Primer: Clean Development Mechanism and Joint Implementation Programs

The Clean Development Mechanism and Joint Implementation programs are an important part of the Kyoto Protocol, which is a protocol to the United Nations Framework Convention on Climate Change. This primer provides background information about the Kyoto Protocol and the Clean Development Mechanism and Joint Implementation programs.

The Kyoto Protocol

The Kyoto Protocol[1] was adopted in December 1997 in Kyoto, Japan and entered into force on February 16th 2005, at which time it became a legally binding international treaty.

The objective of the Kyoto Protocol is to reduce greenhouse gas emissions that cause climate change[2].

There are six Greenhouse gas categories covered under the Protocol:

- Carbon dioxide, or CO_2
- Methane, or CH_4,
- Nitrous oxide, or N_2O
- Hydrofluorocarbons, or HFCs
- Perfluorocarbons, or PFCs, and
- Sulphur hexafluoride, or SF_6.

[POPUP]

- Carbon dioxide (CO_2) [POP-UP: Carbon dioxide (CO_2) is considered the most important greenhouse gas. Although carbon dioxide occurs naturally in the atmosphere, human activity is increasing its concentration. Carbon dioxide remains in the atmosphere for 50 to 100 years, if not longer. The major anthropogenic source of carbon dioxide is fossil fuel burning for power production, transportation and on-site industrial manufacturing processes. END POP-UP]

- Methane (CH_4) [POP-UP: Methane (CH_4) is naturally produced in low oxygen environments, such as swamps, by anaerobic bacterial fermentation (conditions without oxygen). It also occurs in coal and oil sites, and is produced in the digestive systems of some animal livestock. Landfills, fossil fuel burning, agriculture, livestock, and fossil fuel extraction contribute to the recent growth in methane emissions. The atmospheric concentration of methane is much less than carbon dioxide and methane has a shorter atmospheric life, about 10 to 12 years. However, methane is more effective at absorbing heat than carbon dioxide. POP-UP]

- Nitrous oxide (N_2O): [POP-UP: Nitrous oxide (N_2O) occurs naturally in the ocean and soils from anaerobic conditions as a by-product of biological denitrification and in aerobic conditions in biological nitrification processes. About 40% of current nitrous oxide emissions are anthropogenic, resulting from energy production, fertilizer, nitric acid production and biomass burning. Nitrous oxide has a long atmospheric residence of about 120 years due to the lack of significant sink in the atmosphere. END POP-UP]

- Hydrofluorocarbons (HFCs) [POP-UP: Hydrofluorocarbons (HFCs) are being be used as substitutes for CFCs and HCFCs because of they lack chlorine, so they don't deplete the ozone. HFCs, however, are potent greenhouse gases. END POP-UP]

- Perfluorinated compounds (PFCs) [POP-UP: Perflurocarbons (PFCs) contain only fluorine and carbon compounds, are non-flammable, low in toxicity, high in stability, and have zero ozone depleting potential. PFCs are potent greenhouse gases. END POP-UP]

- Sulfur Hexafluoride (SF_6) [POP-UP: SF_6 is a human-made gas and a potent greenhouse gas. It is largely used in heavy industry to insulate high-voltage electrical equipment and the casting of molten magnesium metal. END POP-UP]

[END POPUP]

[1] See http://unfccc.int/kyoto_protocol/items/2830.php
[2] See http://unfccc.int/essential_background/convention/items/2627.php

The central feature of the Kyoto Protocol is its requirement that countries limit or reduce their greenhouse gas emissions. By setting quantified targets, emission reductions took on economic value. To help countries meet their emission targets, and to encourage the private sector and developing countries to contribute to emission reduction efforts, the Protocol introduced three market-based mechanisms:

1. International Emissions Trading (IET),
2. Clean Development Mechanism (CDM), and
3. Joint Implementation (JI).

As of Feb 2009, 183 countries (referred to as "Parties" in the language of the United Nations) have ratified the protocol.[3][4] Of these, 36 developed countries plus the European Union as a supranational entity have– committed to firm greenhouse gas emission reduction targets for the commitment period of 2008 through 2012.[5] [6]. These countries are known as "Annex I" countries[7].

All other countries (i.e., the developing countries) have no GHG emission reduction targets under the Kyoto Protocol in the first commitment period, but do have other obligations such as regular reporting of emissions and information on national policies. These countries are known as "Non-Annex I" countries[8].

The Kyoto Mechanisms

In addition to emission reduction targets for Annex I countries, the Kyoto Protocol introduces three flexibility mechanisms to ease the economic burden of reducing GHG emissions. These mechanisms are the Clean Development Mechanism, Joint Implementation, and International Emissions Trading.

The Clean Development Mechanism, or CDM, defined in Article 12 of the Kyoto Protocol, allows a country, firm, or individual to implement an emission-reduction project in a **developing** (or Non-Annex I) **country.** Such projects can earn saleable certified emission reduction (or CER) credits, each equivalent to one metric tonne of CO_2. These credits can then be used by Annex I countries towards meeting their Kyoto emission reduction targets. For example, if Company A earned CERs by investing in a wind power turbine project in China, the resulting CER credits earned will be allocated to Company A. Company A can then sell these credits to any Annex I country to meet its GHG reduction commitment under Kyoto, or to any other party willing to purchase the CERs. And just like in other commodity markets, governments and private parties can make investments indirectly by purchasing CERs without having to invest in projects directly.

Joint Implementation, or JI, defined in Article 6 of the Kyoto Protocol, allows a country, firm, or individual from an Annex I country to implement an emission-reduction project in other Annex I countries. Such projects can earn saleable emission reduction units (or ERUs), each equivalent to one metric tonne of CO_2. Like CERs, ERUs can be used by the purchasing Annex I country towards meeting its Kyoto target. Essentially, JI is very similar to the CDM except that JI projects must be hosted by Annex I countries, whereas CDM projects are hosted by non-Annex I countries.

International Emissions Trading, or IET, defined in Article 17 of the Kyoto Protocol, allows Annex I countries with Kyoto targets to sell excess emission allowances to countries that are over their targets. IET also allows industrialized countries to purchase credits, such as CERs and ERUs, and use them towards their emission reduction targets. Only Annex I countries may participate in emission trading.

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[3] [insert http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php for updates]
[4] [POPUP] The United States are as of now the only major country that did not yet ratify the protocol.
[5] [POPUP] The Kyoto Protocol defines a quantified emission reduction target of 5.2% below 1990 levels to be achieved during the commitment period. However, the percentages vary between countries – i.e. between 6% for Japan and 0% for Russia, and others that can even emit more than the 1990 level. Each country's target under the Protocol is a function of what it was able to negotiate in Kyoto.
[6] The commitment period is the period of time when Annex I countries have to achieve their Kyoto reduction targets. Currently, the commitment period is the five years from the start of 2008 to the end of 2012. Negotiations are underway for a second commitment period.
[7] [insert http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php for the exact list of countries]
[8] [insert http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php for the exact list of countries]