The Clean Development Mechanism: A Canadian Perspective

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Introduction

The Clean Development Mechanism (CDM) is a market-driven trading mechanism between industrialized and developing countries that will promote sustainable development and provide cost-effective reductions of greenhouse gas emissions. A win-win proposition, the Clean Development Mechanism allows industrialized countries to invest in value-added emissions reduction projects in developing countries and to earn credit for the resulting emissions reductions. At the same time, it allows developing countries to become fully engaged in climate change initiatives and to benefit from new investments and new, clean technologies. The Clean Development Mechanism is one of three emissions trading mechanisms arising out of the Kyoto Protocol, the global initiative to reduce the greenhouse gas emissions responsible for climate change.

Background

Climate Change and Global Warming

Scientists around the world agree that our climate is getting warmer. In the last hundred years since accurate world-wide records have been kept, the world's mean surface temperature has risen about 0.5°C, from 13.5° C to 14°C.[1] Globally, the 11 hottest years on record have occurred since 1982 and 1998 was the hottest year ever recorded.[2] Most scientists now believe that the global warming trend has been caused by human activities and is not just a naturally fluctuating temperature change. The Intergovernmental Panel on Climate Change (IPCC) predicts that mean atmospheric temperatures will rise a further 1.0°C to 3.5°C by 2100.[3] These temperature changes would be uneven throughout the world, changing little at the equator but rising as much as 15°C at the poles.[4] This temperature increase could melt most of the polar icecaps, causing sea levels to rise between 0.5 and 1.0 metres[5] -- a catastrophe that would drown several island nations, such as those belonging to Alliance of Small Island States (AOSIS),[6] permanently flood 10% of countries like Bangladesh and threaten many coastal areas that are home to most of the world's population. Global warming could also lead to broader climate change patterns, including increasingly erratic and severe weather patterns, such as floods, droughts, ice storms and hurricanes. These conditions and overall warmer temperatures will threaten the survival of natural forests and hinder agricultural productivity.

Scientists expect that the impacts of climate change will be more severe toward the poles, meaning that nations such as Canada will experience many adverse affects of a warming atmosphere. Canada will experience droughts in some areas, flooding in others and frequent crop failures across the country. Rising ocean levels will threaten coastal communities and economies. An increase in weather-related disasters, accompanied by losses in economic productivity and retail sales, will be worsened through increased costs for disaster relief, damage control, insurance claims, and health services. For example, in 1996 alone in Canada, weather-related disasters, such as the Saguenay Flood and the Pacific New Year's storm, cost $2.5 billion in property damage and drained $3 billion from the economy.[7] Storms and flooding

will also pressure air, rail and highway transportation systems. The recent evacuation of two million people from Florida to avoid Hurricane Floyd is a good example.

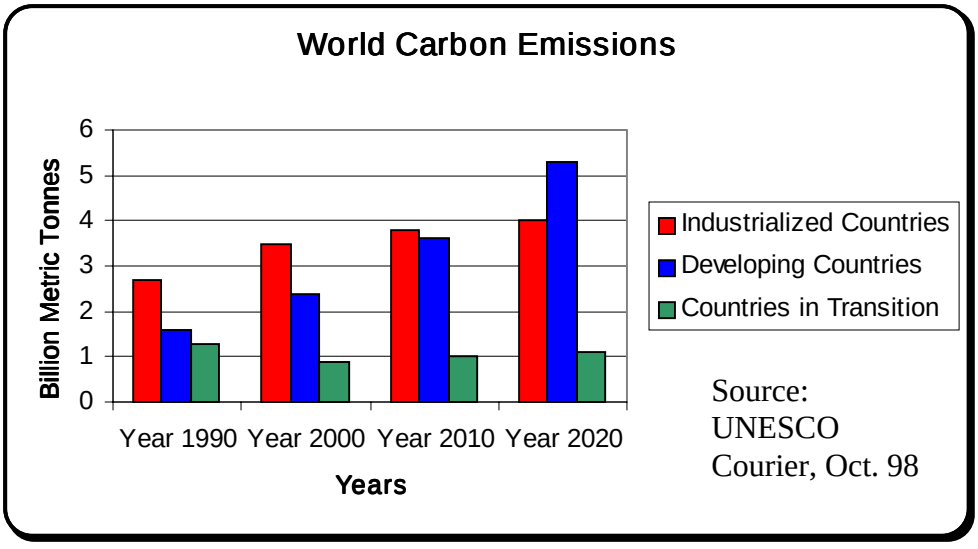
Greenhouse Gases

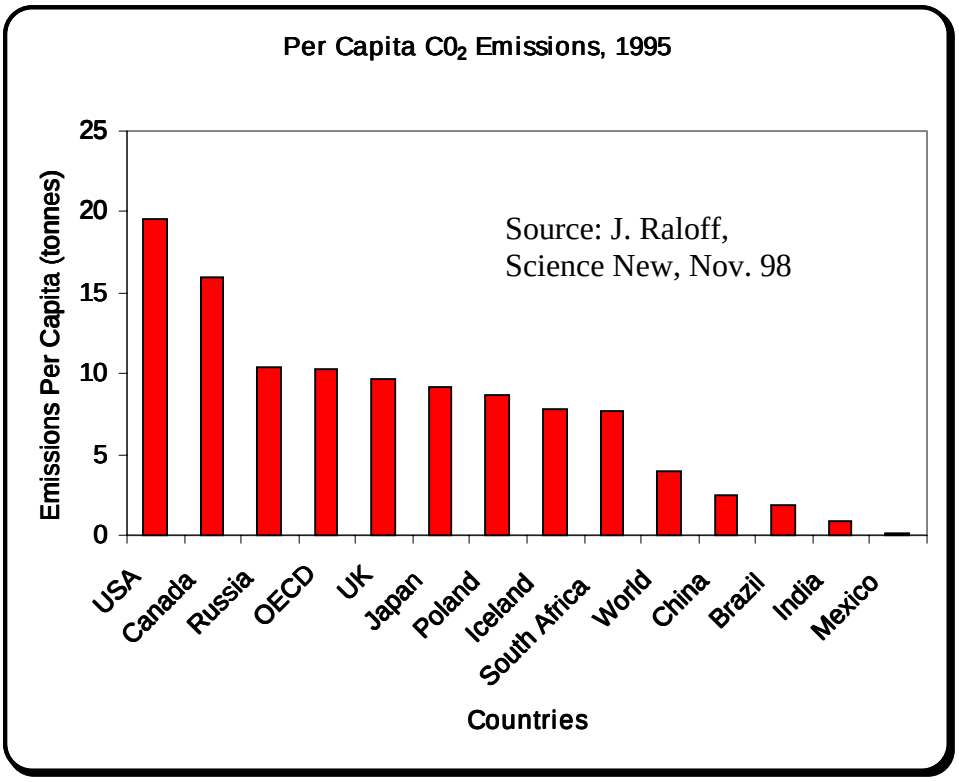
Heat from the sun enters the earth's atmosphere and is either absorbed by the land and oceans or reflected back into space. Our atmosphere is comprised of naturally occurring gases, such as water vapour (H_20), carbon dioxide (CO_2), nitrous oxides (N0x), and methane (CH_4), that form an insulating envelope around the earth that prevent heat from escaping into space. Without this essential envelope of greenhouse gases (GHG), the earth's mean temperature would be about -18°C and would be unable to sustain life.[8]

Scientists believe that human activities such as urbanization, deforestation, agricultural practices, the release of synthetic gases and emissions from burning fossil fuels have all combined to alter the chemical make-up of our atmosphere. In particular, they believe that human activities have released significant quantities of greenhouse gases into the atmosphere, dramatically enhancing its ability to trap heat and cause the global atmospheric temperature to rise. For example, the amount of CO_2 in the atmosphere was 280 ppmv at pre-industrial levels 200 years ago but has risen to 358 parts per million volume (ppmv) by 1994.[9] This enormous increase corresponds directly with increases in the global atmospheric temperature.

Sources of Greenhouse Gases

While most greenhouse gases are naturally occurring, they have been released into the atmosphere in increased concentrations by burning fossil fuels that provide 85% of the world's energy for transportation, manufacturing and heating.[10] With the world population expected to rise from its current 6 billion people to more than 10 billion by 2060 and with more than 75% of the world population located in urban centres, energy requirements may triple by 2050.[11] Currently, industrialized nations account for the majority of greenhouse gas emissions. However, by 2010, the energy consumption of developing nations will increase to 40% of global consumption and China will overtake the United States as the largest emitter of greenhouse gases.





At the end of the millenium, Canada is emitting about 669 megatonnes (MT) of greenhouse gases into the atmosphere every year, up from 564 MT in 1990. Unless Canada acts to reverse this trend, Canada will be emitting 767 MT of greenhouse gases annually by 2020, or 36% higher than in 1990.[12] Canada produces 1.8 % of the world's total greenhouse gas emissions and ranks second only to the United States in per capita emissions.[13]

The world remains dependent on fossil fuels and will remain so for some time. Yet clearly, the global dependence on fossil fuels is unsustainable and must end. As the global population increases dramatically and as the developed world continues to expect to maintain its high standard of living, the demand for energy will only increase. Energy companies and governments are supporting a long-term trend of decarbonizing energy sources and capturing greenhouse gas emissions, yet these efforts must be accelerated to slow down climate change. The challenge for Canada--and for the world--is to move from good intentions and policy around greenhouse gas reduction to implementation and commercialization of alternatives to the status quo.

The United Nations Framework Convention on Climate Change

Most nations of the world have become increasingly concerned about rising concentrations of greenhouse gases in the atmosphere. To address this pressing problem, 150 nations from around the world signed the United Nations Framework Convention on

Climate Change (UNFCCC) in 1992. This treaty included a voluntary and legally non-binding commitment to cut greenhouse gas emissions to 1990 levels by 2000. The convention came into affect in 1994, and many countries initiated emission reducing actions, yet it soon became apparent that few nations would be able to meet their emission reduction targets by 2000. As well, the scientific community continued to gather compelling evidence that increasing concentrations of greenhouse gases was warming the earth because of human activity and that it could result in significant impacts, such as melting the polar ice caps, drought, extreme weather and health problems. This growing body of knowledge has clearly demonstrated the link between greenhouse gas emissions and global warming, effectively countering most suggestions that the warming trend is either natural or merely a temporary aberration.

In 1995, the parties to the UNFCCC met at the first Conference of the Parties (COP-1) in Berlin. At this meeting, the parties agreed to negotiate a protocol to establish legally binding limits or reductions in greenhouse gas emissions for industrialized countries, otherwise known as Annex I or Annex B countries. (There is currently little difference between these two categories. See the glossary for definitions.) These negotiations took place in Kyoto, Japan on December 1-11, 1997 at the third Conference of Parties (COP-3) negotiating session. These negotiations resulted in the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

The Kyoto Protocol

The Kyoto Protocol committed the world's industrialized nations to specific reductions in emissions of six greenhouse gases: carbon dioxide (CO_2), methane (CH_4) nitrous oxide (NO_2), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6). The Protocol has a goal of reducing worldwide, overall emissions of these six gases to at least 5.2% below 1990 levels for the first three greenhouse gases and below 1995 levels for the three synthetic gases (PFCs, HFCs, and SF_6) between 2008 and 2012. To achieve this, each of 39 nations listed in Annex B[14] of the Protocol, including Canada, the United States, Japan, European Union and former Soviet bloc nations, have committed to reduce emissions by percentages of 1990 emissions. These reductions range from 110% (a 10% increase) for Iceland to 92% (an 8% reduction) for most European countries. Canada is committed to achieving a 6 % reduction and the United States is committed to a reduction of 7%.

These emission reductions appear small, yet achieving them will require that most industrialized nations reduce their emissions to 20-30% below where they would be by 2008-2012 if current emission trends were allowed to continue unabated. In real terms, Canada must reduce its emissions 24-28% below projected 2008-12 levels.[15] However, the Protocol's accounting methods may allow countries credit for emissions reductions within the country itself through flexible mechanisms such as Joint Implementation and the Clean Development Mechanism.

The Kyoto Protocol differs from the original UNFCCC because it is legally binding. However, it is legally binding only to nations that ratify it and only once it has also been ratified by at least 55 nations. As well, the nations ratifying the Kyoto Protocol must be those that are the source of at least 55% of total global CO_2 emissions in 1990, the baseline year.

The Kyoto Protocol is controversial because of the emissions reduction levels set, its legally binding nature and its focus on industrialized nations. During negotiations, there was

considerable disagreement over: which greenhouse gases to include in the treaty; the level of legally binding reductions to which each country must commit; whether developing countries should be required to meet emissions reduction targets; and, whether emissions trading should be allowed. Environmentalists and scientists complain that the Kyoto Protocol is too little too late: full compliance to the Kyoto Protocol's emissions reduction targets will reduce global warming by only one tenth of a degree by 2100 because of the cumulative effect of emissions.[16] Industrialized nations opposed high targets because of their expected negative impact on the global economy and because emissions reduction targets are not required of developing countries. Most developing countries opposed participating in the Kyoto Protocol because they feared that being bound to emissions reduction targets would slow their economic growth and that they would bear the brunt of solving a problem created primarily by industrialized countries, which account for most greenhouse gas emissions.

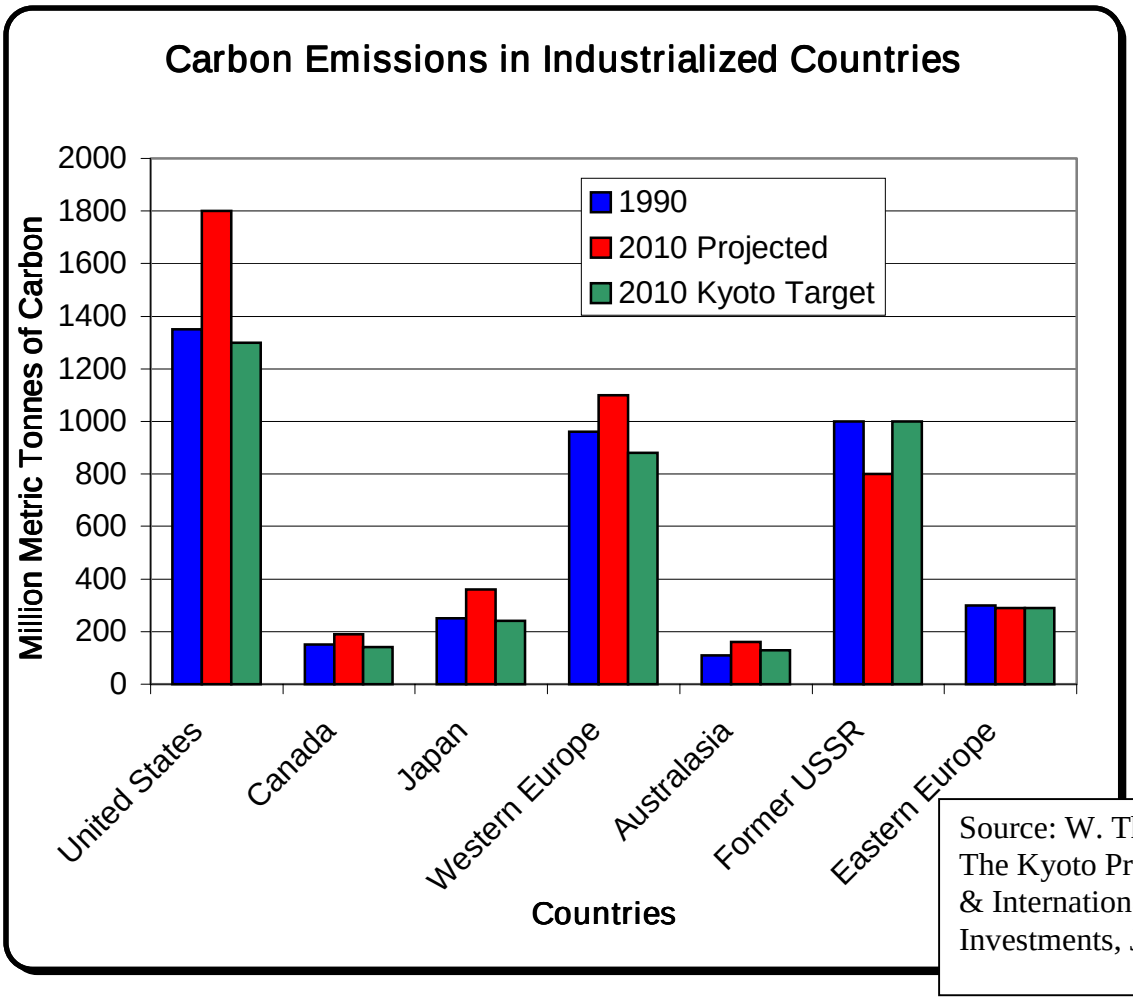
In the end, developing countries were excluded from meeting mandatory emission reduction targets, but provisions, such as the Clean Development Mechanism, were included to give industrialized countries the flexibility they wanted, by allowing credits for emissions reductions undertaken in developing countries. While developing countries will benefit from this participation, their involvement was secondary to obtaining the buy-in from industrialized countries. The Protocol calls for both industrialized and developing nations to take steps towards creating an inventory of greenhouse gas emissions and carbon sinks, to communicate their activities and to create updates on measures that lessen or adapt to climate change.

Industrialized countries have been slow to ratify the Protocol because of concerns about its economic impacts and because it does not require emissions limits for developing countries, in particular. Some lobby groups continue to insist that the Protocol is not scientifically justified, while others maintain that the Protocol is too weak to combat climate change effectively.

The Kyoto Protocol was opened for signature between March 16, 1998 and March 16, 1999. Canada signed the Kyoto Protocol on April 29, 1998. As of January 13, 2000, 84 countries including Canada, the United States, China, Japan, Russia and member countries of the European Union have signed the Kyoto Protocol, but only 22 nations have ratified it. None of the industrialized nations, including Canada, the United States, Japan, Russia and members of the European Union, has yet ratified the Protocol. The only nations that have ratified the Protocol include small island nations, a few nations from the former Soviet bloc, such as Georgia and Uzbekistan, and a few countries from Latin and South America, such as Guatemala, Nicaragua and Bolivia.

The Kyoto Protocol will not take effect until it is ratified by at least 33 more countries that, together with those who have already ratified it, account for 55% of CO_2 emissions. This will be a significant challenge since none of the industrialized nations --the large greenhouse gas emitters -- have yet ratified the protocol. The United States, for example, passed Senate Resolution 98 that prohibits the United States from ratifying the protocol until developing countries have meaningful participation in reducing greenhouse gas emissions. In Canada, ratification will take place only after key outstanding issues have been resolved, a national climate change strategy has been developed and after government is confident that Canada is able to meet the Kyoto Protocol's greenhouse gas emissions reduction targets, which will become legally binding upon

ratification. As yet, Canada has no timetable for ratification.



Source: W. Thomas, The Kyoto Protocol & International Investments, Jan. 00

Developments Since Kyoto

The third Conference of Parties (COP-3) negotiations that resulted in the Kyoto Protocol have been followed by two more COP sessions. The fourth session, COP-4 took place in Buenos Aires, Argentina, November 2-13, 1998. Because of the complexity of issues left unresolved at Kyoto in 1997, the COP-4 meeting focussed primarily on developing a two-year action plan focusing on key issues including: rules and guidelines for market-based mechanisms, rules and procedures governing treaty compliance, technology development and transfer, and defining and verifying carbon sinks. COP-4 scheduled this action plan for completion by late 2000 or early 2001 so that substantive negotiations could take place by COP-6.

COP-5 took place in Bonn, Germany, October 26-November 5, 1999. It was primarily a technical meeting that postponed major

decisions until COP-6. COP-5 did, however, confirm timetables for decisions as set out in COP-4 in Buenos Aires the previous year and sped up the work program[17].

COP-6 is scheduled to take place in The Hague, Netherlands, November 13-24, 2000. According to the schedule, issues such as the implementation of the Clean Development Mechanism are to be resolved at this meeting.

Although they have not yet ratified the Kyoto Protocol, a few countries like Argentina and Kazakhstan have publicly declared that they will make a commitment to meet the binding emissions targets set out in the document. It is not known how many other developing countries may make similar commitments.[18]

The Kyoto Challenge

Meeting the legally binding commitments of the Kyoto Protocol will be extremely difficult. Already, 7 billion tonnes of carbon (or 28 billion tonnes of $C0_2$) are emitted from human sources into the atmosphere annually.[19] As the world population increases, demands for energy will continue to rise globally. Although industrialized countries currently produce the majority of greenhouse gases, China will exceed the emissions of the United States sometime between 2010 and 2020 and, soon after, emissions from the developing world will exceed those of developed nations.[20] If industrialized nations were to achieve the emissions reductions expected by the Protocol solely by limiting fossil fuel use, projected energy demands would have to be reduced by between 40 to 60 quadrillion BTUs, an equivalent 20 and 30 million barrels of oil per day.[21] Such reductions would be difficult-- if not impossible-- because projected global energy demands are rising at about 30% each decade.

Overall, most business communities are nervous about the implications of the Kyoto Protocol. Some industrial lobby groups claim that the scientific models demonstrating global warming are invalid and, consequently, that the high costs of retooling their technologies and processes will lead to unjustified reductions in profits and competitiveness. Others who accept that global warming is a real threat, contend that the timeframes for emissions reductions set out in the Kyoto Protocol are too short for businesses to meet within their normal equipment replacement cycles, making the cost of compliance too high. Almost all businesses that may need to reduce their emissions prefer to comply voluntarily and on an incentive basis, rather than through regulations, taxes and mandatory compliance.[22]

Even if these difficulties and objections are overcome, the Kyoto Protocol may be too little too late, since even full compliance with the Kyoto Protocol will slow global warming only slightly, approximately 4-7% or 0.1°C to 0.2°C, by 2100.[23]

The Kyoto Mechanisms

Recognizing the difficulty of achieving emission reduction targets, the Kyoto Protocol identified three flexible mechanisms to help countries achieve their emission reduction targets. These are: International Emissions Trading, Joint Implementation and the Clean Development Mechanism. Together, they are known as the Kyoto Mechanisms.

International emissions trading is a market-based method of transferring credit for emission reductions achieved at source or through greenhouse gas sinks so that the purchasing country is able to meet its emission reduction commitments under the Kyoto Protocol. Under this mechanism, emission reduction credits will become a commodity with a market value, much as sulphur dioxide (SO_2) is today. International

Emissions Trading is outlined in Article 17 of the Kyoto Protocol.

Joint implementation (JI) is a form of emissions trading in which two industrialized countries form a bilateral agreement to reduce greenhouse gas emissions by undertaking an emission reduction project in one of the countries.

The Clean Development Mechanism (CDM) is a trading mechanism between industrialized and developing countries, rather than between two industrialized nations. It is described in detail below.

The Clean Development Mechanism

The Clean Development Mechanism (CDM) is an emissions trading mechanism between industrialized and developing countries that allows industrialized countries to invest in low-cost emissions reduction projects in developing countries and to earn credits for the emissions reductions that result. These credits from climate-friendly sustainable development projects can be applied against corporate and national emissions reduction targets as set out in the Kyoto Protocol. The benefits of these investments will encourage developing countries to become fully engaged in climate change initiatives.

Under Article 12 of the Kyoto Protocol, the Clean Development Mechanism has three goals:

- To assist in the achievement of sustainable development in developing countries that support initiatives to slow climate change
- To contribute toward meeting the overall emission reduction targets outlined in the Kyoto Protocol
- To help industrialized countries meet their emissions reduction targets.

Whereas Joint Implementation initiatives occur bilaterally between two industrialized countries, CDM initiatives can be either bilateral or multilateral, project-based collaborations between industrialized and developing nations. The CDM is the only Kyoto Mechanism that permits a transfer of credits from developing countries not bound by the Kyoto Protocol to governments seeking to meet Kyoto obligations. As well, it is the only mechanism that can be implemented for credit immediately. Other Kyoto Mechanisms do not provide credits prior to 2008.

Article 6 of the Kyoto Protocol outlines several restrictions on CDM (and Joint Implementation). In particular, this type of emissions trading "shall be supplemental to domestic actions," meaning that emissions trading cannot be the sole means through which a nation achieves its emission reduction commitment, but that it must undertake abatement measures within its borders.[24] As well, reductions will only receive credit when they are additional to reductions that would normally occur.[25] (See section below, or the Glossary for an explanation of additionality.)

Most of the details of CDM are scheduled to be worked out at COP-6 in The Hague in November, 2000. Because the outcome of these negotiations is unknown and because the Kyoto Protocol is unlikely to be ratified before the end of 2000, the CDM will likely move forward under some sort of interim arrangement, delaying the final rules for CDM until at least 2001, if not later. The following is known:

- CDM will be a market-driven trade mechanism where projects and their benefits have both economic and environmental value.
- Both public and private agencies and corporations can participate in CDM and

gain credits that can be applied against emission reductions targets.

- CDM projects must support the sustainable development objectives of the developing nation where the projects will occur.
- Credits obtained through CDM between 2000 and 2008 can be used for early credit towards the initial Kyoto Protocol reporting period of 2008-12.
- Projects are eligible for CDM status only if they meet the following general eligibility criteria:
  - Participation in projects by public or private agencies is voluntary.
  - Projects are approved by the participating countries and help developing countries meet their sustainable development objectives and help industrialized countries gain credit for reducing emissions.
  - Projects provide real, measurable, verifiable and long-term emission reductions benefits.
  - projects reduce emissions more than, or in addition to, what would occur if the project were not implemented.
- A portion of the profits from certified CDM projects will cover CDM administrative costs.
- Part of the profits from certified CDM projects must be used to help developing countries especially vulnerable to the negative impacts of climate change and to meet the costs of adapting to these impacts.
- Three administrative bodies will oversee and monitor the CDM: COP representatives, an Executive Board established by COP, and independent auditors who will verify that project activities take place and that they achieve the expected results in emissions reduction. The authority and design of these supervisory agencies will be worked out in future negotiations.

The Size of the CDM Market

The value of credits obtained through CDM to industrialized countries could be between $1.5 and $12 billion with a median market size of $5.6 billion annually, with totals ranging between $7.5 and $60 billion during the first Kyoto Protocol emissions reduction reporting period, 2008-12.[26] These figures could be exceeded significantly with credit for early action for CDM measures taken as early as 2000. The value of the CDM market will depend on the commodity prices for CERs, the cost of implementing CDM projects and the cost of transactions. Scarcity and the proximity in time of a project to compliance deadlines will also influence the value of the CDM market.

CDM will be of most interest to businesses seeking to reduce their greenhouse gas emissions cost-effectively. Oil and gas, pipeline, pharmaceutical, mining, utilities, plastics manufacturers, pulp and paper, chemical, transportation, and energy companies are among those who may benefit through direct participation in CDM projects. Others with an interest include financial institutions, insurance companies, non-governmental organizations, facilitating agencies, private sector brokers, certification bodies and companies or organizations that can provide technological assessments and verification of emissions reductions.

How the Clean Development Mechanism Works

The CDM will help industrialized countries meet their greenhouse gas emissions reduction targets as set out in the Kyoto Protocol by allowing them to partially achieve these targets through investments in emissions reduction projects in developing countries. The investing country will receive Certified Emission Reduction credits (CERs) for projects that reduce greenhouse gas emissions below the baseline emissions of a previous process or facility. For example, replacing a coal-fired power station with one fired by gas would reduce emissions and earn the investing company CERs that can then be applied against the company's quota or the investing country's emissions reduction targets as per the Kyoto Protocol. Between 2000 and 2008, these credits can be banked as Credits for Early Action and then applied against the Kyoto Protocol's emissions reduction targets for its first reporting period, 2008-20012.

To receive credit for emissions reduction in developing countries, investing countries must meet the following criteria:

- Both the investing and host countries must approve the project and participate voluntarily. In other words, participating in emissions reductions must not be forced by legislation or regulations.
- All projects must reduce GHG emissions more than would occur if the project were not undertaken. The emissions reductions must compare favourably against a pre-determined baseline. This requirement is often referred to as 'additionality.'
- The projects must create real, measurable and long-term benefits to reduce the impacts of climate change. This criteria suggests that emissions reductions must be the actual reduction of the emission rate as a result of a specific action or process, not just a change in activity level, such as a shut-down. The reductions must be quantifiable and verified by an objective third party. As well, the emissions reduction must continue far into the future and not be merely a short-term solution for the sole purpose of achieving credits.

The credits awarded each project will be determined according to the difference between baseline emissions and the emissions reductions achieved.[27] The market will determine their value.

Credits for Early Action

The Kyoto Protocol has established a first commitment period of 2008-12. During this five-year period, industrialized countries that have ratified the Protocol will be legally bound to meet the emissions reduction targets set for them within the Protocol. For Canada, this means reducing our emissions to 6% below 1990 levels. All nations are permitted to average out their reductions over the first commitment period.

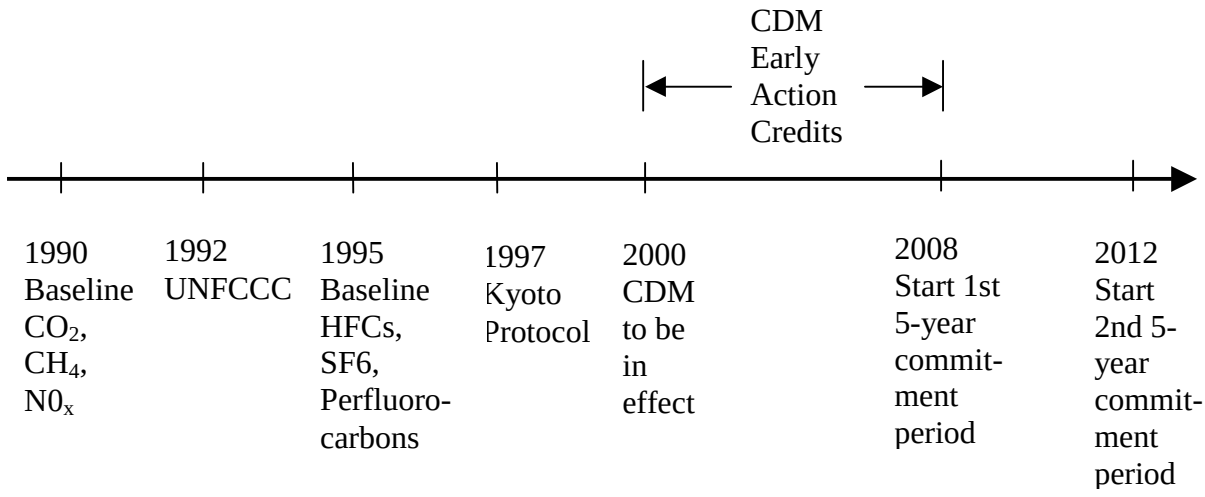
The CDM is the only Kyoto Mechanism that creates credits for early action that can apply towards the emissions reduction targets of industrialized nations during 2008-12. As early as 2000, credits gained from CDM projects (or, if CDM is not yet in place, interim CDM projects) can be accumulated and used to offset emissions released at the end of the decade.

Credits for early action will be advantageous to countries that make use of them. They offer the opportunity to obtain high volumes of greenhouse gas emissions at low costs. Parties that involve themselves in emissions reduction early will be able to select those projects that offer the easiest and most cost-effective emissions reductions and will obtain the greatest

emission reductions at the least cost. As emissions reduction initiatives succeed, the cost and difficulty of achieving reductions will increase. Companies and countries that take advantage of credits for early action will also comply more easily with the Kyoto targets because they have an extra eight years to achieve them before the first reporting period begins in 2008.

Credits for early action will also create the context for the creation of an international greenhouse gas trading emissions credit trading system. It is vital that the integrity of the emissions trading market be assured. Necessarily, there will be a period of learning-by-doing, in which the trading market would develop common protocols for accounting, reporting, monitoring, certifying and enforcing the trade in early action credits. Developing this consistency will take time.

Kyoto Protocol Emissions Reduction Timeline



Unresolved CDM Issues

As the CDM is still under development and has yet to be substantially negotiated, many outstanding issues remain, creating uncertainty and hindering its adoption. These issues include regulatory controls and monitoring, project financing and administration.

Project Eligibility Criteria

Criteria for selecting CDM projects have been outlined only in rudimentary form, as noted above. The criteria state that projects must result in real, measurable and long-term benefits, but do not define more specifically what these terms mean. As well, there are no guidelines or procedures in place to determine whether or not a project is eligible for certification as a CDM project.

Making these definitions and rules more specific will entail considerable debate at COP-6. For example, industrialized countries will likely apply criteria developed under the previous initiatives, although these vary from country to country. Few developing countries have developed criteria that could be applied to CDM. Developing countries will likely insist that CDM projects must provide several economic benefits, such as job creation, new services and spin-off products, poverty reduction and local economic development. They will also want to ensure that projects promote local environmental benefits, such as better air and water quality, in addition to the world-wide benefit of greenhouse gas reductions. They will likely also require that CDM projects be sustainable and not cause a negative environmental impact, such as removing land from agricultural use or creating toxic wastes, while reducing greenhouse gases. Projects must also not burden local communities.[28]

Another matter that will be debated intensely at COP-6 is the issue of whether projects to create carbon sinks through forestry and agriculture-related projects will be eligible for CDM certification. The Kyoto Protocol is silent on this matter for CDM, although it allows these measures under the Joint Implementation initiative (JI). Countries in the European Union tend to oppose the inclusion of carbon sinks, while countries with large plantable tracts of land believe that it would be to their advantage to include forestry projects. Carbon sequestration through forestry or agriculture is attractive because it is easily and relatively cheaply implemented. Large-scale and long-term projects yield high levels of emissions reductions compared to many other emissions reduction projects. Countries opposed to carbon sinks tend to take this position because they believe forestry or agriculture-intensive countries have an unfair advantage over those with limited forestry options that must then reduce emissions through more expensive means. They also note that these projects take many years to yield their sequestration benefits and that these benefits may not be permanent.

Additionality

Additionality is likely the most difficult eligibility criterion for CDM projects to meet. CDM projects must be "additional to any that would occur in the absence of the certified project activity."[29] In other words, the project will only be approved -- and credits granted -- if the reductions in greenhouse gas emissions can be quantified and verified as surplus to reductions caused by other factors, such as legislation, economic slowdowns, business development, non-CDM emissions reduction projects, etc. In short, eligible projects must prove that they are the source of emissions reductions and that they are not claiming benefits that occur from other causes.

Several types of additionality must be demonstrated.[30] The most important of these are:

- Emissions additionality must demonstrate that greenhouse gas emissions are real. This will require reliable baseline emissions assessments, specific standards for quantitative monitoring and verification, and accredited certifiers. Project boundaries must be established to ensure a fair assessment of emissions reductions within a particular project and within an industrial sector so that reductions are not calculated incorrectly or offset by emission leakages or transfers elsewhere. As well, the ownership of the emissions reductions must be clearly established to ensure reductions are counted only once and by only one party. This type of additionality is of the highest priority and is mandatory if the CDM is to succeed in fulfilling its purpose.

- Financial additionality will ensure that new financial resources are invested in developing countries and that these resources are not just regular development assistance or other investments in disguise. This is a mandatory type of additionality.

- Regulatory additionality will ensure that projects are voluntary rather than required by laws or regulations. This may be difficult to assess fairly because many developing countries have environmental regulations that are not enforced. Whether projects will qualify for credits if they conform to unenforced regulations or laws to reduce greenhouse gas emissions remains under debate. Regulatory additionality is not mandatory, but must be given very important consideration so that businesses and countries are able to participate and compete fairly.

- Technology additionality means that the technology, resources or practices used in a CDM project must be advanced compared to those that might normally be used to address an emissions problem. Developing nations want innovative, new technology and do not want to end up with out-of-date technologies and processes. On the other hand, investors worry that introducing state-of-the-art technology will continually move back the benchmark for what would be considered additional under CDM. Also, they do not want each project to define a new standard because they want to repeat similar, later projects in the host country or in other developing countries to ensure they develop a profitable market, rather than a one-off project. This type of additionality is not mandatory, but must be a very important consideration in designing the implementation of the CDM.

- Investment additionality must ensure that CERs are not allotted to everyday business practices but result from investments that go beyond what is expected in the industrial sector or business environment. Projects that meet this requirement might be those that are implemented despite excessive red tape, a difficult labour climate, or low profitability, all conditions that can be assessed only subjectively. Investment additionality is a very important consideration when implementing the CDM to ensure that CDM projects go beyond the status quo.

Each of these types of additionality is difficult to quantify and assess, yet their successful resolution is essential before the CDM can go forward. Of the five listed above, emissions additionality and financial additionality are the most important and mandatory requirements that will allow the CDM to function as it was envisaged.

Supplementality

There is significant debate over how much CDM projects should supplement domestic actions. The Kyoto Protocol indicates that all emissions trading initiatives should be supplemental, but fails to define exactly what this means. Some nations worry that an overly broad definition of supplementality will allow industrialized nations to use it as a loophole to avoid domestic actions. Industrialized countries might also be tempted to limit the strictness of their domestic emission reduction policies and slow the development of technology to keep the baseline of domestic activity low and ensure that foreign projects continue to qualify as supplemental. If supplementality is interpreted strictly, it would ensure that industrialized countries undertake emissions reduction actions at home and do not just substitute actions in developing countries where they may be

cheaper to undertake. On the other hand, removing this loophole could raise the cost of complying with the Kyoto Protocol and make countries unwilling to meet emissions reduction targets.

Transaction Costs

All CDM transactions -- from establishing a project's eligibility to trading credits and applying them against a nation's emission reduction target -- will incur overhead costs. The Kyoto Protocol stipulates that industrialized nations will bear these costs. Understandably, those paying for transactions will want to keep these costs to a minimum. If transactions are charged on a formulaic basis, costs would be minimized, but this method would likely reduce the accuracy of assessing emissions reductions or determining whether or not they are additional to what would otherwise occur. Attempts to assess CDM projects and credits more precisely will raise costs and decrease the interest of companies or countries in participating in CDM activities.[31] Acceptable trade-offs must be found.

CER Accounting

To date, no accounting institution has been created to track newly created CERs, oversee exchanges and transactions and apply them to the emission reduction targets for industrialized countries. As well, the specific details regarding accounting for these credits remains unresolved. Rules remain to be established to define whether credits can be used in advance of certification, as in some emissions trading programs in the United States, or whether they will only be allowable after-the-fact. If credits can be used in advance of certification, liability becomes an issue should the project fail to deliver its expected emissions reduction, either through poor performance or misrepresentation of the project's potential. If credits can be issued only after-the-fact, liability becomes a minor issue. The Kyoto Protocol is clear that industrial countries and companies, not the developing country, will bear the responsibility for liability if credits are disallowed.

Commitment to Adaptation

The Kyoto Protocol commits industrialized countries to using some of the proceeds from CDM projects to help vulnerable developing countries adapt to the impacts of climate change. To date, it is unclear what portion of these profits would be earmarked for this assistance.

Investment Risks

Clearly, the unresolved issues around the CDM weigh heavily on the minds of potential investors interested in participating in emissions reduction projects in developing countries. In addition, there is significant investor hesitation because investment risks will vary from project to project. A typical CDM project will likely be small or medium-sized, located in a developing country, and dependent on new or innovative technologies or processes. Each of these three factors may make finding appropriate financing a challenge.

Even with funding sources like the Prototype Carbon Fund, discussed below, small and mid-size businesses may share the experience of many sustainable development projects by having difficulty gaining financing for projects located in developing countries with financial markets that have not yet matured. Projects that are successful in gaining financing will still run the risk of defaulting or not being able to meet emissions reduction targets, thus not being able to earn credits against greenhouse gas emissions. Further, the value of these credits will be set by a free market and may be

unpredictable: current forecasts of the value of carbon ranges from $0.50 to $20 per tonne.[32] Investors are justifiably wary of making investments where profits are uncertain. As well, since existing national and international laws do not define or recognize greenhouse gas reductions or credits, sellers and buyers may be in a legal limbo over credit ownership and the future rights to early action credits.[33]

These market factors are magnified by the context set by the host developing country. Investors must seek countries that are politically and economically stable, with sound laws, robust sectoral institutions, and an ability to manage its economy, control inflation and maintain stable exchange rates. These countries must have a well-developed infrastructure and the capacity to receive and support international investment in sustainable development projects such as those initiated under the CDM.

Finally, companies are often hesitant to invest because of the untried nature of their technologies and the uncertainty of their profitability in new markets or their eligibility for CDM credits, even though the technologies may be highly effective and meet their technical objectives. Investors will only participate in CDM if they feel that the potential for profit is worth the risks of taking a new technology to an untried market. Investors will gain this confidence as developing countries improve their capacity to accept new technologies and as the success of CDM projects becomes demonstrated around the world.

Benefits of Participation

Industrialized countries and participating companies will invest in CDM, first of all, to reduce their greenhouse gas emissions more cost-effectively than they can within their own borders and to receive credits that they can apply to the targets set for the Kyoto Protocol's first reporting period, 2008-2012.

Naturally enough, companies will only participate in CDM if it has a positive impact on their bottom line. This means that CDM credits must be financially attractive in their own right. In addition to gaining credits and the accruing environmental and policy benefits, CDM projects open the door for new sustainable development investments that increase profits through cost efficiencies, new global markets and increased sales.[34] As well, CDM projects will become international showcases for an investor's innovative new technologies, environmental leadership and management strengths, leading to new business opportunities and relationships both including and beyond CDM. Businesses, in particular, will select CDM investments that make good business sense. They will invest in projects that:

- match their business goals and objectives
- reduce emissions
- create CERs at costs below capital investments within their own borders
- are cost-effective total projects that provide a reasonable cost/benefit ratio of project costs to CERs created
- fit cost-effective equipment and process replacement schedules
- develop new markets and increase profit margins
- contribute to shareholder value
- provide public relations benefits.

Bringing North and South Together

Host developing countries, such as Mexico, will benefit greatly from CDM. Through CDM projects, these countries will be able to participate as a global citizen in the task of reducing greenhouse gas emissions and mitigating the effects of climate change. More directly, they will benefit from development

investment, increased economic activity, technology transfer, reduced emissions, and reduced local environmental problems, such as smog. Through CDM, these developing countries -- which are not required to ratify the Kyoto Protocol's legally binding emission reduction targets -- can achieve their sustainable development goals and develop their industrial and environmental infrastructure.

Developing countries will also benefit from a reduced dependence on fossil fuels and their attendant high greenhouse gas emissions, uncertain supply and fluctuating prices. They will be able to reduce energy costs through improvements in energy efficiencies and the use of locally available alternative fuels, such as those created through wind, solar and biomass sources. As well, developing countries will gain access to sustainable technologies that advance their domestic goals and provide health benefits, such as improvements in local air quality. They will also be able to direct increased investment towards high-priority sectors of their economies, enhance employment opportunities in underdeveloped sectors of the economy, geographical regions and social groups. CDM projects may also contribute to the reduction of poverty and unemployment and may promote rural development in remote areas not currently well served by conventional power supplies[35]. Because a portion of the profits from CDM activities will be channeled to the developing countries most vulnerable to the impacts of climate change, they will be better able to adapt to the changing conditions caused by climate change.

Types of Eligible Projects

There are many opportunities for Canadian industry, non-governmental organizations and all levels of government to get involved in CDM projects. Projects might include:

Renewable Energy

- Small-scale hydro-power
- Biomass fuel sources, such as anaerobic digesters
- Wind energy
- Solar photovoltaic and solar thermal technologies
- Irrigation using wind pumps

Fuel Switching

- Cogeneration technologies
- Recovery and use of coalbed methane
- Fuelwood gasification with pulp residues
- Alternative combustion technologies
- Bagasse-based electricity cogeneration[36]

Industrial Applications

- Efficiency improvements in equipment
- Energy-saving processes
- Use of zero-emission fuel cells
- Electricity production and distribution

Forestry

- Biodiversity protection through sustainable forest management
- Sustainable forestry
- Silviculture activities and community woodlots

Agriculture

- Developing biomass fuel sources
- Soil tillage alternatives and sustainable agriculture
- Agro-forestry projects
- Flood control activities
- Waste management activities

The most significant opportunities appear to be those that shift power generation away from

traditional fossil fuels, such as coal, diesel and gas towards lower-emission alternative fuels, such as natural gas, or toward alternative energy sources, such as wind or solar power.

International Perspectives on the CDM

The idea of the CDM has been strongly supported by both industrialized and developing countries, indicating that market opportunities will be strongly supported globally. Debate remains over many unresolved issues that are scheduled to be resolved at the COP-6 meeting in the Hague in November, 2000. Once these issues are clarified, the momentum of the CDM market will accelerate.

Industrialized Countries

Most industrialized nations strongly support the Clean Development Mechanism because it increases their options for meeting their greenhouse gas emission reductions targets at lower costs and provides new markets and funding for sustainable development technologies. CDM is also supported because it provides a means for developing countries that are not bound by the Kyoto Protocol to participate in the greenhouse gas emissions reduction process. However, industrialized countries differ over how effective CDM will be in creating environmental benefits. Some industrialized nations believe that no limits should be placed on CDM, so that the costs of meeting the Kyoto Protocol's emissions reduction targets are minimized. Other nations are uncertain of the CDM's environmental effectiveness and believe some limits should be placed on CDM activities. The European Union strongly supports the CDM and is proactively involved in emissions reduction projects in the developing world through government, the private sector and NGOs, yet it is opposed to including carbon sequestration as eligible for inclusion within CDM. The United States supports the CDM because it is adamant that developing countries must participate in emissions reduction before it will ratify the Kyoto Protocol.

Canada is a strong supporter of the CDM and hopes to foster significant private sector involvement. However, Canada believes that CDM rules must be simplified to minimize transaction costs and strongly supports the use of CDM profits to help vulnerable countries adapt to climate change.[37] Canada is attempting to create private sector interest by earmarking $100 million for environmental projects in developing countries in Budget 2000. Some of these projects may qualify as CDM projects. Canada has also contributed $15 million to the Carbon Prototype Fund to finance CDM investments. It has also established the CDM/JI Office to match CDM and JI projects with potential investors.

Developing Countries

Developing countries generally welcome the CDM because they anticipate significant economic benefits from increased investments in sustainable technologies and from the spin-off benefits of these investments, such as employment and poverty reduction. They welcome the provision in the Kyoto Protocol that stipulates that a portion of CDM profits must be used to assist developing countries to adapt to the effects of climate change.

However, many developing nations are concerned that CDM will merely be a disguise for existing sustainable development projects and Official Development Aid (ODA)and that CDM will provide no new financial resources. They worry that CDM activities might even be used to justify a reduction in development assistance; they want reassurance that CDM

investments would be in addition to official development aid, not a replacement for it. Most developing nations are apprehensive that CDM projects will allow industrialized nations to earn credits for the easiest emissions reductions, often referred to as 'low-hanging fruit', leaving developing countries to achieve the more difficult, more expensive emissions reductions later on. They are also concerned that industrialized nations will use CDM as an excuse not to reduce emissions within their own countries. African nations, in particular, are concerned that they lack the infrastructure and ability to attract CDM projects and funding.[38]

The private sector in developing nations has little knowledge of the CDM, but companies that do know about it welcome the opportunity to do business. The unresolved issues around the CDM cause them great concern, especially around procedures for monitoring and certification, pricing of credits, transaction costs and technology transfer issues. Many private investors, both within and outside developing countries, are concerned that most developing countries lack the necessary business and environmental infrastructure to implement the CDM and that their governments are not providing clear policy directions on this issue.[39] Without an enabling environment that has an adequate infrastructure and the appropriate institutional support, investors fear that host countries would be unable to absorb CDM projects successfully.

Non-Governmental Organizations

Non-Governmental Organizations (NGOs), particularly those involved in environmental activity or advocacy, have a mixed response to the CDM. Most cautiously favour it, but question its environmental benefits unless strict definitions and limitations are put in place. Most NGO concerns revolve around the need for clearly defined emissions benchmarks that ensure that emissions reductions are really additional to what would happen normally. Most are also concerned that CDM investments might replace Official Development Aid and result in no net increase in technology transfer or investments in developing countries. Some NGOs want CDM projects reserved for renewable energy and energy efficiency projects, to the exclusion of large hydro, coal or nuclear projects.[40]

Mexico: A North American Opportunity

Mexico is a party to the UNFCCC and signed the Kyoto Protocol on June 9, 1998. However, as a developing country, Mexico is not bound by the emissions reduction targets applied to industrialized nations.

Mexico -- a developing nation rich in fossil fuels, but vulnerable to the effects of climate change -- represents a key market for new investments that reduce greenhouse gas emissions. With a population of 94 million growing at a rate of about 1.8% a year and an economy growing at between 3.9 and 4.5 % per year, Mexico is recovering from the oil crisis and the devaluation of the peso in 1994-95. Compared to other countries in Latin America, Mexico is considered to have a bright economic future with a real GDP growth of 3.9% in the year 2000. In its year 2000 budget, Mexico indicated it will reduce the deficit to 1% of its GDP. Employment figures, another indicator of increasing stability, indicate that unemployment has fallen from about 9% to about 2% in the past few years. Politically, Mexico is relatively stable, having been governed by the ruling Party of Institutional Revolution (PRI) for the past 70 years. Mexico will hold presidential elections in July 2000 and a general election in November, 2000, but a weak opposition means it is most likely that the Presidential incumbent Ernesto

Zedillo and his PRI party will be victorious in both.

Within this economic context, Mexico's demand for energy will rise rapidly in the next few decades.[41] At the same time, Mexico recognizes that greenhouse gas emissions could drastically affect the country's rainfall patterns, intensify droughts, desertify land, reduce the size and health of the country's tropical and temperate forests and increase the incidence of forest fires.[42]

Mexico is the 14th largest emitter of greenhouse gases and accounts for 1.9% of the global total.[43] Mexico is the world's fifth largest producer of crude oil and has the second largest oil reserves in the western hemisphere, about 40 billion barrels. It is also the world's eighth largest producer of natural gas with reserves of about 63.9 trillion cubic feet (tcf). Currently, about 70% of Mexico's electrical capacity comes from thermal power plants fueled by fossil fuels like oil and natural gas. Hydroelectric plants account for about 25%. Mexico has one nuclear plant, accounting for about 4 % of energy, and uses geothermal and alternative energy sources for about 2% of its energy capacity.[44] Mexico's Secretaria de Energia predicts that the nation's demand for natural gas will grow by about 8 % annually and that power plants may account for 40% of all natural gas consumption by 2006.

Although rich in energy resources, Mexico must greatly improve its energy infrastructure both to take advantage of its resources and to undertake locally and globally beneficial activities to reduce greenhouse gas emissions. For example, Mexico must link its offshore and southeastern natural gas reservoirs to its north and northeastern population centres where consumption levels are rising rapidly. Over the next six years, Mexico expects it must invest US$25 billion to modernize its electricity transmission and distribution systems.

Recognizing the need to attract foreign investment, Mexico is reversing previous energy policies and is now allowing limited opportunities for foreign investments in power generation, cogeneration and the transportation, storage and distribution of natural gas. A reform movement hopes to make significant legislative and constitutional changes in the electricity sector as well.[45]

The North American Free Trade Agreement (NAFTA) creates a unique context for implementing CDM projects between Canada and Mexico. Although controversial, NAFTA is the largest free trade agreement in the world. As such, NAFTA was designed to improve trade between Canada, the United States and Mexico by eliminating tariffs completely over several years and removing non-tariff barriers, such as quotas. Joining NAFTA was but one step in Mexico's long process of trade liberalization. As a result, and even despite the peso devaluation crisis of late 1994, trade between Canada and Mexico has increased, foreign investment has increased, and Mexico's economy is recovering and becoming more diversified. Although NAFTA was promoted as an environmentally friendly trade deal, critics feel it has provided few environmental benefits as Mexico industrializes, leaving ample room for CDM and other initiatives that reduce greenhouse gas emissions and improve Mexico's environmental record.[46]

The Centre for Global Studies at the University of Victoria is leading an international initiative to build Mexico's capacity to support investments in CDM projects that reduce greenhouse gas emissions. This project, which is supported by the highest levels of government in Mexico, Canada and the United States, will:

- Facilitate climate change mitigation using the CDM by establishing private and public capacity and eliminating barriers to mitigation projects

- Assist the Government of Mexico, the private sector and other stakeholders to assess the environmental, financial and social benefits of CDM
- Enhance the capacity of the Government of Mexico to seek, evaluate and approve CDM projects
- Support the establishment of institutional mechanisms that can inform and facilitate private sector project implementation
- Identify an initial set of CDM projects and support the private sector in its project development efforts.

For more information on Mexico, see the section on Mexican Actions to Facilitate the CDM, below.

International Markets

All developing countries are potential sites for CDM investments. The developing countries that will be most responsive are those that see CDM as augmenting their own sustainable development and economic objectives.

Of these, China, India and Brazil may offer the most significant early opportunities outside of North America. Together, these three nations account for 40% of the world's population and 18% of industrial CO_2 emissions.[47] Each of these countries has a rapidly growing population and a corresponding growth in energy consumption and emissions from burning fossil fuels. In just ten years, their economies could be 50-100% larger than today and their combined population increased by 250 million people. By this time, China will be emitting more greenhouse gases than the current largest emitter, the United States.

In most cases, developing countries have economic goals that are more important to them than environmental goals. China, for example, intends to double its Gross National Product (GNP) by 2010 and will rely heavily on developing fossil fuel energy sources, particularly coal, to do so.[48] Coal is abundant in both India and China, providing 65-75% of their energy supplies. Brazil relies primarily on hydroelectric power but increasing demands for energy are causing it to resort more to fossil fuels. Brazil's rapid deforestation is having a grave effect on the concentration of greenhouse gases in the atmosphere because carbon is released as the forests are burned to make way for development and the forests are no longer available as a carbon sink.

In Africa, coal and hydroelectricity are the primary sources of energy. Much needs to be done to reverse deforestation, increase energy efficiencies and convert to cleaner technologies. However, most African nations lack the private sector depth needed to encourage international CDM investments. As well, they lack the capacity needed to address many economic, technical and environmental issues.[49] Despite these barriers, African nations are eager to participate in CDM and have sought preliminary help in building awareness and capacity to make themselves more attractive to the CDM market.

Opportunities for CDM investments will cluster around projects that both reduce greenhouse gas emissions and address other pressing environmental issues, such as: poor air quality due to particulates; smoke fumes and urban smog; acid rain; soil and forest preservation; sanitation; and improved energy efficiencies. Switching power generation to alternative or renewable energy sources will be a significant market in the longer term, but high up-front costs for new technologies and the cheaper availability of fossil fuels, especially coal, may make efficiency improvements in current energy sources a higher priority in the short term. All countries also offer significant markets for using biomass as a fuel. If the CDM is defined at COP-6 so that it includes carbon sequestration through forestry, there could be a large market

for reforestation, silviculture and sustainable forestry projects in all developing countries.

Past Experience

Activities Implemented Jointly

Activities Implemented Jointly (AIJ) are an emissions trading mechanism between industrialized and developing countries under the first Conference of the Parties (COP-1) to the UNFCCC in 1995. AIJ was established as a pilot project to facilitate international cooperation on emissions reductions. As a demonstration project, it was used to assess the potential and pitfalls of jointly developed international projects that would reduce emissions in a host country for credit in the investing country. Unlike projects accepted under CDM, emissions reductions from AIJ projects were not credited against national emissions reduction targets.

In the past five years, about 100 AIJ projects were reviewed and accepted. Most of these projects were in Asia, Latin America and some formerly communist countries of Eastern Europe, known as countries with economies in transition. Few projects were undertaken in Africa.[50]During this time, these projects reduced greenhouse gas emissions by more than 67 million metric tonnes, a tiny fraction of what is required to slow global warming. These projects included fugitive gas capture, afforestation, energy efficiency, fuel switching, reforestation, renewable energy and reforestation. Of these, the reforestation projects reduced emissions most effectively by capturing carbon; they accounted for over half of the emissions reductions.

Now at the end of its five-year pilot phase, AIJ is being phased out. Some AIJ projects will cease, while others will be converted into CDM projects.[51] The major weakness with AIJ was its complete absence of incentives in the form of credits for actions taken to reduce emissions. As a result, only limited actions were undertaken. Although AIJ provides some lessons, opportunities for significant actions were lost as were many opportunities for learning about emissions reduction policies and the emissions crediting process.

Lessons Learned

- Incentives are more effective than penalties or mandatory contributions in achieving the desired emissions reductions and in fostering cooperation between industrialized and developing countries.
- Creation and ownership of credits must be clearly and legally defined.
- A third party must establish and verify baseline emissions to ensure they are not overstated to gain extra credits.
- Emissions reductions must be verified, certified and then monitored to ensure their reality and permanence.
- Regulations should be minimal and standardized wherever possible.
- Efforts should be made to ensure that CDM projects of all types are undertaken in all parts of the world, including Africa, to ensure that CDM benefits are as evenly distributed as possible.
- Because AIJ projects were not credited to emissions reduction targets, participation levels by most countries was low. CDM will overcome this difficulty by ensuring that certified emissions reductions are credited to investing nations.

Emissions Trading

Emissions trading is a market-driven means of lowering the cost of reducing greenhouse gas emissions. By putting a market value on

emissions reductions, emissions trading gives companies a positive incentive to reduce emissions. Emissions trading transfers certified emissions reduction credits from sellers who are able to reduce emissions cheaply to buyers who have only limited options or who would incur higher capital investment costs for reducing their own emissions relative to the cost of purchasable credits. In this win-win transaction, sellers make a profit and buyers are able to apply the credits to their emissions reductions targets and meet their own or regulated emissions reduction targets. Companies are also better able to promote economic efficiency and better resource planning.

Emissions traders have the most experience trading SO_2 emissions, which are governed by the Clean Air Act in the United States and administered by the Environmental Protection Agency. Under this legislation, electrical utilities must produce one SO_2 Emission Allowance for every tonne of SO_2 emitted. The goal of the legislation is to reduce annual SO_2 emissions by 10 million tonnes below 1980 levels over the program's life. By 2000, two million tonnes of NOx should also be reduced. Together, these reductions constitute the EPA's program to combat acid rain. SO_2 emitters receive permits, called Emissions Allowances, that allow them to emit specific quantities of SO_2. These permits can be sold, purchased or held, but at the end of each year each emitter must hold permits that at least equal its annual emissions. Utilities then have a choice of purchasing an Emissions Allowance for about US$200 each or paying a fine of about US$2000 per tonne of SO_2, facing stiffer allowance restrictions the next year and risking the imprisonment of company representatives.[52] With penalties for non-compliance far greater than the cost of complying, industry is economically motivated to participate. 445 coal-fired units at electricity producing plants participated in phase one of this program. In 2000, the program will be expanded to include oil and gas fired plants and will cover about 2000 units.

Other currently traded emissions include NO_2 at CAN$1500/tonne during ozone season and $150/tonne during non-ozone season. Preliminary carbon trading indicates the price for CO_2 may be anywhere from $2 to $20/tonne. In all cases, prices will fluctuate according to market supply and demand.

Emissions trading gives businesses greater flexibility in achieving their emissions reduction targets. Because this type of trading provides profits to sellers and reduces costs for buyers, businesses prefer this approach to legislation, which can be difficult and expensive to comply with and implement. As well, the uniform nature of legislation and its focus on point sources, rather than mobile and area sources, may not effectively address emissions created by certain sources or industry sectors. However, the extent to which industry will reduce emissions without legislation remains in question, as the most successful emissions trading market, SO_2, is largely due to legislation that enforces emissions limits and imposes penalties for non-compliance.

Canada does not currently have federal legislation that allows or prevents emissions trading, although it would be permitted under the pending Canadian Environmental Protection Act (CEPA). See sections on PERT and GERT for information on Canada's involvement in emissions trading.

Lessons of Emissions Trading

Some of the lessons learned from emissions reduction trading that could be applied to CDM:[53]

- Emissions trading creates a win-win situation for both buyers and sellers.

- A competitive, market-based emissions trading system leaves countries free to choose their own domestic policies for controlling GHG emissions.
- Flexible compliance reduces the costs of emissions trading and increases political and economic acceptability, thus ensuring that environmental benefits are gained earlier.
- Minimum cost emissions trading requires efficient trading services and effective monitoring, certification and enforcement authorities.
- Transaction costs can be reduced through high trading volumes.
- The source of CERs must be acceptable to both the buyer and seller.
- The price of CERs must be negotiated with cost control considerations in mind.
- Equity ownership of the CER must be firmly established.
- Contracts should be standardized as much as possible to minimize transaction costs.
- When international trades are conducted, close attention should be paid to different reporting practices.
- Visible commitment from all partners makes success more likely.

Canadian Actions to Facilitate the CDM

The Canadian Perspective

The federal government of Canada accepts its role in reducing greenhouse gas emissions and is in the process of researching the implications of the Kyoto Protocol and the costs and benefits of meeting the Protocol's emissions reduction target of 6% below 1990 levels set for Canada. Canada was one of the first nations to sign the Kyoto Protocol, yet its critics complain that the signing was merely a political gesture, particularly since Canada has been slower than other industrialized nations to take action to reduce greenhouse gas emissions in the spirit of the protocol. The federal government has not yet ratified the Kyoto Protocol and, although it has made no official statement to this effect, it appears that it does not intend to do so until the government is certain it can meet the binding legal obligations set out in the Protocol. No strict timetable has been established. Canada has no legislation governing greenhouse gas emissions, although Canada would be legally bound to honour emissions reductions targets expected in the Kyoto Protocol once the federal government has ratified it. Even if Canada ratifies the Protocol today, it will only be binding once 55% of greenhouse gas emitters have also ratified it.

The federal government expects the COP-6 negotiations in The Hague, November 13-24, 2000, to yield substantial progress toward resolving outstanding CDM issues noted above, as well as on other issues arising from the Kyoto Protocol. Canada is pushing for the early resolution of technical issues so that COP-6 has a strong foundation for making other important decisions. The government believes that the Kyoto mechanisms must be designed so that they maximize environmental benefits and minimize transaction costs. This is stressed because options to reduce greenhouse gas emissions must be attractive to industry, as well as environmentally effective.

Carbon Sequestration and Sinks

Although Joint Initiatives clearly allow carbon sequestration projects, the wording of the Kyoto Protocol is unclear regarding the inclusion of carbon sinks as eligible CDM projects. Countries in the European Union are lobbying hard in an attempt to ensure that carbon sequestration and sinks are not included within

the CDM. They intend to oppose carbon sequestration at the COP-6 negotiations in November, 2000. The Europeans take the general position that sinks are only short term, temporary solutions and are, therefore, invalid.

The federal government believes that carbon sinks, including forestry and agricultural soils, should be included among projects eligible for CDM. It takes the view that a wide definition of sinks should be used to maximize activities that remove CO_2 from the atmosphere. As it approaches the COP-6 negotiations, Canada will take the position that there should be consistency between provisions of the Protocol, meaning that all Kyoto Mechanisms should consider sink projects eligible for credit, and that sink definitions and accounting should be based upon sound science.

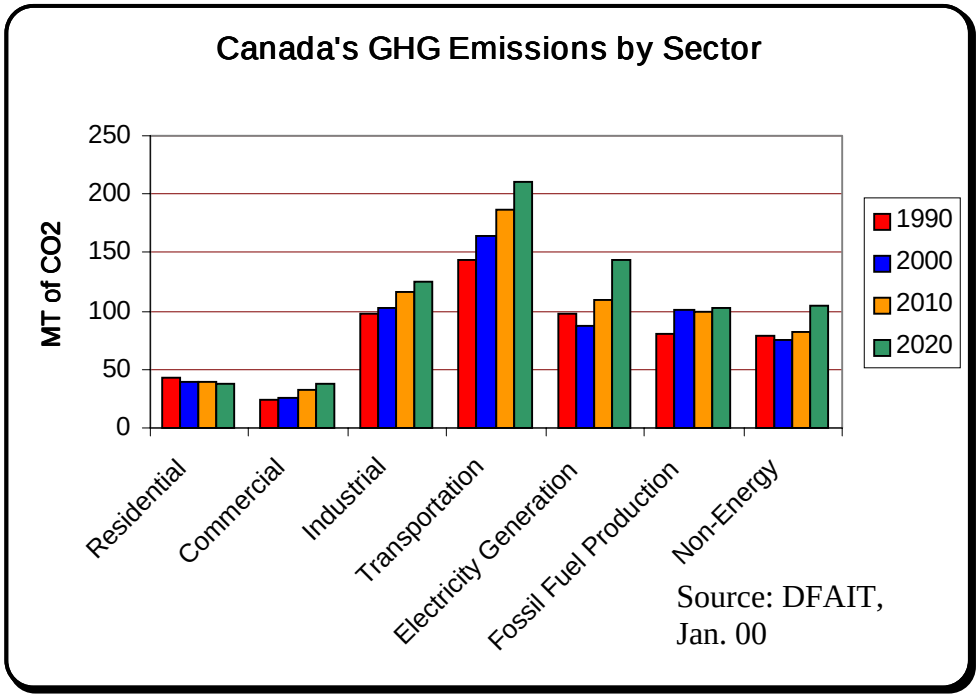
The federal government opposes a cap on the mechanisms because a cap would limit technological innovation and investment in developing countries. Canada also supports efforts to develop a capacity building plan that ensures all parties benefit from the Kyoto Mechanisms, rather than merely investors or the host countries.

Compliance

Canada's federal government supports the establishment of a governing body that would assess compliance with the emissions reduction targets set by the Kyoto Protocol. Such a body would focus on emissions monitoring and reporting, and would determine the consequences of non-compliance. Canada also believes that an appeals process should be explored.

Adaptation

The federal government believes that weather-related natural disasters will likely have a larger effect on developing countries than on industrialized ones. For this reason, Canada strongly supports the position that some of the proceeds of CDM projects should be used to assist vulnerable countries to adapt to the impacts of climate change, as per Article 12 of the Kyoto Protocol. Canada also wants to encourage the broadest possible global participation in achieving the Kyoto Protocol's greenhouse gas emission reduction targets, although it recognizes that industrialized nations must take the lead and bear most of the responsibility at this time. The federal government hopes that a capacity building plan will be one of the outcomes of COP-6 so that the efforts of developing countries to address climate change can be strengthened.



National Strategy Development

In 1998, Canada began efforts to develop a national climate change strategy. Canada is seeking the full participation of the provinces and territories to develop, implement and manage a national climate change strategy. In developing a national climate change strategy, no region of the country will be asked to bear an unreasonable burden of action. Sixteen expert committees, known as Issues Tables, were established in 1998 to report on various elements required to meet the targets set by the Kyoto Protocol.[54] These Issues Tables have prepared foundation papers describing the current state of each sector or issue. They are now in the process of finalizing or presenting option papers that present a range of short-term to long-term options for reducing emissions, as well as estimating their social, economic, environmental and health benefits. Based on this process and a review by a Joint Committee of federal and provincial energy and environment ministers, elements of the national strategy were scheduled to be outlined in the Spring 2000, with a draft strategy and first business plan expected by the Fall 2000. However, this schedule has not been met and has been extended indefinitely because the process has become bogged down.

Budget 2000

Canada's Budget 2000 will set aside $520 million over the next four years to address climate change issues, about half of what environmental lobbyists were hoping for. Canada has established a Sustainable Development Technology Fund, worth $100 million in 2000/01, to stimulate the development of new technologies that reduce greenhouse gas emissions, such as fuel cells and wind turbines. Research centres, the private sector and institutes will qualify for funding. The budget also provides $210 million over

three years for the Climate Change Action Fund. The Green Municipal Investment Fund will lend $100 million to municipalities to support projects that reduce waste and air and water pollution. It must be noted that not all of these funds will be used to reduce greenhouse gas emissions. The budget also set aside $60 million over six years for the Canadian Foundation for Climate and Atmospheric Sciences to create a cross-Canada network of institutes and universities researching climate change. Most pertinent to the CDM, the budget allots $100 million to assist developing countries reduce greenhouse gas emissions. These funds are not specifically for CDM projects, but CDM projects may be included. At this time, it is unknown how these funds will be allocated through various government agencies, although they may be administered through CIDA as Official Development Aid.

Climate Change Action Fund

Canada established the Climate Change Action Fund (CCAF) to help the country meet the commitments made in Kyoto. The 1998 budget allocated $150 million over three years to support the development of an implementation strategy to meet Canada's Kyoto Protocol commitments and to support projects that take early action to reduce greenhouse gas emissions. The CCAF provides funds in four areas: research, technology, analysis and public education. As of January 2000, the fund had committed $91.1 million to 295 projects. The budget for the year 2000 increased total CCAF funding to $210 million.

Technology Early Action Measures

Technology Early Action Measures (TEAM) is a component of the CCAF that offers support to federal technology funding projects that reduce greenhouse gas emissions. TEAM supports early action measures that will measurably reduce greenhouse gas emissions by 2004 and provide additional long-term benefits. Eligible emissions reduction projects will partner with Canadian industry, support community-based project implementation and transfer Canadian emissions reduction technologies to other countries, especially developing nations. TEAM projects will be approved and delivered through existing federal government programs, such as those supported by Natural Resources Canada, Environment Canada, Industry Canada, the National Research Council, the Canadian International Development Agency and regional development agencies. Funding for TEAM accounts for more than $50 million of the CCAF budget.

Centre for Global Studies

The Centre for Global Studies (CFGS) is a policy centre that seeks to contribute to public awareness and the policy process on issues of sustainability, global governance and security in our interdependent world. Located at the University of Victoria, the Centre advises decision-makers and the general public on the management of global issues and global governance. It works actively with national governments, as well as the United Nations and other international organizations, to initiate policy discussions on key issues of global concern, such as climate change. As an action-oriented institution, the Centre acts as an implementing agency on specific global initiatives.

In Canada, the Centre is promoting an understanding and awareness of the Clean Development Mechanism. The Centre, with support from the MacArthur Foundation, is leading a CDM project that will build Mexico's capacity to host climate-friendly sustainable development projects eligible for CDM credits. To this end, the Centre is leading and managing a multi-disciplinary team from Canada, Mexico and the United States to create an enabling environment that will be receptive to CDM

investments. This project has the support of the highest levels of government in Canada, Mexico and the United States.

CDM/JI Office

Canada's federal government has established the Clean Development Mechanism/Joint Implementation Office within the Department of Foreign Affairs and International Trade to build Canada's capacity for implementing the CDM and Joint Initiatives. The Office will be the first stop for companies, agencies and NGOs wishing to gain access to federal government programs, expertise and resources. It will help match Canadian businesses and agencies that wish to invest in CDM or JI projects with potential projects in host countries. In addition to offering technical guidance, the Office will also assist Canadian investors to gain host country approval and help them explore strategic cooperation arrangements with host countries. The CDM/JI office works closely with the federal government programs and agencies involved in climate change issues, including the Climate Change Secretariat, Environment Canada, Natural Resources Canada, the Canadian International Development Agency, Industry Canada, and Agriculture and Agri-Food Canada.

Canadian International Development Agency

The Canadian international Development Agency (CIDA) is lead agency for delivering Canada's official development assistance program. It coordinates the distribution of more than $2 billion in foreign aid annually to countries around the globe and works with public and private partners to provide goods, services and the transfer of knowledge and skills to more than 100 developing countries. Its primary mission is to reduce poverty and promote sustainable development. Its top priorities are to assist developing countries build their capacity and governance mechanisms to support environmentally sound economic development.

In Budget 2000, the federal government allotted $100 million over four years to help developing countries reduce their greenhouse gas emissions. These funds may be available for CDM activities through CIDA, although, as of April 2000, these details have not yet been worked out.

Pilot Emissions Reduction Trading Project

The Pilot Emissions Reduction Trading Project (PERT) is an industry-led demonstration project to evaluate voluntary emissions reduction trading as a means of reducing greenhouse gases and air pollution in Ontario. Since 1996, PERT has been assessing the environmental and economic benefits of emission reduction trading in Ontario, particularly in the Windsor-Quebec corridor. Initially focussed on air pollutants that create smog, PERT's mandate has been expanded to include the greenhouse gases considered in the Kyoto Protocol. As the first emissions trading pilot project in Canada, the goals of PERT include:

- exploring mechanisms to support emissions trading
- studying the compatibility of emissions reduction trading with Ontario's legislative and regulatory framework
- studying the creation, trading and use of emissions trading credits, and
- designing a flexible, easy to use trading system for Ontario.

PERT pilot projects encourage participating companies to voluntarily reduce their emissions of greenhouse gases and other air pollutants more quickly than laws or regulations require.

Greenhouse gas reductions from all sources, both mobile and stationary, qualify as PERT projects as long as they are real, quantifiable, surplus to current emissions reduction activities and credited only once. As a result, local communities will benefit from cleaner air; globally, fewer greenhouse gas emissions will enter the atmosphere. The companies involved will earn emissions reduction credits that can be applied against future voluntary reduction commitments or sold to other companies.[55] Ten percent of the credits are permanently retired to ensure that the environmental benefit resulting from the pilot projects remains intact.

PERT was modeled on similar emissions trading programs in the United States that are currently used to trade nitrous oxide (N_2O) and volatile organic compounds (VOCs).[56] About 20 companies are currently involved in PERT.

Greenhouse Gas Emissions Trading Pilot

The Greenhouse Gas Emission Reduction Trading (GERT) pilot project is a demonstration project that will provide practical experience in greenhouse gas emissions reduction trading. Established in 1998 as a partnership between industry and government, GERT is providing knowledge about the environmental and economic benefits of emissions trading, as well as practical, technical, administrative and legal knowledge about how to implement an emissions trading system in the future.

Projects eligible for inclusion in GERT must reduce emissions through fuel-switching or improving energy efficiencies, avoiding emissions increases by using renewable energy sources or sources emitting less carbon, or absorbing or sequestering emissions. Projects are submitted to a technical committee to ensure they create real, measurable and verifiable emissions reductions in addition to those required by law and to ensure that they follow other rules established in this pilot program.

GERT projects can be located anywhere in the world, but either the buyer or the seller must be Canadian. If a project is located outside Canada, the buyer can report the emissions reduction for credit only in Canada, not in the host country as well. Also, international agreements, such as the CDM, will govern the crediting of the emissions reduction for compliance purposes. To date, GERT has matched 5 pairs of buyers and sellers.

Voluntary Challenge and Registry Inc.

The Voluntary Challenge and Registry (VCR) is an association of about 800 Canadian companies and organizations, representing most of the companies that emit greenhouse gases in Canada. Originally a government incubated program established in 1994, the VCR is now a private-public partnership that promotes and assesses the effectiveness of a voluntary approach to reducing greenhouse gas emissions to address climate change. It has a mandate to record and document industry participation in emissions reduction, development of action plans, best practices and achievements. It also promotes these achievements and facilitates the transfer of knowledge throughout the association so that participants can adopt best practices more easily. The VCR is based on the premise that voluntary industry participation in greenhouse gas emissions reduction is preferable to compliance with mandatory regulations and legislation.

Participants are able to register and submit action plans on-line. As of March 2000, 687 action plans had been registered with the VCR and 260 companies had also submitted progress reports.

American Actions to Facilitate the CDM

American Perspective

The United States is a strong supporter of the CDM because it is a market-driven mechanism that lowers the cost of reducing emissions and increases the flexibility allowed to achieve these goals. In particular, the United States supports the CDM because it increases the participation of developing countries in the reduction of greenhouse gas emissions. The United States insists that developing countries must have meaningful involvement in emissions reductions before it will ratify the Kyoto Protocol and has passed Senate Resolution 98 to ensure by law that the Protocol is not ratified until this occurs. The United States views the CDM positively as a mechanism that will move developing countries toward the meaningful participation in reducing greenhouse gas emissions.

Overall, the American response to climate change initiatives is to prefer a market-driven approach that uses incentives and voluntary participation rather than legislation and regulation. For example, the United States passed Senate Bill 547, the Credit for Voluntary Reduction Act (1999) independent of the Kyoto Protocol to recognize voluntary reductions of greenhouse gas emissions. Industry and business clearly prefers market forces over legislation, while environmental advocates argue that this voluntary approach is ineffective and unenforceable.

This voluntary approach is reflected in federal financial management as well. Tax incentives have played a major role in the United States' energy policy for many years and have played a major role in allowing new technologies to gain market penetration. Current incentives are small and short-lived compared to those used in the 1970's. Incentives are available for energy efficient homes and buildings, electric, fuel cell and hybrid vehicles, cogeneration and renewable electricity generation.

The United States' budget for the year 2000 requests more than $4 billion for programs related to climate change. Of this total, $1.8 billion is earmarked for tax incentives, research and development, efficiency standards and the Climate Change Technology Initiative (CCTI). The CCTI is primarily a tax incentive or credit program encouraging the use of low emissions technologies.

Emissions trading and initiatives such as the CDM, although not tax incentives, fit well with the tax incentive paradigm since they are market-driven mechanisms to reduce greenhouse gas emissions rather than 'command and control' regulations that require industries to meet mandatory emissions reduction targets. Even though the United States' Congress has not ratified the Kyoto Protocol and will not do so until developing countries have meaningful participation in emissions reduction, the administration acts as if the protocol has indeed been ratified, strongly supporting emissions reduction measures. Government agencies, such as USAID and NREL are particularly active in supporting global climate change activities, especially in countries like Mexico.

The Technology Cooperation Agreement Pilot Project

The Technology Cooperation Agreement Pilot Project (TCAPP) is an American initiative that establishes voluntary partnerships with developing countries to help them design and implement actions that will attract investment in clean energy technologies and meet their economic and sustainable development goals. TCAPP works strategically and collaboratively with developing countries to spur private

investment in clean energy, build sustainable markets and establish a model for international technology transfer under the UNFCCC.

TCAPP has projects around the world, including Mexico, Brazil, China, the Philippines, South Africa and Egypt. It was established in 1997 by the US Agency for International Development (USAID), the US Environmental Protection Agency (USEPA) and the US Department of Energy (USDOE).

Mexican Actions to Facilitate the CDM

As a developing nation, Mexico has signed but not yet ratified the Kyoto Protocol and is not bound by its emissions reduction targets. Although it is in the process of designing an environmental policy somewhat similar to the American Environmental Protection Act, Mexico is still in the early stages of developing the capacity required to implement measures to reduce greenhouse gas emissions effectively. Mexican environmental policy strongly advocates the use of forestry and agriculture to capture greenhouse gas emissions.

Mexico has a history of policies that support renewable energy and energy efficiency, although these projects have been sporadic because of a lack of infrastructure and capacity. Among the notable projects are those done in cooperation between the Mexican National Commission for Energy Conservation (CONAE) and the American Technology Cooperation Agreement Pilot Project (TCAPP). Among these projects is the Efficient Lighting Program that reduced energy use in lighting systems by 20% in 1000 federal government buildings. TCAPP and CONAE are also working with Mexico to establish a Solar Water Heating Program that will heat water for houses in Mexico City.

Mexico strongly supports the idea of the Clean Development Mechanism. The Institute Nacional de Ecologia (INE) is currently working with the Centre for Global Studies at the University of Victoria to develop its capacity in this area. Working with the Centre for Global Studies, Mexico will be moving as quickly as possible to establish its public and private capacity and to eliminate barriers to the development of CDM projects. This multilateral project will enable Mexico to:

- analyze the costs and benefits of CDM and the key CDM issues
- establish an institutional structure to promote, process, implement and review CDM projects
- develop a strategy for identifying and soliciting CDM projects
- strengthen collaboration between governments, business and other stakeholders
- establish baselines for approving and reviewing projects
- develop monitoring, verification and certification capabilities, and
- develop its legal capabilities.

As these capabilities fall into place over the next couple of years, Mexico will have the investment environment capable of launch and support a full-scale CDM program.

International Actions to Facilitate the CDM

Prototype Carbon Fund

The World Bank launched the $150 (U.S) million Prototype Carbon Fund (PCF) on January 18, 2000 to act as a catalyst for the emissions reduction market. Beginning in April 2000, the PCF will invest in emission reduction projects in developing countries and in countries

with economies in transition, such as formerly communist countries. The PCF will function somewhat like a mutual fund. Contributions made by the private sector and governments will be invested in CDM and JI projects to reduce greenhouse gas emissions as described in the Kyoto Protocol. Investors will receive a pro rata share of verified and certified emissions reductions that can then be applied against emissions reduction targets set by the Kyoto Protocol. Although it is known as the Prototype Carbon Fund, it will be a financial mechanism for investing in projects that reduce emissions of all six greenhouse gases identified in the Kyoto Protocol.

The Prototype Carbon Fund will fund about 20 medium scale emissions reduction projects around the world. It will invest in emissions reduction projects that can be achieved at reasonable cost and independently validated. Most of these projects will focus on renewable energy development, either through switching fuel sources, changing to cleaner technologies, or a combination of both. The PCF expects to achieve five million tonnes of carbon emission reductions, or almost 20 million tons of CO_2 emissions reductions, if the fund achieves its $150 million limit and if carbon emissions have a value of about $20/tonne or CO_2 emissions have a value of $5/tonne.[57]

The PCF will support both CDM and JI projects around the world. About 20 projects in developing countries and countries with economies in transition will be selected . The portfolio will be diversified so that it is balanced between CDM and JI projects, geographic regions and different project types. Investments will be distributed so that no project receives more than 10% of the fund's assets, and no host country receives more than 20% of the funds' assets. To distribute investments across geothermal, wind, solar and small-scale hydro energy projects, a maximum of 25% of the fund's assets will be invested in any single type of technology. Land use projects will be limited to 10% of the funds and will not be located in a developing country until the issue of the eligibility of greenhouse gas sinks for CDM credits is resolved. All projects must be consistent with the Kyoto Protocol's rules and procedures, relevant national criteria for Kyoto Mechanisms projects, and the PCF's objectives and operating principles, among other criteria.[58]

The first project funded by PCF will be a solid waste management project in Liepaja, Latvia. PCF financing will allow Latvia to replace open municipal waste dump sites with sanitary landfills. Methane from the landfill will be captured through energy cell technology and used to replace fossil fuel generated electricity for the Latvian power grid. As a result, 90% of municipal waste will be recycled and the lifetime of the landfill extended indefinitely, waste treatment will be lower cost, land use will be minimized and the residue will be used for compost. In return, PCF investors will gain the rights to emission reductions based on a negotiated price that includes a profit and a payment schedule acceptable to all parties.

As a prototype fund, the PCF is the first international fund of its kind. The World Bank intends the fund to serve as a stimulus to emissions reduction investments and hopes that it will act as just one of many such funds in the market. This pilot fund will operate on a 'learning by doing' basis and will demonstrate how public and private agencies can participate as partners in the emissions reduction market. The PCF will collect, analyze and distribute this knowledge to governments, the private sector, NGOs and other stakeholders with the intent that the most successful and cost-effective aspects of the PCF can be replicated in other funds. As a practical learning experience, the PCF will contribute to the ongoing negotiation of rule and procedures for funding project-based emissions reductions projects. At this time, the World Bank anticipates that this prototype fund

will conclude in 2012 and that it will be replaced by funds set up by host countries, commercial and development banks and other agencies once they have developed confidence in the emissions trading market.

All World Bank member countries and any company or agency located in these countries can participate in the PCF. Governments are limited to investing US$10 million and companies are limited to US$5 million. To date, Finland, the Netherlands, Norway and Sweden, Canada and nine utilities and trading houses[59] have committed US$100 million to the PCF, which is capped at US$150 million. Canada announced in its most recent budget that it is committing $15 million (US$10 million) to the fund.

United Nations Conference on Trade and Development

The United Nations Conference on Trade and Development (UNCTAD) is the primary agency of the United Nations for trade and development for developing countries and countries undergoing economic transition. UNCTAD has a mandate to assist countries to face the challenge of globalization. In particular, it has been studying the issue surrounding greenhouse gas emissions trading for the past decade. To prepare for the implementation of the Kyoto Protocol and the Kyoto Mechanisms, including CDM, UNCTAD has established the International Emissions Trading Association (IETA) to provide full emissions trading back-up services, including internet trades and certification.

United Nations Environment Program

The United Nations Environment Program (UNEP) coordinates the environmental work of the United Nations. It plays a unique role as an advocate for environmental concerns within the international system, forming partnerships with governments, non-governmental agencies, the private sector, the scientific community, national and regional bodies, women and youth. It serves as a catalyst to the sustainable development agenda around the world. UNEP has a very broad international mandate that includes everything from the safe use of biotechnology to disaster relief. In the area of climate change, UNEP is responsible for implementing the World Climate Assessment and Response Strategies Program (WCIRP) as part of the international World Climate Program. It supports activities that assess the impacts of climate change and identifies responses to reduce global vulnerability to climate change. As a co-founder of the Intergovernmental Panel on Climate Change (IPCC), UNEP is responsible for assessing the international state of the climate.[60] UNEP has been active since it was established in 1972 as a result of the Stockholm Conference on the Human Environment.

United Nations Industrial Development Organization

The United Nations Industrial Development Organization (UNIDO) is an international organization operating under the auspices of the United Nations that develops industrial capacity in developing countries. UNIDO has been providing technical assistance, training, technology transfer and financing to small and medium-scale industrial projects since 1966. It currently invests more than $150 million annually to oversee 425 projects in 62 developing countries. UNIDO is actively involved in climate change mitigation through its work to improve the environmental infrastructure of developing countries. Its activities are guided by national industrial priorities to provide energy at an affordable cost. UNIDO assesses industrial energy needs, identifies market barriers and opportunities and

recommends economic and regulatory policies required to overcome barriers and create opportunities. It also helps countries and industries develop energy efficiency programs to reduce greenhouse gas emissions and ensure energy security.

Global Environment Facility

The Global Environment Facility (GEF) is an international mechanisms that funds projects that benefit the global environment. First discussed by the Brundtland Commission, GEF was launched in 1990 by the World Bank, the United Nations Development Program and the United Nations Environment Program. GEF has a mandate to transfer funds and technology to developing countries and to countries with economies in transition on a grant or concessional basis. It provides funds for incremental project costs to complement regular development assistance so these projects can address global environmental concerns. Established before the UNFCCC and the Kyoto Protocol, GEF has been designated as a primary financial mechanism for implementing the Kyoto Protocol, including CDM.

In addition to climate change projects, GEF covers three main areas: biological diversity, international waters, and ozone layer protection. At the end of 1996, climate change activities accounted for about 38% of the gross funds allocated in the GEF portfolio. All GEF projects must be country-driven and must support sustainable development priorities. GEF also supports enabling activities that help countries develop the institutional capacity for implementing environmentally sound policies. Besides directly providing grants, the GEF facilitates other bilateral, co-financing, and parallel financing arrangements. It also promotes the leveraging of private-sector participation and resources.

The GEF will advise the Prototype Carbon Fund to avoid competition between the GEF and the PCF. The two mechanisms differ in that the PCF's primary goal is to fund projects that create emissions reductions and to serve as a demonstration about how a high volume flow of private and public funds can reduce greenhouse gas emissions. The GEF provides grants and emphasizes a strategic approach to reducing greenhouse gas emissions. The PCF relies on both private and public funds to generate CERs while the GEF relies solely on public funds donated by member governments to fund incremental project costs[61].

GEF funds are raised through voluntary contributions from member governments of the United Nations. For the four-year period beginning in 1998, GEF will allocate $2.75 billion.

Other International Initiatives

The International Petroleum Exchange in London is establishing an emissions trading centre. The European Commission is currently developing guidelines for emissions trading to prevent market distortions. Large oil and gas companies, such as Shell Energy and British Petroleum have developed internal mechanisms for emissions trading between their international divisions.[62]

Some Other Resources: Non-Governmental Organizations

Hundreds of non-governmental agencies exist around the world to provide public information on climate change and advocate for action. Of these, five have been selected for mention because of their effectiveness and their potential to provide information and assistance on Clean Development Mechanism projects.

International Institute for Sustainable Development

The International Institute for Sustainable Development promotes the transition toward a sustainable future by advocating policy recommendations on international trade and investment, economic instruments, climate change, measurement and indicators, and natural resource management. The institute reports on international negotiations and brokers knowledge gained through collaborative projects with global partners. Its strategic priorities are to promote government expenditure and taxation policies that encourage the transition to sustainable development, design and advocate trade and investment policies that advance sustainable development, promote creative responses to climate change, encourage sustainable agriculture and natural resource use and measure international progress toward sustainable development.

International Emissions Trading Association

The International Emissions Trading Association (IETA) is an independent, non-profit organization that is committed to establishing effective greenhouse gas emissions trading systems for use by businesses. IETA views its mission as securing the development of market-based trading systems that are fair, open, efficient, accountable and consistent across national boundaries. Membership in IETA is open to all companies, business organizations and national and regional trading associations around the world that have an interest in promoting GHG emissions trading at the international, national and regional levels. As a non-profit organization, IETA does not participate directly in commercial activities.

Pembina Institute

The Pembina Institute is an activist public interest organization and non-profit consulting group focusing on work in energy and the environment, environmental economics and sustainable resource management. As an independent, grassroots think tank, the Pembina Institute conducts multi-disciplinary research to provide detailed knowledge and thorough analysis as a basis for policy development and action for change. The Pembina Institute has done a significant amount of independent research in the areas of climate change policy and the Clean Development Mechanism. In addition to research and analysis and consulting to the Secretariat to the UNFCCC and all levels of government in Canada as well as leading environmental groups, the Pembina Institute works directly with many leading Canadian corporations to help them develop climate change response strategies and action plans. Based in Drayton, Alberta, the institute has satellite offices in Calgary, Edmonton, Victoria and Vancouver.

International Council for Local Environmental Initiatives

The International Council for Local Environmental Initiatives (ICLEI) is an international association of local governments and associations that are building a worldwide movement to improve global environmental

conditions through the cumulative impact of local actions.

The ICLEI is currently running two international campaigns: the Local Agenda 21 Initiative that works with local governments to develop and test sustainable development plans; and the Cities for Climate Protection campaign (CCP), a global campaign to reduce greenhouse gas emissions by reducing energy consumption. The Cities for Climate Protection Campaign includes more than 250 municipalities that account for about 5% of global greenhouse gas emissions, but hopes to recruit cities that account for about 10% of emissions. The CCP offers technical assistance projects that finance and implement energy efficiency measures, waste management programs, land-use planning and transportation strategies that reduce greenhouse gas emissions.

The ICLEI operates worldwide, with offices in Asia, Latin America and Africa, as well as Europe and the United States. Its head office is in Toronto.

Greenhouse Emissions Management Consortium

The Greenhouse Emissions Management Consortium (GEMCo) is a not-for-profit corporation formed by Canadian energy companies to demonstrate industry leadership in developing market-based approaches to managing greenhouse gas emissions. Companies involved in GEMCo share the goal of developing investment opportunities that turn environmental challenges into competitive advantages. Together, they identify and implement and demonstrate greenhouse gas emission offset projects and establish commercial mechanisms for emissions offsets investments and emissions trading. Members assist each other to develop their capacity to identify and implement emissions reductions projects. GEMCo has been at the forefront in supporting carbon sequestration through sustainable agriculture. GEMCo is not explicitly involved in the CDM at this time, but has invaluable expertise in emissions management.

Charitable Foundations and Granting Agencies

Many charitable foundations and granting agencies in the United States and Canada fund projects and initiatives concerning climate change. Several have a specific interest in international trade and financial mechanisms, such as CDM, as they relate to climate change. The following is a short description of a few granting agencies that may support CDM initiatives or projects related to CDM as an instrument of finance and public policy. The following short list is not intended to be exhaustive, but merely a sampling of granting agencies known to have an interest in financial mechanisms associated with climate change.

United Nations Foundation

The United Nations Foundation is a granting agency operated under the auspices of the United Nations. It focuses on four key global issues: the environment, children's health, women and population, and humanitarian causes. The UN Foundation has a mandate to assist the United Nations in providing a global forum for environmental problems that must be solved through global action. The Foundation is particularly interested in seeking innovative ways to implement international agendas arising from UN conferences and conventions, including the UN Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity. In the area of climate change the UN Foundation focuses its attention

on market mechanisms, such as the CDM, and promoting sustainable energy technologies.

Pew Charitable Trusts

The Pew Foundation is a private American foundation that funds international projects on environmental issues, health and human services, education and public policy, as well as other themes. It has long been actively involved in supporting initiatives to mitigate climate change. In particular, it supports projects that reduce greenhouse gas and ozone-depleting emissions through policy work promoting the adoption of federal and state electrical utility regulations that support investments in energy-efficient and renewable technologies. Projects that reduce emissions from electric utilities through applied research or restructuring the electric power industry are welcomed. The Pew Foundation has been particularly active in exploring financial mechanisms that will encourage Mexico to develop clean energy policies and strategies.

John D. and Catherine T. MacArthur Foundation

The John D. and Catherine T. MacArthur Foundation is a private grantmaking institution in the United States that funds projects around the world, including Canada. The foundation focuses on two integrated programs: 1) Global Security and Sustainability and 2) Human and Community Development. The Global Security and Sustainability program is particularly interested in supporting projects that integrate environmental sustainability with security issues. It supports innovative research and training and the development of new institutions for cooperative action. The Foundation has been among the most active in supporting the CDM.

Charles Stewart Mott Foundation

The Charles Steward Mott Foundation fund projects four thematic areas, including the environment and poverty. As it relates to the CDM, the Mott Foundation is particularly interested in funding projects that contribute to the reform of international finance and trade, particularly in the United States, Canada, Latin America and Japan. This program supports projects that will re-orient international finance and trade to sustainable development through capacity building, policy reform and developing new approaches to doing business. It is very interested in innovative initiatives leading to systemic change or shifts in public policy, programs that can be replicated in other communities, local solutions and the promotion of environmental diversity.

Stepping into Action

Clearly, much needs to be done before businesses and nations are willing to move forward with the Clean Development Mechanism.

On an international level, outstanding Clean Development Mechanism issues must be resolved and defined at the COP-6 meeting in The Hague in November, 2000. All national governments participating in negotiations must work to define their national interests and policies and develop their negotiating strategies to achieve their desired outcomes.

Developing countries need to analyze their potential for CDM projects, set their emissions reduction priorities and develop policies to allow timely action on approving and implementing projects. Further, they must focus on building their capacity to host CDM projects by developing the necessary infrastructure to set criteria for projects, to attract investment interest, to filter and evaluate proposed projects

and their local and regional impacts, and to monitor and verify emissions reductions.

Companies wishing to invest in CDM projects must first develop a corporate plan for managing their greenhouse gas emissions, and then develop rationales, policies and priorities for investing in projects that would provide CERs. They must identify, research and assess potential projects according to project type, geographic region and the trading system involved, in addition to assessing the contribution these projects will make toward their corporate goals and their need for CERs. Multinational corporations can establish CDM initiatives within their climate change action plans by supporting CDM projects within and between their own subsidiaries to earn emissions reduction credits and to learn about how CDM works by implementing it within the corporate family.

Ongoing CDM linkages and partnerships must be created between industrialized and developing countries between appropriate levels of government, financial resources, industrial participants, monitoring and certification agencies and other stakeholders. To begin, bilateral arrangements between pairs of industrialized and developing countries, such as Canada and Mexico, could accelerate both action and learning about emissions reductions through the CDM.

Representatives of all levels of government, potential investors, industries with an interest in reducing their greenhouse gas emissions, clean technology industries, non-governmental organizations and other key stakeholders need to become informed about CDM and regularly kept updated about progress in implementing it.

Act Now

The Clean Development Mechanism represents a significant opportunity for industrialized countries to invest in low-cost emissions reductions projects that will assist them in meeting their emissions reduction target as established by the Kyoto Protocol. For developing countries, the CDM represents an opportunity to participate in the global effort to minimize climate change while attracting investment in clean technologies that will meet national sustainable development objectives. Certainly, there are risks, as there are with all new business ventures. But CDM opportunities can be identified now and initial policies can be set. Those who act early to develop projects will be the first to realize the corporate benefits of participation because the Clean Development Mechanism represents the best opportunity available for industrialized and developing countries to work together in an unprecedented way to address the negative impacts of climate change.

Article 12 of the Kyoto Convention

1. A clean development mechanism is hereby defined.

2. The purpose of the clean development mechanism shall be to assist Parties not included in Annex 1 in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.

3. Under the clean development mechanism:

(a) Parties not included in Annex I will benefit from project activities resulting in certified emission reductions; and

(b) Parties included in Annex I may use the certified emission reductions accruing from such project activities to contribute to compliance with part of their quantified emission limitation and reduction commitments under Article 3, as determined by the Conference of the Parties serving as the meeting of the Parties to this Protocol.

4. The clean development mechanism shall be subject to the authority and guidance of the Conference of the Parties serving as the meeting of the Parties to this Protocol and be supervised by an executive board of the clean development mechanism.

5. Emission reductions resulting from each project activity shall be certified by operational entities to be designated by the Conference of the Parties serving as the meeting of the Parties to this Protocol, on the basis of:

(a) Voluntary participation approved by each Party involved;

(b) Real, measurable, and long-term benefits related to the mitigation of climate change; and

(c) Reductions in emissions that are additional to any that would occur in the absence of the certified project activity.

6. The clean development mechanism shall assist in arranging funding of certified project activities as necessary.

7. The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, elaborate modalities and procedures with the objective of ensuring transparency, efficiency and accountability through independent auditing and verification of project activities.

8. The Conference of the Parties serving as the meeting of the Parties to this Protocol shall ensure that a share of the proceeds from certified project activities is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation.

9. Participation under the clean development mechanism, including in activities mentioned in paragraph 3(a) above and acquisition of certified emission reductions, may involve private and/or public entities, and is to be subject to whatever guidance may be provided by the executive board of the clean development mechanism.

10. Certified emission reductions obtained during the period from the year 2000 up to the beginning of the first commitment period can be used to assist in achieving compliance in the first commitment period.

Glossary

Activities Implemented Jointly (AIJ) are pilot projects for emissions trading between industrialized and developing countries established under the first Conference of the Parties (COP-1) to the UNFCCC in 1995. As a demonstration project, it was used to assess the potential and pitfalls of jointly developed international projects that would reduce emissions in a host country for credit in the investing country. Unlike projects accepted under CDM, emissions reductions from AIJ projects were not credited against national emissions reduction targets. Most AIJ is being phased out or converted to CDM.

Additionality is the reduction of greenhouse gas emissions over and above a baseline and that would not occur otherwise without the implementation of the project.

Annex 1 Countries are industrialized countries that are trying to reduce their greenhouse gas emissions voluntarily to a percentage below 1990 levels in the UNFCCC. The countries include all OECD countries that were members in 1992. Very similar to Annex B countries. See Annex B Countries and OECD.

Annex II Countries are the same industrialized countries as Annex I with the exception of the 11 Countries in Economic Transition.

Annex B Countries are industrialized countries listed in the Kyoto Protocol that have committed to reducing their GHG emissions. Annex B consists of all countries listed in Annex I of the UNFCCC, except Turkey and Czechoslovakia. New countries include Croatia, the Czech Republic, Liechtenstein, Monaco, Slovakia and Slovenia. Non-Annex I countries can get on the Annex B list by committing to an emissions reduction target.

AOSIS. The Alliance of Small Island States is a group of 42 island and coastal nations vulnerable to a rise in sea levels because their land masses are close to sea level. These nations share public policy positions on climate change. They include: American Samoa, Antigua and Barbuda, Bahamas, Barbados, Belize, Cape Verde, Comoros, Cook Islands, Cuba, Cyprus, Dominica, Federated States of Micronesia, Fiji, Grenada, Guam, Guinea-Bissau, Guyana, Jamaica, Kiribati, Maldives, Malta, Marshall Islands, Mauritius, Nauru, Netherlands Antilles, Niue, Palau, Papua New Guinea, Samoa, SoaTome and Principe, Seychelles, Singapore, Solomon Islands, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Tonga, Trinidad and Tobago, Tuvula, U.S. Virgin Islands and Vanuatu.

Carbon Sequestration. Capturing carbon in a sink, such as the ocean, forests or soils to keep the carbon from entering the atmosphere as CO_2 or CO.

Certified Emissions Reductions (CERs) or Certified Emission Reduction Units (CERUs) are verified units of greenhouse gas reductions from emissions reduction or sequestration projects certified under the Clean Development Mechanism.

Clean Development Mechanism (CDM) is a market-driven emissions trading mechanism between industrialized and developing countries. It allows developed countries to invest in low-cost emissions reduction projects in developing countries and to receive credit for the emissions reductions that result.

Climate Change is an alteration in the primary features of the global atmosphere. It includes changes to the mean global temperature of the atmosphere as well as other weather patterns,

such as the frequency and intensity of storms, caused by changes to the concentration of greenhouse gases in the atmosphere.

Global Warming is the increase in the mean global temperature of the atmosphere. It is a subset of climate change.

Greenhouse gases (GHG): The six greenhouse gases targeted by the Kyoto Protocol are:

- Carbon dioxide (CO_2) is released by burning fossil fuels and decay. It is considered the main contributor to global warming.
- Nitrous oxide (N_2O) is released by burning fossil fuels and organic materials but comes mostly from soils and the oceans. Present in low concentrations, it enters the atmosphere primarily through soil cultivation and the use of fertilizer.
- Methane (CH4) is produced when organic materials in wetlands, rice paddies, landfill sites and animal feces decay in an oxygen-free environment.
- Perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) are humanly created gases used for manufacturing and as propellants.

In addition to the gases being reduced under the Kyoto Protocol, commonly occurring gases, such as water vapor (H_2O) and naturally occurring ozone (O_3).

Commitment Periods are the 5-year periods during which GHG emissions reduction targets are to be met, averaged out over the five years. The first commitment period is 2008-12.

Conference of Parties (COP) is the supreme body of the UN Framework Conventon on Climate Change. Meeting yearlyl, COP promotes and reviews the implementation of the Convention and

Countries with Economies in Transition are formerly communist countries that are in the process of moving to a market economy. They are classed with EU, Japan and the U.S. as Annex I parties to the UNFCCC. They face smaller emissions reductions targets than industrialized countries.

Developing Countries: Also known as Less Developed Countries (LDC) or popularly as Third World Countries, developing countries are becoming industrialized but lack resources or infrastructure to fully industrialize at this time.

Emissions Trading is a market-led, incentive-based mechanism where either credits or permits are traded like a commodity.

Fossil fuels are energy sources, such as coal, petroleum and natural gas, that have been created through by pressurizing dead organic materials over time. They are high in carbon content, which is released when burned or consumed.

Industrialized countries are also known as Annex I or Annex B countries under the Kyoto Protocol. They are politically stable countries with a long-lasting industrial economy. With high levels of capital and natural resources, these countries have high economic and environmental sustainability.

Issues Tables are study groups established by the Canadian government to analyze 16 issues related to climate change: 1) Agriculture and Agri-Food; 2) Analysis and Modeling; 3) Buildings; 4) Credit for Early Action; 5) Electricity; 6) Enhanced Voluntary Sector; 7) Forest Sector; 8) Industry 9) Kyoto Mechanisms; 10) Municipalities; 11) Public Education and Outreach; 12) Science, Impacts and Adaptation; 13) Sinks (Carbon Sequestration); 14) Technology; 15) Tradable Permits; 16) Transportation.

Joint Implementation (JI) is a market-led initiative in which industrialized countries form bilateral agreements to reduce GHG emissions

Nitrogen oxide (NOx) is a generic reference to both nitric oxide (NO) and nitrogen dioxide (NO2). NOx is one of the most significant electricity-related pollutants.

OECD is an acronym for the Organization for Economic Cooperation and Development. It includes Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Korea, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

Supplementality refers to whether countries reducing greenhouse gas emissions through projects in host countries are accomplishing this above their domestic energy policies to achieve their GHG reduction targets.

Technology transfer, within the climate change context, is the process of shifting energy-efficient technology and processes from industrialized nations to developing countries or countries with economies in transition.

Tradable emissions permits are licenses to release a specific amount of a pollutant that can be bought, sold or held. It is used in environmental regulation policies to allow pollution sources flexibility in how they achieve emissions reductions within an overall limit on emissions allowed by a country or industry. Large emitters can purchase permits from smaller emitters to meet their target allowances.

United Nations Framework Convention on Climate Change (UNFCCC) is the foundation of international policies to combat climate change. The UNFCCC has the purpose of stabilizing GHG concentrations so that the global ecosystem can adapt and so that global warming is slowed or prevented.

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