

⁹ Fugitive emissions are unintended leakages of greenhouse gases during their processing, transmission and/or transportation, or during their use; eg, CFCs from refrigeration leaks.

In comparison, New Zealand's emissions in 2003 comprised 43% from energy, 49% from agriculture, 5% from industrial processes and 2% from waste. Argentina's total emissions in 1997 were around four times greater than New Zealand's 2003 emissions, although Argentina's emissions *per capita* and emissions intensity still remain well below the OECD average.

Natural gas is the primary means of electricity generation in Argentina. As in New Zealand, bovine cattle are the principal source of emissions from the agricultural sector.

Between 1990 and 1997, Argentina's gross emissions increased by 21%, although the growth rate eased towards the end of this period. This easing resulted from a move to more efficient electricity generation derived from more environmentally sound technologies (eg, a move to combined-cycle plants), the replacement of road vehicles with more efficient ones, and a reduction of the cattle population.

A 1999 study published by the UNEP projected that Argentina's energy greenhouse gas emissions would grow by an average of 3.5% per year between 1994 and 2020 under a business-as-usual scenario. It is estimated that this average growth rate can be reduced to 2.6% if a variety of mitigation measures are employed.

Mitigation responses

Existing and contemplated policies that will contribute to emissions abatement include:

- improving energy efficiency by facilitating the adoption of efficient technologies
- replacing the use of fuel oil with natural gas in combined-cycle power stations
- encouraging the development of forest plantations to provide carbon sinks
- adopting financial support measures to promote the development of wind energy
- resolving to progressively reduce natural gas emissions from oil wells
- encouraging flaring of methane emissions from sanitary landfills, rather than combustion
- reducing emissions from the agricultural sector by improving the production system with better diets and managing an increased proportion of animals in confined conditions
- promoting "no till" and "low till" land-use practices to reduce fuel consumption for agricultural purposes
- examining potential hydroelectric power opportunities to offset or replace thermal generation
- contemplating the use of co-generation plants as a mitigation option for industrial activities
- promoting the use of compressed natural gas in the transport sector.

Argentina sees the CDM¹⁰ as a significant opportunity for emissions mitigation and currently has around 75 projects in the pipeline.

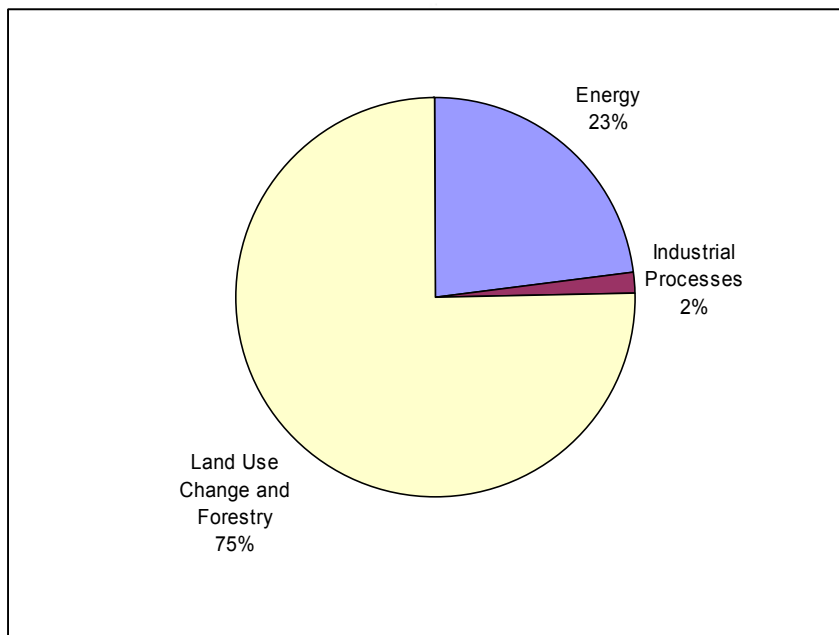
Argentina has established a dynamic greenhouse gas emissions target based on its GDP. The aim of such a target is to allow Argentina to continue its socio-economic progress while still providing a goal for emissions reductions.

Brazil

Emissions profile and trends

The majority of Brazil's greenhouse gas emissions are carbon dioxide. Brazil's carbon dioxide emissions profile is shown in the graph below.

Figure 10 - Carbon Dioxide Emissions by Sector in Brazil 1994



Source: Brazil's national communication to the United Nations Framework Convention on Climate Change (2004)

¹⁰ The Clean Development Mechanism is one of three Kyoto flexible mechanisms.

Joint Implementation (JI) is a project-based mechanism designed to assist Annex I countries in meeting their emission reduction targets through joint projects with other Annex I countries, meaning that JI projects can only be implemented between capped industrialised countries. One or more investors (governments, companies, funds etc) will agree with partners in a host country to participate in project activities which generate **Emission Reduction Units (ERUs)**, in order to use them for compliance with targets under the Kyoto Protocol.

The **Clean Development Mechanism (CDM)** is a similar instrument, but based on agreements between Annex I and Non-Annex I (or developing) countries. Both JI and CDM offer possibilities for project-based emission reduction "credits", referred to as "emission reduction units" for JI and "certified emissions reductions" for transfer of credits from Non-Annex I countries envisioned in CDM.

International Emissions Trading (IET) is a flexibility mechanism of the Kyoto Protocol which allows the trade of Assigned Amount Units (AAUs) among Annex B countries. This activity may be delegated by national governments to entities within their jurisdictions so that international trading between entities will occur. This will adjust each nation's "pool" of AAUs.

Of the land-use change and forestry emissions, 96% were from forest conversion to agricultural activities. Low-energy emissions arise from Brazil's low overall energy intensity and high proportion of renewable energy. In 2000, around 94% of electricity delivered to the national grid was from hydroelectric sources. Of the remainder, a significant amount was produced with nuclear energy (around 1.5%) and biomass (around 3%). Generation of electricity in the country emits almost no greenhouse gases.

Since the oil shocks of the 1970s, ethanol (manufactured from sugarcane) has been used in Brazil as a transport fuel, both blended with petrol and as a pure alcohol in specially designed vehicles. In 2002, biofuels provided 13% of road transport fuel. Sugar-cane bagasse and charcoal are used in industry in place of coal, which results in significant emissions savings. Overall, Brazil's energy system is one of the least carbon intensive in the world.

Between 1990 and 1994, overall emissions in Brazil grew by 5%, largely based on a 16% growth in emissions in the energy sector. The World Energy Outlook projects that Brazil's energy-related carbon dioxide emissions will double by 2030, albeit from a low base.

Mitigation responses

Brazil's government runs a number of programmes to improve energy efficiency and conservation. Programmes include PROCEL, which aims to reduce electricity waste and promote the adoption of more energy-efficient technologies; CONPET, which aims to rationalise the use of oil and gas products without affecting levels of activities in economic sectors; and PRODEEM, which aims to supply electricity to isolated communities from local renewable sources.

Natural gas is a growing energy source in Brazil and incentive policies have been developed to encourage its use where this will avoid the use of other emissions-intensive sources (such as fuel oil), including in thermal electricity generation. In the domestic production of natural gas, a programme has been initiated to reduce the degree of gas flaring, which will also reduce carbon dioxide emissions.

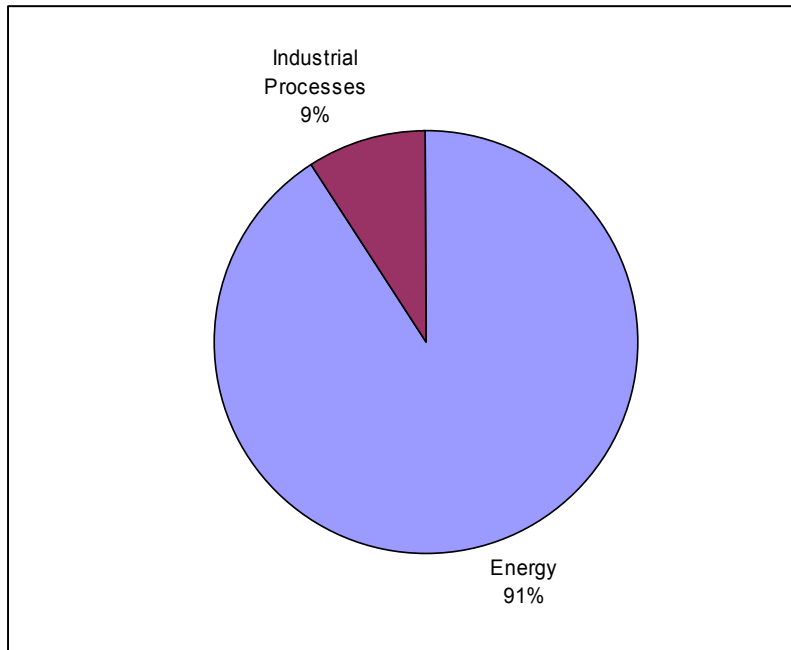
Attempts have been made to expand education, public awareness and training on climate change issues. The National Environmental Education Programme aims to promote broad education of environmental issues in Brazil, and the "PROCEL in schools" and "CONPET in schools" programmes aim to expand the awareness of teachers and students on the importance of using electricity, oil products and natural gas efficiently. Government-operated websites on climate change also contribute to increasing public awareness.

China

Emissions profile and trends

China is the second-largest economy and the second-largest consumer of primary energy in the world (after the United States). It currently accounts for 12% of global GDP and primary energy demand. In 1994, China's total greenhouse gas emissions equated to 3,650 million tonnes of carbon dioxide equivalent, also making China the second-highest greenhouse gas emitter. Carbon sinks and land-use change offset around 400 million tonnes of carbon dioxide. Around 73% of total emissions were carbon dioxide. China's carbon dioxide emissions profile is shown in the graph below.

Figure 11 - Carbon Dioxide Emissions by Sector in China 1994



Source: The People's Republic of China Initial national communication on Climate Change (2004)

About 80% of China's electricity production is derived from fossil fuels, predominantly coal. China is the highest consumer of coal in the world. Most of the remaining generation comes from hydro. Poverty and lack of access to modern energy are still widespread in China. In recent times, acute power shortages have hampered economic development. Demand for energy is projected to continue to grow strongly. Significant new electricity plant development (primarily powered by coal) is being progressed and is expected to continue.

The World Energy Outlook 2004 forecasts that China's demand for coal will continue to expand, accounting for 53% of the worldwide increase in coal demand through to 2030. Use of nuclear generation in China is also predicted to grow strongly. Overall, China's dependence on energy imports is projected to increase.

Continuing population growth and increased urbanisation, economic development and consumption, and a continued reliance on coal, mean that greenhouse gas emissions in China are likely to grow significantly in the future. The World Energy Outlook projects emissions growth of 2.8% per year through to 2030. China is predicted to overtake the United States as the largest emitter of greenhouse gases by around 2025.

Mitigation responses

Since the 1980s, the Chinese Government has carried out wide-ranging reforms in the energy sector to promote technical progress and increase the sector's efficiency. Other policies that will contribute to emissions abatement include:

- introducing finance, credit and taxation incentives to reduce consumption of energy and other resources by the industrial sector
- setting development goals and policies for energy development and conservation
- introducing policies and measures to foster the development of new, renewable energy, including wind, small-scale hydro, biogas, solar and geothermal technologies in rural areas
- establishing energy-efficiency standards, labelling and certification processes and launching a national energy conservation publicity week
- establishing standards for energy conservation in the building and construction sector
- developing and applying substitute fuels for motor vehicles, including gas-powered vehicles
- conserving and improving pastures and forest lands, including establishing loans for afforestation
- introducing administrative regulations, policies and criteria for waste management to help prevent pollution from waste treatment
- implementing programmes to improve education, training and public awareness on climate change, predominantly through the education system.

China is a founding member of the recently formed Asia-Pacific Partnership on Clean Development and Climate, which aims to develop and share climate change mitigating technologies.

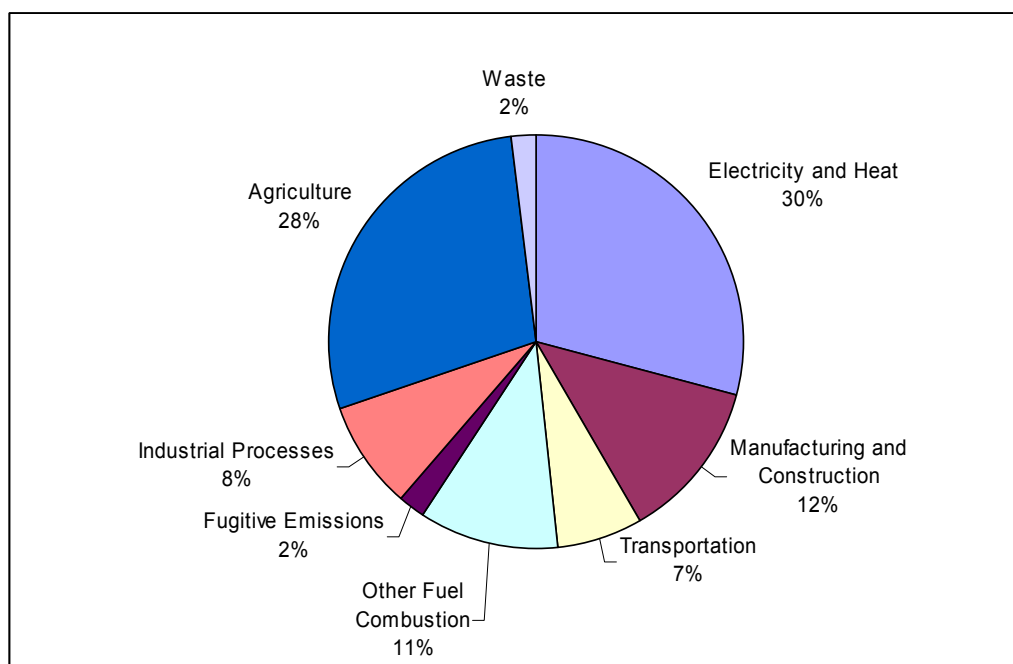
India

Emissions profile and trends

India has the world's second-largest population and fourth-largest economy. Its economy grew at a rate of almost 6.6% per year during the 1990s, nearly doubling in size over that time. Energy use grew even faster, at a rate close to 7%, while the demand for electricity grew at 8% per year. Despite this growth, India's *per capita* electricity use averaged only one-sixth of the world average in 1994. Its *per capita* carbon dioxide emissions also rank among the lowest in the world, averaging 4% of the United States *per capita* carbon dioxide emissions in 1994 and 23% of the global average.

India's greenhouse gas emissions profile is shown in the graph below. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 61% of overall emissions. A total of 70% of India's energy is derived from fossil fuels, with coal making up 47% of commercial energy use.

Figure 12 - Greenhouse Gas Emissions by Sector in India 1994



Source: World Resources Institute <<http://cait.wri.org/>>

The World Energy Outlook projects that India's use of coal and nuclear energy will grow significantly, as will its dependence on energy imports. Carbon dioxide emissions are projected to grow at 2.9% per year to 2030, more than doubling over this period.

Mitigation responses

Education and public awareness on the efficient use and conservation of energy has been a key focus for India, with a number of government ministries undertaking publicity campaigns, establishing best-practice resource centres and running training programmes. Other policies that will contribute to emissions abatement include:

- establishing a Bureau of Energy Efficiency to promote energy efficiency and conservation, and setting energy-efficiency targets for motors, lighting and energy-intensive industries
- undertaking regulatory reforms to promote competition in the electricity, petroleum and coal markets, to help enhance the technical and economic efficiency of energy use, and to encourage investment in the development of natural gas infrastructure to replace more carbon-intensive forms of energy
- promoting the use of renewable energy through financial support to hydroelectric developments and upgrading existing hydro stations, using solar photovoltaic power systems for a variety of decentralised applications and extending distributed solar, hydro and biomass generation to rural and remote areas
- improving transport fuels, including unleaded petrol and low-sulphur petrol and diesel, introducing a programme to blend 5% ethanol in petrol, and making CNG and LPG available in some cities

- introducing vehicle emissions performance standards (in 2000) and increasing these to European-level norms for new cars and passenger vehicles in major cities (in 2002)
- introducing agricultural initiatives focused on improving the energy efficiency of irrigation, improved animal feeds and digesters, and rationalisation of power tariffs and
- introducing initiatives to maintain or enhance existing forest land for ecological reasons, including afforestation programmes by government power organisations..

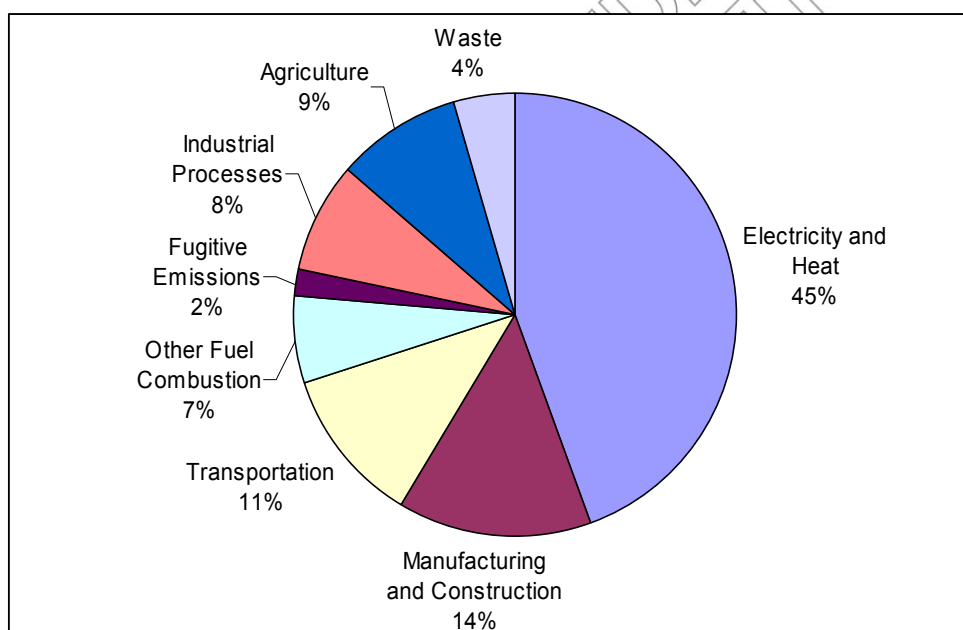
India is a founding member of the recently formed Asia-Pacific Partnership on Clean Development and Climate, which aims to develop and share climate change mitigating technologies.

South Africa

Emissions profile and trends

South Africa's greenhouse gas emissions profile is shown in the graph below. Total energy emissions (comprising electricity and heat, manufacturing and construction, transportation, other fuel combustion and fugitive emissions) add up to 78% of overall emissions.

Figure 13 - Greenhouse Gas Emissions by Sector in South Africa 1994



Source: World Resources Institute <<http://cait.wri.org/>>

The high level of emissions from energy relates to the high energy intensity of the South African economy, which is dependent on large-scale primary extraction and processing, particularly in the mining and minerals industries. Coal currently provides 90% of the energy for electricity generation and is expected to continue to be the dominant source of electricity until 2040, given South Africa's abundant reserves. Total emissions increased by 9% between 1990 and 1994.

Mitigation responses

South Africa has stated that its approach to specific greenhouse gas mitigation measures is currently (in 2000) at only an exploratory phase. It has identified that the major potential for domestic mitigation is in the energy sector and has identified a national target for energy-efficiency improvements of 12% by 2015. The intention is to meet this target through a mix of economic instruments and regulatory tools, as well as energy-management programmes. A voluntary target of a 10,000 GWh contribution of renewable energy by 2013 has also been set, to be produced mainly from biomass, wind, solar, small-scale hydro and bio-fuels.

Existing programmes aim to foster the development of off-grid energy sources, including solar, wind and solar water heating. For existing fossil-fuel generation, technologies are being investigated and developed to make coal-fired power stations less polluting and more efficient.

The South African Government has acknowledged the need to increase general awareness of climate change and build the government sector's capacity to consider this issue. The formal education system has been identified as a potential means for creating awareness of climate change and creating a future shift in attitudes.

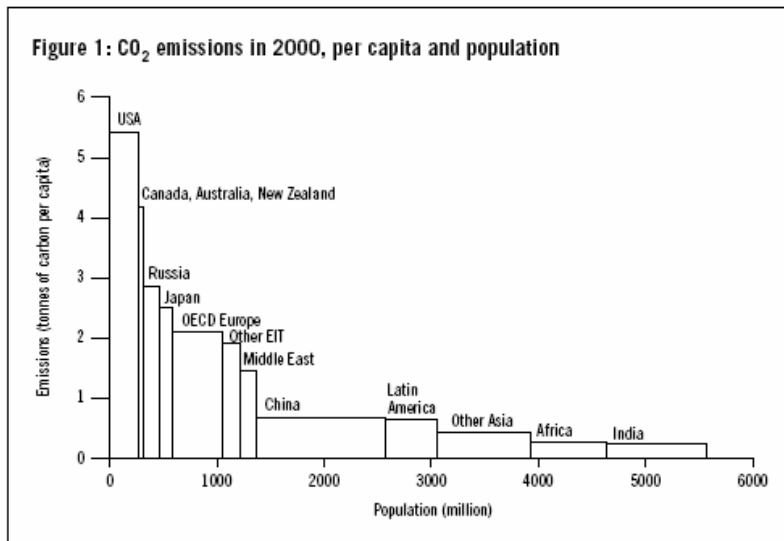
An *Air Quality Act* was passed in 2004, which provides a regulatory framework to set emission standards for priority pollutants including greenhouse gases. Public transport measures are being investigated, including introducing incentives to use bio-fuels. The use of building-standard regulations to improve energy efficiency is being examined.

Assessment

In reviewing the emissions of Non-Annex I countries, it is clear that emissions profiles vary considerably across countries. Agriculture and land-use change often play a more critical role for developing countries than for developed (which tend to generate most emissions from energy). These emissions profiles are fundamentally tied to the economic structure, comparative advantage, energy resources and level of development of these countries (such as the mining industry in South Africa, the use of bio-fuels in Brazil, agricultural emissions in Argentina).

Emission intensities in developing countries tend to be well below those in developed nations, as illustrated below.

Figure 14 – CO₂ Emissions in 2000, per Capita and Population



Source: Grubb, M (2003) "The Economics of the Kyoto Protocol". *World Economics* 4(3), July to September 2003

This figure also illustrates the significant potential for global emissions growth if developing-country emissions intensities climb towards industrialised world levels. For most countries reviewed, projections indicate that continued growth in total emissions can be expected for the next 25 years. The significant and increasing contribution of China and India, in particular, to total global emissions has considerable implications. These two countries currently contribute approximately 15% and 5% of global emissions respectively, and their total emissions are projected to double between 2002 and 2030. Engaging developing countries, including China and India, in slowing the growth of their emissions in the future will therefore be critical to achieving the UNFCCC's ultimate goal of stabilising the climate.

In general, New Zealand as an Annex I member is faced with greater pressures to take actions to address the issue of climate change. However, New Zealand also competes with developing countries in some international markets. This creates a risk that some New Zealand firms may experience relative losses of competitiveness as a result of being subject to more stringent climate change measures than firms in other countries. However, other factors such as labour or raw-material costs will typically be stronger determinants of competitiveness. This issue may arise most often in relation to price-based measures, which can directly increase firms' costs.

Development needs of Non-Annex I countries may create a tension with emissions reductions. India and South Africa in particular have highlighted that climate change is just one of a number of pressing issues they are trying to address, including poverty eradication, providing basic services (including energy, water, education and health services) and moving to a market-based economy.

[withheld under OIA s6(a)]

These characteristics need to be taken into account in any future consideration of climate change responsibilities.

In the absence of specific emissions targets, Non-Annex 1 countries have continued to seek viable emissions-reduction opportunities. Countries reviewed have all acknowledged the considerable threat posed by climate change and their desire for a solution through international actions. However, an overriding view remains that constraining developing-country emissions should not be at the expense of economic growth and that developed countries need to take the lead in actions to address climate change.

2.3 The future: Possible post-2012 frameworks and implications for New Zealand

Summary

This section:

- summarises approaches to a post-2012 international framework for climate change that have been developed in an array of international think-tank dialogues
- identifies some key issues of interest for New Zealand.

It concludes that:

- two distinct approaches – “top-down” and “bottom-up” – are apparent from these dialogues
 - top-down approaches seek to define emission targets in the near term based on long-term climate change outcomes and assume an international framework based around binding emission targets for industrialised countries
 - bottom-up approaches generally focus on technology development and sector-specific policies and measures
- some of the ideas that have been explored contemplate significantly more stringent emission reductions than New Zealand is required to meet during the first Kyoto commitment period
- the evolution of a post-2012 international framework will entail important risks and opportunities that need careful management as New Zealand engages in international processes.

While there is clear international support for the UNFCCC to continue as the primary forum for intergovernmental discussion on climate change, there is currently no agreement by parties to the Convention to begin considering future action beyond 2012. “Post-2012” or “beyond-2012” are commonly used to describe future action on climate change, with 2012 being the final year of CP1. The future of intergovernmental commitments delivered through the UNFCCC is uncertain beyond that point. Under Article 3.9, the Kyoto Protocol requires Parties to initiate consideration of future commitment periods in 2005

In the absence of formal UNFCCC consideration, many ideas for a post-2012 international climate change regime have been developed in an array of informal think-tank “dialogues”

– often involving government experts acting in an individual capacity – or through workshops and publications by independent research institutes. These think tanks, with some exceptions (eg, the Pew Center) tend to focus on how to achieve multilateral engagement under the framework of the UNFCCC. Some of these ideas were also explored in a recent discussion paper prepared by the Canadian Government in its capacity as host of the forthcoming United Nations Climate Change Conference (Environment Canada, Foreign Affairs Canada, 2005).

2.3.1 Possible post-2012 frameworks

Most of these dialogues have recently been summarised in work by the Pew Center and the OECD (Pew Center, 2004; OECD, 2005a). Two broad groupings of mitigation ideas can be seen:

- top-down approaches focusing on long-term outcomes and emission targets
- bottom-up approaches focusing on technology and supporting policies, voluntary agreements and partnerships.

Top-down approaches: long-term outcomes and emission targets

This first grouping of ideas generally sits within a quantitative or top-down approach. This approach is generally based on explicit consideration of aggregate global greenhouse gas emissions over some time period, guided by views (and underpinning science) about the risks of climate change associated with greenhouse gas concentrations in the atmosphere.

This type of approach generally assumes that all (or most) industrialised countries take on fixed and binding emission targets, but developing countries do not. An international carbon market (perhaps with some price-cap mechanism) is sustained through international emissions trading. In some countries, targets might be taken on at a sub-national level. There has also been discussion of what role agreements between sector-specific transnational companies might play as part of such a framework.

This core policy framework is then supplemented by various ideas for how developing countries might be engaged. These generally are a mix of ideas for policies and measures plus some form of evolution or transformation of the CDM. Proposals for economy-wide emission-intensity targets and dynamic sectoral “crediting baselines” are being actively analysed and discussed in a range of fora. Beyond general agreement that the concept has merit, discussions have encountered a number of difficulties in trying to make the concept work in practice. There are also some ideas for fully including developing countries in an overall targets and trading framework in this next step of the international regime; eg, under some kind of emissions- per-capita formula that provides developing countries with surplus allowances. But these face many political obstacles.

Supporters of this approach to seeking multilateral agreement generally also believe that it is urgent that emissions in the coming one to two decades need to be reduced significantly from current trends and projections. This reflects an assessment that if this is not done, options to eventually stabilise atmospheric greenhouse gas concentrations at required low levels will have been foregone or will become prohibitively costly. It also reflects the concern that critical thresholds in the climate system could be crossed with severe global effects that cannot be reversed, even if greenhouse gas concentrations are reduced later.

Top-down approaches are generally based around an explicit long-term climate change goal, expressed either as a maximum-acceptable temperature rise or as a target for the stabilisation of greenhouse gas concentrations (expressed in CO₂ or CO₂-equivalent (CO₂e)). Working backwards from such long-term targets, short-term emission goals are derived as necessary milestones along the way (den Elzen and Meinshausen, 2005).

Bottom-up approaches: technology and supporting policies and measures

The second grouping of ideas generally does not sit within a quantitative, top-down frame or its attendant timing concerns. These ideas tend to be of a “policies and measures” nature; eg, agreements to adopt specific technology uses over time (such as in the transportation or power generation sectors) or to adopt managed low-carbon price paths (such as through harmonised carbon charges or price-capped domestic emissions trading schemes). While some of these ideas may be framed as quantitative in nature, the metric is not emissions in general and specifically not about aggregate global emissions, except perhaps in the very long-term sense. Some proponents of these ideas still see a role for a carbon market. This might be created, for example, by a projects-like “offsets” approach, where commitments to specific policies and measures can be met by some other action, perhaps in another country. Moreover, at a domestic level, countries could choose the policy of a cap-and-trade emissions-trading scheme for some of their emission sectors. It may also be possible for these schemes to be linked with schemes of other countries or regional groups. Many technology-based approaches tend to aim for climate change outcomes as well as co-benefits in the area of energy security, air pollution and reduced resource consumptions.

The label generally put to this second grouping of ideas is “bottom-up”. This is because an overall outcome is more likely to emerge from a mosaic of domestic, bilateral and perhaps regional initiatives. These approaches are generally not framed against the objective of achieving an explicit emissions target within a particular timeframe. Further, an overarching multilateral agreement per se is not normally envisaged. Some experts who favour this “policies and measures plus market” approach share the assessment commonly underpinning the top-down approach that there is an urgent need to address climate change. However, they consider that a negotiation process leading to a top-down outcome is not feasible in the near term, citing the difficulties experienced with Kyoto. In this view, a bottom-up approach, with substantive non-binding undertakings by those who are party to it, may be the more achievable short- to medium-term solution (OECD, 2003).

Approaches to obligations and commitments

Both top-down and bottom-up approaches have explored a broad range of targets and other obligations that countries might be asked to adopt. Binding emission targets could take any number of forms, but three of the most commonly discussed are: absolute (fixed) national emissions targets (as in the current Kyoto Protocol regime), dynamic intensity targets (eg, expressed as a ratio of emissions to GDP) and per-capita emissions targets. Technology agreements could spell out coordinated approaches to research and development funding, market development, and joint demonstration projects. Policies and measures might include pledges by countries towards adopting certain standards or percentages of low-emitting technologies, which may or may not be combined with broader market mechanisms (OECD, 2005a).

The role of adaptation in future agreements

The past years have seen an increasing push for considering adaptation in the UNFCCC and possible post-2012 regimes. Developing countries are seeking greater emphasis on adaptation as part of any future international agreement, given the limited resources they have to manage adverse impacts of climate change and their typically lower per-capita emissions. Success in balancing adaptation and mitigation efforts and expectations is generally seen as crucial to the success of any future multilateral negotiations. Any successful future adaptation framework will very likely require support by Annex I countries for adaptation in developing countries through multilateral funds, targeted support mechanisms for capacity building and climate modelling, and specific assistance for the most vulnerable countries. Think tanks are only beginning to consider the possible role of adaptation in future agreements and how to ensure efforts and needs are measurable and comparable between countries (OECD, 2005a, 2005b; CCAP, 2005).

Different vulnerabilities and perspectives of developing countries on adaptation also mean that the most vulnerable developing countries, such as low-lying Pacific Islands, could begin to argue for mitigation actions in future agreements not only by developed countries but also by large developing countries. Clear statements of this kind have already been made in fora outside the UNFCCC (eg, in the 33rd Pacific Islands Leaders' Forum), but are yet to appear in formal climate change negotiations.

2.3.2 Possible post-2012 frameworks: issues for New Zealand

Taking a broad-brush look at the many possibilities for post-2012 being discussed mostly offline, but beginning to be raised by some parties in more formal discussions, it is possible to distil some key issues of interest to New Zealand.

Top-down approaches and implied emission targets

Much of the work emerging from (mostly European) think tanks brings a top-down approach to post-2012 frameworks (Climate Action Network, 2002; German Advisory Council on Global Change, 2003; International Task Force on Climate Change, 2005).

The official policy goal of the European Union to limit global warming to less than 2°C above pre-industrial levels implies that global greenhouse gas concentrations would need to stabilise at 450ppm CO₂e to provide a 50/50 chance of not exceeding this target. Such long-term goals are used to derive medium-term emission targets of 15% to 30% below 1990 levels by 2020 for Annex I countries, but would also require major developing countries to limit their further emissions growth (den Elzen and Meinshausen, 2005).

Other long-term targets based on higher temperature targets, or higher risk of exceeding the temperature limit, would result in less stringent medium-term emission targets (Wigley 2004). However, most plausible long-term targets would still require ongoing and significant emissions reductions in the medium and long term.

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

To date, the New Zealand Government has taken no formal position on the desirability of a specific long-term temperature or concentration target in future climate change agreements.

Developing countries and competitiveness

The discussion of top-down approaches has not contemplated developing countries taking on, at least for the foreseeable future, targets that could restrict their economic growth. The possibility of providing developing countries with positive incentives has been raised; eg, through “no lose” targets. However, for this to be effective, developed countries would need to take on more stringent binding targets.

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

To date, New Zealand has advocated that future agreements would require “broad and balanced participation by all major emitters”, by implication including key developing countries. The criteria for “broad and balanced participation” have not, however, been specified.

[withheld under OIA s6(a), s9(2)(g)(i)]

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

Annex I and Non-Annex I framework and differentiation

Much of the work under way in think tanks has taken as a given the principle of “common but differentiated responsibilities” within the UNFCCC, with the Annex I and Non-Annex I classification being a key aspect of this. While there has been some examination of possible ways to differentiate within Non-Annex I – mostly centred on how groupings of countries might “graduate” from easy to more difficult commitments over time – there has been very little consideration of possible differentiation within Annex I. One paper that has considered this grouped New Zealand with a number of other Annex I countries in a middle tier of future commitments. The United States and Australia were in the first (hardest) tier.

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

Adaptation

Future agreements are likely to involve greater and more comprehensive efforts to support adaptation.

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

Land use, land-use change, and forestry (LULUCF)

There is often little consideration of how LULUCF might fit into possible frameworks. The issue is considered difficult and complex and other sectors are receiving far greater attention. To date, LULUCF has been an important focus for New Zealand, given the value of sinks in helping New Zealand meet its obligations in CP1.

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

New Zealand is currently actively engaged in technical and policy discussion on LULUCF. Continued engagement will take time and resources.

Emissions *per capita*

Emissions *per capita* are used in some proposals as an indicator on which to base various commitments. New Zealand does not come out positively on this scale, largely due to its high share of agricultural emissions.

Existence of a carbon market

A particular feature of the Kyoto Protocol is that it has supported the emergence of a market for greenhouse gas emissions. The existence of binding commitments has driven the development of the European Emissions Trading Scheme System. Moreover, the Kyoto arrangements provide for flexibility mechanisms that allow for the sale and purchase of emissions reductions, facilitating the identification and exploitation of the lowest-cost emission-reduction options.

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

[withheld under OIA s6(a), s9(2)(g)(i), s9(2)(j)]

New Zealand has been a strong advocate of international market mechanisms in the design of the Kyoto Protocol.

2.3.3 Conclusion

The uncertainty surrounding the international framework for climate change post-2012 is apparent from the divergence between the top-down and bottom-up ideas that have to date been explored outside the formal UNFCCC processes. This uncertainty presents particular challenges in framing domestic climate change policy.

[withheld under OIA s9(2)(g)(i), s9(2)(j)]

Section 6 discusses a possible position and strategy for the forthcoming UNFCCC Conference of the Parties in Montreal.

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