Carbon Trading: A New International Business Opportunity in Sri Lanka

Abstract

Carbon Trading is a new international market introduced by the Kyoto Protocol as a global strategy to combat global warming. Under this new market mechanism, reductions of emissions of Green House Gases (GHG) by industries or any entity can be traded at international market at competitive prices. Industrial countries that emit high level of GHG emissions and that have been given emission reduction targets by the Kyoto Protocol can purchase the emission reductions from countries that do not have mandatory emission reduction targets. The Kyoto Protocol to United Nations Framework Convention on Climate Change (UNFCCC) adopted in 1997 has provided rules and guidelines for this new international market of Carbon trading. Though this new market has been in operation since year 2000 with a demand of 5.5 billion tons of GHG emission reductions equivalent to Carbon Dioxide (CO_2), Sri Lanka has so far traded only 5 projects which reduce around 109,619 tons of CO_2 per year. Up to March 2008, in the world, 950 CDM projects have been registered and are expected to reduce 1170 M t/CO_2e by 2012 at the rate of 193 M t/ CO_2 e per year. Recently established State-owned Sri Lanka Carbon Fund Limited is expected to increase the Sri Lankan share of this new international business.

Kyoto Protocol and Carbon Trading

The Kyoto Protocol is an international treaty adopted under the United Nations Framework Convention on Climate Change (UNFCCC) to strengthen the international response to climate change. Adopted by consensus at the third session of the Conference of the Parties (COP-3) to the UNFCCC in December 1997 in Kyoto, Japan, it has imposed legally binding emission reduction targets for 39 developed countries (Annex 1 countries) for the post-2000 period. Developed countries have committed themselves to reducing their collective emissions of six key greenhouse gases (GHG) by at least 5.2% from their total GHG emission in 1990. The key GHGs of which emission reductions have been agreed under the Kyoto Protocol are Carbon Dioxide (CO2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulfur hexafluoride (SF6). This emission reduction will be achieved through emission cuts of 8% by most Central and East European States and the European Union, 7% by the USA, and 6% by Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine have 0 target while Norway may increase emissions by up to 1%, Australia by up to 8%, and Iceland 10% during the commitment period 2008-2012. Developing countries that have no legal commitments under the Kyoto Protocol can assist the 39 developed countries to reduce GHG emissions by implementing emission reduction projects and charge a price for their emission reduction from developed countries. This is called Clean Development Mechanism (CDM) or carbon trading (www.unfccc.int/cdm).

Clean Development Mechanism (CDM)

The Kyoto protocol introduced three flexibility mechanisms for developed countries to implement their emission reduction targets. They are Clean Development mechanism (CDM), Joint Implementation (JI), and Emission Trading (ET). Of these three mechanisms, only CDM is applicable for developing countries.

Clean Development Mechanism (CDM) is defined in the Kyoto Protocol (Article 12) as a mechanism for North- South cooperation. The objective of the CDM is to "assist countries included in Annex 1 (developed countries) in achieving compliance with their quantified emission limitations and reduction commitments under Article 3" and to support "sustainable development" in developing countries (www.unfccc.int/cdm). The Clean Development Mechanism (CDM) and associated carbon trading between developed and developing countries have received great international attention since it is the only mechanism that both developed and developing countries can participate. Implementing projects in developing countries, that reduces emissions of GHG or absorbs GHG from the atmosphere and selling the amount avoided or absorbed to developed countries is called CDM or carbon trading.

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Carbon trading can be undertaken by implementing two types of projects: Emission avoidance projects and Green House Gas Removal or sink projects. Therefore, Projects on energy, industries, agriculture, waste water and forestry are eligible for Carbon Trading. The type of projects that have been submitted for carbon trading include biomass-fired co-generation, landfill gas capture, wind power, hydropower, biomass-fired power generation, fuel switching, energy efficiency, waste to energy, technology upgrading in cement industry and HFC Control project.

Forestry CDM or Sink Projects

Forest sector accounts for 20% of the global CO_2 emissions which is around 1.6 GtC annually. Therefore Land Use, Land Use Changes and Forestry (LULUCF) sector has a potential to mitigate 2 GtC per year. However, only afforestation and reforestation projects are eligible for forestry CDM according to Bonn Agreement. Marrakesh Accord which sets limits on Certified Emission Reductions (CERs) from afforestation and reforestation activities. So far only 4% of total CERs that are traded at the international market are from forestry sector.

Afforestation is direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.

Reforestation is direct human-induced conversion of non-forested land to forested land through planting, seeding or human-induced promotion of natural seed sources on land that was forested but that has been converted to non-forested land prior to 31st December 1989. For the first commitment period (2008 –2012), reforestation activities will be limited to reforestation occurring on those lands that did not contain forest by 31st December 1989.

There is a need for addressing the issue of non-permanence in forestry CDM projects. This

means that forests absorb carbon temporarily. Once a forest is destroyed, the carbon will be released to the atmosphere. In order to address the non-permanence issue, system of temporary certified emission reductions (tCERs) and long- term certified reductions (lCERs) have been introduced.

Forest CDM projects that are eligible under Bonn Agreement are:

- Establishment of woodlots on communal lands
- Reforestation of marginal areas with native species eg: riverine areas, steep slopes, around and between existing forest fragments (Through planting and natural regeneration)
- New large-scale, industrial plantations
- Establishment of biomass plantations for energy production and the substitution of fossil fuels
- Small-scale plantations by landowners
- Introduction of trees in to existing agricultural systems (agroforestry)
- Rehabilitation of degraded areas through tree planting or assisted natural regeneration

International Carbon Market

The Kyoto Protocol has created a large international market for emission reductions of about 5.0 to 5.5 billion tons of Carbon Dioxide equivalents (CO_2e). The regulatory framework of the carbon market has been established considerably with the enforcement of Kyoto Protocol on February 16, 2005. With the registration of more than 950 Clean Development Mechanism (CDM) projects by the CDM Executive Board by March 2008, the CDM market is now certain. The 950 CDM projects registered up to March 2008 are expected to reduce 1170 M t/CO_2 e by 2012 at the rate of 193 M t/CO_2 e per year. Figure 1 illustrates the distribution of CDM project in developing countries. The estimated market potential of the carbon trading is 250 $MtCO_2e$ (range from 50 to 500 $MtCO_2e$) per year at a price of \$15.00 tCO_2e (range ± 50%). This represents a total demand of 1250 $MtCO_2e$ by 2012. The minimum demand by industries in Europe and the planned purchases by governments yield an annual demand of at least 100 $MtCO_2e$. The median demand by industries in Europe combined with the estimated government purchases yields a potential demand for Certified Emission Reductions (CERs) and Emission Removal Unit (ERUs) of roughly 230 $MtCO_2e$ in 2010. Table 1 presents the market share of carbon reduction buyers up to 2005.

In order to tap this emerging international carbon market, various countries including multi-lateral organisations have established Carbon Funds i.e World Bank- Prototype Carbon Fund, Community Development Carbon Fund, Bio-carbon Fund. Dutch Carbon Fund, The Netherlands Carbon Development Fund, Andean Development Bank, European Bank for Reconstruction and Development, Denmark JI/CDM Fund, Development Bank of Japan, Japan Bank for International Corporation, Spanish Carbon Fund, Belgium Carbon Fund. In addition to these funds individual private companies also purchase emission reductions from developing countries. Several emission trading exchanges have been established to facilitate private sector to engage in this market, i.e. Chicago emission trading exchange. The annual transactions of these markets are around US\$ 1000 M. Figure 2 presents the international market share of emission reductions by buyers. Therefore, this has become a large international market opportunity for developing countries like Sri Lanka (Batagoda et al., 2007).

Many developing countries including India, Malaysia and Brazil have established mechanisms to reap the benefit of this emerging international market. For example, Argentina has established a Carbon Fund to promote CDM market in the country.

Expected average annual CERs from registered projects by host party.Total: 193, 195, 250

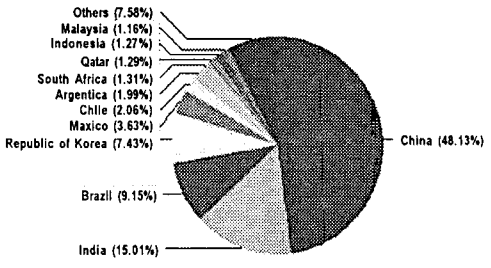


Figure 1 – Distribution of sellers of CDM projects in developing countries as at March 2008

Table 1
Annual Volumes of Project-based Emission Reductions Traded
(Up to 2012 vintages)

Year	Total Project-Based Transactions(tCO_2)	Compliance (tCO_2)	Voluntary (tCO_2)	Retail (tCO_2)
1998	17,976,538	0	17,907,448	69,090
1999	35,423,491	0	35,265,724	157,767
2000	17,094,425	387,933	16,507,407	199,085
2001	13,004,103	4,724,591	8,161,652	117,860
2002	28,776,967	14,676,748	13,893,209	207,010
2003	77,641,815	70,429,780	6,773,367	438,669
2004	107,010,089	104,600,758	2,299,050	110,281
2005 up to April	42,863,095	39,323,182	2,995,000	44,913
Total	339,790,524	234,642,992	103,802,856	1,344,675

Source: World Bank (2005)

Registered projects by AI and NaI investor parties

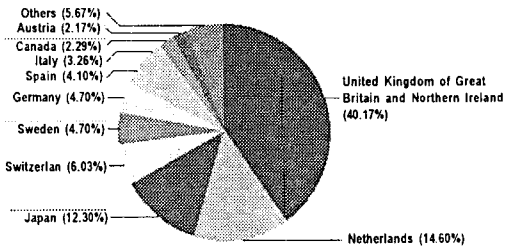


Figure 2 – Distribution of buyers of CERs in developed countries in March 2008
AI – annex I country
Source : Impacts of Carbon Trading Revenue on Investment

Impacts of Carbon Trading Revenue on Investment

The impacts of CERs revenue on the total project investment vary with project type. In general, carbon finance provides around 5 – 20% of the total project cost. Table 2 presents the results of sensitivity analysis carried out to illustrate the change of Internal Rate of Return (IRR) when the revenues of sales of carbon credits are included in to the analysis.

Table 2
Summary Sensitivity Analysis of - Incremental Internal Rate of Return (IRR)
Results – Contribution of Carbon Finance

Sector	Impact of percentage change of IRR when CER Price = $6.5/ton CO_2e			
	IRR change due to sale of carbon credit for 7yrs %	IRR change due to sale of carbon credit for 10yrs %	IRR change due to sale of carbon credit for 14yrs%	IRR change due to sale of carbon credit for 21yrs%
Landfill	5.5 – 46.8	13.9 - 48.8	17.6 - 49.3	20.3 - 49.3
CH_4 from coal	7.6	9.7	10.8	11.5
Bio mass	1.9 – 3.5	2.3 – 5.1	2.6 – 6.3	2.9 – 7.1
Forestry	0.4 – 4.6	0.9 – 5.7	1.7 – 6.3	2.6 – 6.8
Renewable Energy	0.2 – 1.7	0.3 – 2.2	0.5 – 2.6	0.6 – 2.9
District Heating	0.5	0.6	0.6	0.7

Source: World Bank (2005).

Sri Lanka Carbon Market

Sri Lanka still is in the initial stage of CDM project implementation compared to neighbouring India and many other developing countries. Of over 950 CDM projects registered so far, only 5 projects are from Sri Lanka. Of the expected annual CERs of 193 M/tCO_2 marketed so far from the world (by March 2008), Sri Lanka has sold only 109,619 tCO_2 per year. Many attempts by the private sector to initiate CDM projects have failed due to various constraints. One of the reasons for this low level of participation is lack of financial mechanism to promote CDM market in Sri Lanka. Neither private sector nor the government was ready to invest funds to promote CDM.

In addition to this, there are several other serious constraints that need to be resolved in order for Sri Lanka to effectively engage and compete with other countries in the carbon market and maximize the benefits of CDM while achieving sustainable development objectives of the country. Some of the serious constraints which restrict the optimum use of CDM for the benefits of country are explained below.

Financing constraints: Lack of a financing mechanism for CDM project development, feasibility studies, proper execution and providing equity capital is an important barrier for CDM project development in Sri Lanka. This is important since CDM projects tie up with underlying financing. However, mainstream financing institutions in Sri Lanka have not engaged in the CDM yet.

Investment risk: Since the CDM market depends on the mid and long-term foreign investments, international perception on the risk of investing in Sri Lanka has significant bearing on CDM projects. Sri Lanka may be in a disadvantages position compared to other CDM competitors due to the existing civil conflict the country. The country has not been able to establish a link between foreign direct investments (FDI) and CDM. Sri Lanka has failed to attract CDM investors, competing with other countries.

Information constraints: Most stakeholders, communities, companies and farmers who could benefit from CDM are not knowledgeable on CDM programs, market trends, prices, and rules of project formulation, project development process and mode of operation of CDM. The project developers cannot design project or negotiate with investors without proper knowledge on the CERs market dynamics, sales prices of CERs in the future, buyers of CERs and emerging rules of CDM. Sri Lanka doe not have a proper information gathering and dissemination system on the changes in CDM market.

Institutional constraints: Inadequate institutional structures and enabling legal environment both in the private and public sector to address the implementation issues of various CDM project development cycles hinder the CDM project development in the country. Sri Lanka needs a CDM office for approval and development of CDM projects, which can run effectively and transparently with strong partnership with all stakeholders.

Inadequate technical capacity: Technical capacity for the CDM project development among the stakeholders is fairly weak. This includes the capacity for effective participation in international market including strong legal and negotiation skills at international forum. The industry and project developers depend on consultants, particularly on foreign consultants whose rates are generally high. Unless the technical capacity of local institutions and consultants is built, the transaction costs of CDM project in Sri Lanka will continue to be high.

In order to address these barriers the government decided to establish the Sri Lanka Carbon Fund as a joint venture company with government and private sector participation.

Sri Lanka Carbon Fund Limited

In order to address the above-mentioned constraints for carbon trading and to promote international carbon trading in Sri Lanka, His Excellency the President having discussed with Hon. Minister of Environment and Natural resources, presented a proposal to the parliament in his 2008 budget proposals to set up a Carbon Fund as a joint venture company of government and private sector. This is based on the facts that if Sri Lanka to capture a considerable share of the international carbon market during the first commitment period ending in 2012, the country should act fast and adopt a proactive strategy. The proposed Sri Lanka Carbon Fund will provide overall support for the country to enter into the global CDM market through providing financial and other technical assistance.

Therefore Sri Lanka carbon Fund has been given authority to undertake entire carbon asset management activities including providing finance, investment on CDM project activities, purchasing carbon credits, CDM consultancy service, Project Design Documents (PDD) preparation, bundling of small projects in to one CDM projects and preparation of CDM sales agreements. This fund will also deal with other development banks to organize capital funding for CDM project. This Fund can attract local and foreign investments for the marginal sectors which are not attractive to normal commercial banks.

The Sri Lanka Carbon Fund Limited has been established under the Companies Act No. 7 of 2007 as a private company jointly owned by the government and the private sector.

Objective of the Sri Lanka Carbon Fund Ltd.

Objectives of the Sri Lanka Carbon Fund Ltd. are to:

1. undertake carbon trading and CDM project development activities including the preparation of project design document
2. provide consultancy services to the private, public and non governmental organizations on the CDM project development activities
3. facilitate the validation and verification of CDM project undertaken by private and public sector
4. purchase and sell certified emission reduction (CER) under the CDM
5. provide any support services to the project developers on CDM project development
6. provide technical assistance for the development of environmental project

including preparation of Environment Impacts Assessment reports

7. provide laboratory services for the improvement of environment quality
8. develop and run environmental product marketing program including eco tourism
9. develop and run bio-prospecting program
10. develop and run commercially viable land fills including sanitary land fills
11. develop and run incinerations for medical wastes
12. provide financial assistance to environmental product and services development on reasonable terms
13. function as a sustainable development banks of the nation
14. develop and manage micro financing program for environmental product development
15. charge fees or taxes for the environmental services and cost of environment pollution
16. invest the funds in sustainable development activities.

The government of Sri Lanka owns 51 percent of shares of the company and operates as a State-owned enterprise.

The government will provide Rs.100 million as the initial capital of the company. Another Rs.100 million will be raised from private sector by issuing shares of 10 million (Rs.10 each). Possible grants are also expected from the multilateral donors for providing technical assistance to the needy private sector. A business plan will be prepared by the Sri Lanka Carbon Fund to solicit funds from selected donors and general public. With the establishment of the Sri Lanka carbon fund, the country is expected to earn around 300000 CERs annually.

The board should consist of eminent professionals in the field of environmental product marketing including carbon trading. The proposed board of directors consists of three government nominees, one from professionals in the field and three from the private sector shareholders. A dedicated team of management will be assigned to assist the board of directors to achieve the objective of the company.

Bundling Small CDM Projects

As Sri Lanka being a small country, the CDM projects are relatively small. These small projects are not attractive to the international buyers. However, when these small project are bundled together to increase the scale, these project can be made competitive at the international market. There are no institutional arrangements to bundle small project belonging to various companies. The Sri Lanka Carbon Fund will function as a Special Purpose Vehicle for the purpose of carbon asset management of these small bundled projects. Sri Lanka has a large potential for carbon trading which can be harnessed by Sri Lanka Carbon Fund through bundling small projects.

Carbon Trading Potential in Sri Lanka

Several studies have estimated the Sri Lanka carbon trading potential of both private sector and state sector (Batagoda et al., 2007). Table 3 presents the estimated total national potential for carbon trading.

Table 3
National CDM Potential by Sectors for strategic development

Sector	Annual Energy Reduction/ Substitution potential/ year	Annual CO_2 Reduction Potential tCO_2/ year
Hydro Power	250 MW	613,200
Wind	480 MW	672,768
Biomass (Grid Power)	300 MW	1,680,000
Biomass (Industrial Heat)	162 toe	512,000
Biomass (Absorption Refrigeration)	100 MW	400,000
Energy Conservation: Electricity (Industry)	20,400 toe	64,700
Energy Conservation: Petroleum (Industry)	36,000 toe	113,800
Transport	206,000 toe	600,000
Agro Residue-Rice Husk	20 MW	112,000
Agro Residue-Sawdust	20 MW	112,000
Municipal Solid Waste	500000 toe	500000
Forestry	100000 ha	1,352,000
Total	6,732,468	

toe: tonnes of equivalence

Source: Batagoda et al. (2007)

Carbon trading potential of the private sector

Based on a project submitted to the Ministry of Environment for approval, the private sector potential for carbon trading was estimated to 2.4 million tonnes per year. Table 4 presents the summary of CDM project proposals received to the Ministry of Environment.

State sector potential of CDM projects

State sector has a great potential for carbon trading, but so far it has not been reaped. Major State sectors that have high carbon trading potential include petroleum, power, transport, and plantation. An analysis of some State sector potentials is given below:

Replacing old refineries

Refineries of the Ceylon Petroleum Corporation are inefficient due to outdated machinery and equipment. The replacement of these old refineries has been hindered due to financial, economic and political situation of the country. However, there is a possibility to replace these old refineries under the CDM project activity, if CDM revenue can meet a percentage of total investment. According to past experience, CDM projects can provide up to 20% of the total investment depending on the total volume of GHG saved.

Baseline emissions for this project are the GHG emitted from the old refinery (old technology) including any fugitive emissions. The difference between the emissions from old refinery and emissions from new technology can be estimated as carbon credits. Further analysis is required to estimate the total carbon trading potential of this project.

Replacing the outdated fleet of buses of the Sri Lanka Transport Board

The Ceylon Transport Board has a fleet buses numbering over 8900. These buses consume considerably higher volume of fuel than new buses. Due to economic and financial situation of the Sri Lanka Transport Board and the country, it is unlikely that these old fleet will be replaced with a new fleet in the near future. The business as usual scenario is that the Sri Lanka Transport Board continues to use this old fleet owing to the financial and economic situation of the organization. However, there is a possibility to replace this old fleet under the CDM project activity, if CDM revenue can meet a percentage of total cost of the project.

Baseline emissions for this project are the carbon dioxide (CO_2) emitted from the old fleets. The difference between the emissions from the old fleet and emissions from new fleet can be estimated as carbon credits under CDM. Every kilogram of diesel saved from this exercise can avoid 3.14 kg of CO_2 which can be marketed under carbon trading.

Table 4
Estimated revenue from already proposed private sector CDM projects

ID	Project title	Scope	Gas	Emission reduction t/CO_2e	Potential income at US$ 7 per t/CO2
1	Aqua Power (Pvt) Ltd - Labuwawa Mini Hydropower project (PIN)	2MW Hydropower Plant	CO_2	9,930	7,646,100
2	Tokyo Cement Biomass Power Project Trincomalee (PIN)	6.6 MW Biomass Power Plant	CO_2	49,807	38,351,390
3	SJL Holdings (Pvt) Ltd. (PIN)	12.25 MW hydro powerplant	CO_2	36,000	27,720,000
4	Coconut shell carbonising gas based power Generation (PIN)	8 MW Biomass Power Plant	CO_2,CH_4, N_2O, CO	80,000	61,600,000
5	Rubber cultivation for sustainable development forestry (PIN)	20,000 ha of forestry	CO_2	53,166	40,937,820
6	AssupiniellaSmall Hydro Power Project (PIN)	4 MW hydro powerplant	CO_2	15,462	11,905,740
7	VanasaviyaBiodiesel production (PIN)	40,000 haJatrophacultivation	CO_2	400,000	308,000,000
8	1MW Biomass Power Plant in Walapane (PDD)	1	CO_2	12,040	9,270,800
9	Biomass Power Project at Amapara (PIN)	15 MW Biomass Power Plant	CO_2	90,000	69,300,000
11	1 MW Biomass Power Plant of Informatics Agrotech (PDD)	1,14	CO_2	6,020	4,635,400
12	Delta, Halgran Oya, Sanquhar power project (PIN)	1	CO_2	20,358	15,675,660
13	AdavikandaSmall Hydro Power Project	6.5 MW hydro powerplant	CO_2	20,616	15,874,320
14	Barcaple Small Hydro Power Project	6.5 MW hydro powerplant	CO_2	16,664	12,831,280
15	Erathna Small Hydro Power Project	9.9 MW hydro powerplant	CO_2	55,490	42,727,300
16	Way Ganga Small Hydro Power Project	9.0 MW hydro powerplant	CO_2	65,284	50,268,680
17	Landfill Gas Energy Project		CH_4	29,400	22,638,000
18	Kumburuteniwela Small Hydro Power Project	2.4 MW hydro power	CO_2	21,320	6,416,400
19	Bambarabatuoya minihydro	3.2 MW	CO_2		
20	Colombo organic waste plant	56784 MWh	CO_2	244,000	187,880,000
21	Wind power plant	20MW	CO_2	65,000	50,050,000
22	Gatambe Mydro	12MW	CO_2	42,000	32,340,000
23	Atambage small hydro	3MW	CO_2	10,500	8,085,000
24	Wind power plant	50MW	CO_2	175,000	134,750,000
25	Biomass power	6MW	CO_2	30,000	23,100,000
26	Lion Brewery Ltd.			1,656,000	1,275,120,000
27	Wind power plant	50 MW	CO_2	200,000	154,000,000
28	Labuwewa mini hydro	3 MW	CO_2	4,965	3,823,050
	Total			2,427,465	2624,946,940

PIN – Project Idea Note
PDD – Project Design Document

Source: Ministry of Environment and Natural Resource, Designated National Authority (DNA) Records (2007)

Improvement of the Sri Lanka Railways by replacing old engines and possibly introducing electric trains

The Sri Lanka Railway Department uses very old diesel engines polluting the environment. There is a lot of potential to improve the train service by putting new trains and adding new railway lines which attract new commuters to railway. There is a potential to increase commuters by 200,000 a day and increase to over a 1.4 million per day in few years. This will reduce a great deal of CO_2 emission through fuel saving. However, due to various technical, financial and economic barriers, this project is not possible in the near future. These barriers can be removed through developing this as a CDM project, since the CDM revenues can meet part of the investment costs.

The difference between the emissions due to present railway system and emissions from the improved railway system which can be estimated as carbon credits under CDM. A kilo gram of diesel saved from this exercise can avoid 3.14 kg of CO_2 which can be marketed under carbon trading.

Cleaning the Sri Lanka power system

Sri Lanka has a large CDM potential in the power sector. Some of these old diesel and fuel oil plants can be converted to combined-cycle plants (the CEB officials can decide on plants which should be replaced). The proposed 900 MW of coal power plant could be converted to more advanced coal processing technologies with clean coal. Proposed new gas power plants can be developed as a CDM project.

The proposed 300 MW Liquid Natural Gas (LNG) power plant at Kerawalapitiya can be easily converted to a CDM project. Even Upper Kotmale Hydro Power Project can be converted to a CDM project through interpretation of CDM rules for our benefits and getting further clarifications from Executive Board. There are some barriers for this. However, if Upper Kotmale Hydro Power project was developed as a CDM project it can generate around 236000 t/CO_2 per year and the CEB can earn about US$ 5 million per year by selling sold at US$ 20 per tonne of CO_2. If the government gives its priority, this is the largest CDM sector in the country. National baseline at present for this type of project is kg 0.63 per kWh of power generation. However, this can be changed when the composition of power system changes.

Introducing nationwide Compact Fluorescent Light (CFL) bulb system

The Ceylon Electricity Board has been promoting the use of CFL bulbs in residential and commercial premises for many years on a voluntary basis. Since, CFL bulbs consume considerably lower amount of energy than normal incandescent bulbs, this will reduce GHG emissions. With the government intervention, a nationwide CFL bulb introduction program can be undertaken as a CDM project.

Reduction of transmission loss

Sri Lanka power system experiences around 17% transmission loss. This can be reduced considerably through technical and management

interventions. Through proper designing, a project on electricity transmission loss reduction can be undertaken as a CDM activity. The total potential of CDM earning depends on the total possible reduction of transmission loss.

Improvement of efficiency of industrial process

Some State-owned industries such as Paper Company still use old boilers and other equipment n the production processes. These old incustries can be replaced with new energy efficient technologies under CDM project activities.

Introducing water pumping efficiency improvement

National Water Supply and Drainage Board (NWSDB) consumes a considerable amount of energy for pumping water. Introducing an efficient system the NWSDB can save energy. Through implementing this project as a CDM project, the country can earn foreign exchange by selling carbon credits.

Reforestation and aforestation projects in State lands

There is a vast potential for forest plantation in the marginal areas of the Jantha Estates Development Board (JEDB), Sate Plantations Corporation (SPC), National Livestock Development Board (NLDB) and other State-owned coconut, rubber and tea estates including pasture lands. There are about 1.7 million hectares of degraded or abandoned lands which can be reforested as CDM projects. Forest Department can undertake forestry projects as CDM projects. Agro-forestry CDM project can sequester 2-5 t C per ha per year. Restoration of degraded forest can sequester 0.25 – 0.9 2-5 t C per ha per year while industrial plantation can take up 12 – 15 2-5 t C per ha per year.

However in order to develop these CDM projects the country should have experts who understand the CDM process. The government should develop necessary institutional and legal framework to facilitate carbon trading. Figure 3 presents the existing institutional structure of carbon trading in Sri Lanka.

Project Development Process and Institutional Framework for CDM

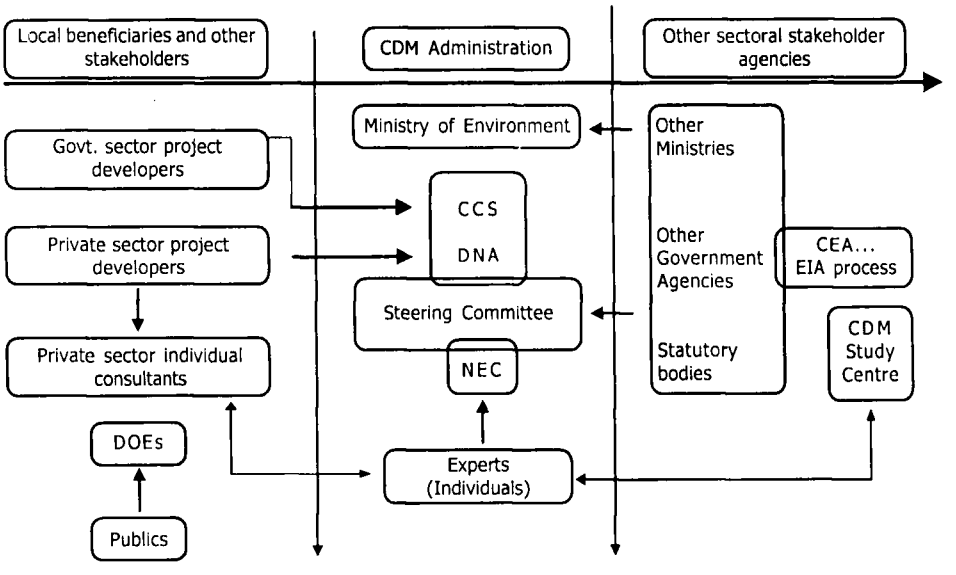
The process of development of a project for carbon trading includes the following steps:

1. Project developer or investor develops the project concept note on CO_2 emission reduction project
2. The Designated National Authority (DNA) which is the Ministry of Environment and Natural Resources issues a letter confirming that the project meets the sustainable development criteria of the country
3. The project developer prepares the Project Design Document (PDD), details of emission reductions and monitoring of the project
4. The Designated Operational Entity (DOE) which is accredited by the UNFCCC CDM Executive Board validates the PDD and send it to the UN Executive Board for registration
5. The CDM Executive Board (EB) registers the project, if it is eligible
6. The project developer implements the project
7. After one year of project implementation, the project developer contacts again a Designated Operational Entity (DOE) for verification of actual emission reductions during the previous year
8. The Designated Operational Entity (DOE) sends the verification report to the CDM Executive Board (EB)
9. The CDM Executive Board (EB) issues the Certified Emission Reductions (CERs)
10. The project developer sells the CERs through bi-lateraal agreement or carbon trading exchanges

The figure 4 presents the Sri Lanka CDM project development process diagrammatically.

Conclusions

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) adopted in 1997 has created a new international market of Carbon trading. Though this new market has been in operation since year 2000 with a demand of 5.5 billion tonnes of GHG emission reductions equivalent to Carbon Dioxide (CO_2), Sri Lanka has so far traded only around 173,000 tones of CO_2. Up to March 2008, in the world, 950 CDM projects have been registered and are expected to reduce 1170 M t/CO_2e by 2012 at the rate of 193 M t/ CO_2 e per year. Recently, established State-owned Sri Lanka Carbon Fund Limited is expected to increase the Sri Lankan share of this new international business. It has been estimated, that Sri Lanka has a potential to trade around 6 million tonnes of carbon per year through a joint program of the government and the private sector. Sri Lanka can maximize benefits of this trade.



CCS – Climate Change Secretariat
NEC – National Expert Committee
CEA – Central Environmental Authority

Figure 3 - Illustration of the existing institutional structure and linkages of CDM Project implementation in Sri Lanka

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Sri Lanka's position among the Green Countries

The EPI (Environmental Performance Index) 2008 was jointly produced by Yale's Centre for Law & Environmental Policy (led by Daniel Esty) and Colombia's Centre for International Earth Science Information network (led by Marc Levy) using 25 indicators in its grading system. Those 25 indicators were categorized under 6 broad areas such as Environmental Health, Air Pollution (effects on ecosystems), Water (effects on ecosystems), Biodiversity and Habitats, Productive Natural Resources and Climate Change. Among these indicators, Sri Lanka's scores as follows in EPI – 2008.

Environmental Health	78.8
Air Pollution (effects on ecosystems)	98.1
Water (effects on ecosystems)	79.7
Biodiversity and Habitats	62.6
Productive Natural Resources	75.0
Climate Change	85.6

According to this Index, Sri Lanka scored 79.5 and ranked 50th in the list of 149 countries and 1st in the South Asian region. [In EPI -2006, Sri Lanka was at the 67th ranking position carrying a score of 64.6]

Top 50 Countries among the Green Countries

Rank	Country	Score	Rank	Country	Score
1	Switzerland	95.5	26	Malaysia	84.0
2	Sweden	93.1	27	Albania	84.0
3	Norway	93.1	28	Russia	83.9
4	Finland	91.4	29	Chile	83.4
5	Costa Rica	90.5	30	Spain	83.1
6	Austria	89.4	31	Luxembourg	83.1
7	New Zealand	88.9	32	Panama	83.1
8	Latvia	88.8	33	Dominican Republic	83.0
9	Colombia	88.3	34	Ireland	82.7
10	France	87.8	35	Brazil	82.7
11	Iceland	87.6	36	Uruguay	82.3
12	Canada	86.6	37	Georgia	82.2
13	Germany	86.3	38	Argentina	81.8
14	United Kingdom	86.3	39	United States	81.0
15	Slovenia	86.3	40	Taiwan	80.8
16	Lithuania	86.2	41	Cuba	80.7
17	Slovakia	86.0	42	Poland	80.5
18	Portugal	85.8	43	Belarus	80.5
19	Estonia	85.2	44	Greece	80.2
20	Croatia	84.6	45	Venezuela	80.0
21	Japan	84.5	46	Australia	79.8
22	Ecuador	84.4	47	Mexico	79.8
23	Hungary	84.2	48	Bosnia & Herzegovina	79.7
24	Italy	84.2	49	Israel	79.6
25	Denmark	84.0	50	Sri Lanka	79.5

Source: 2008 Environmental Performance Index, Yale Center for Environmental Law and Policy, Yale University Center for International Earth Science Information Network (CIESIN), Columbia University – www.yale.edu/2008epi/overview

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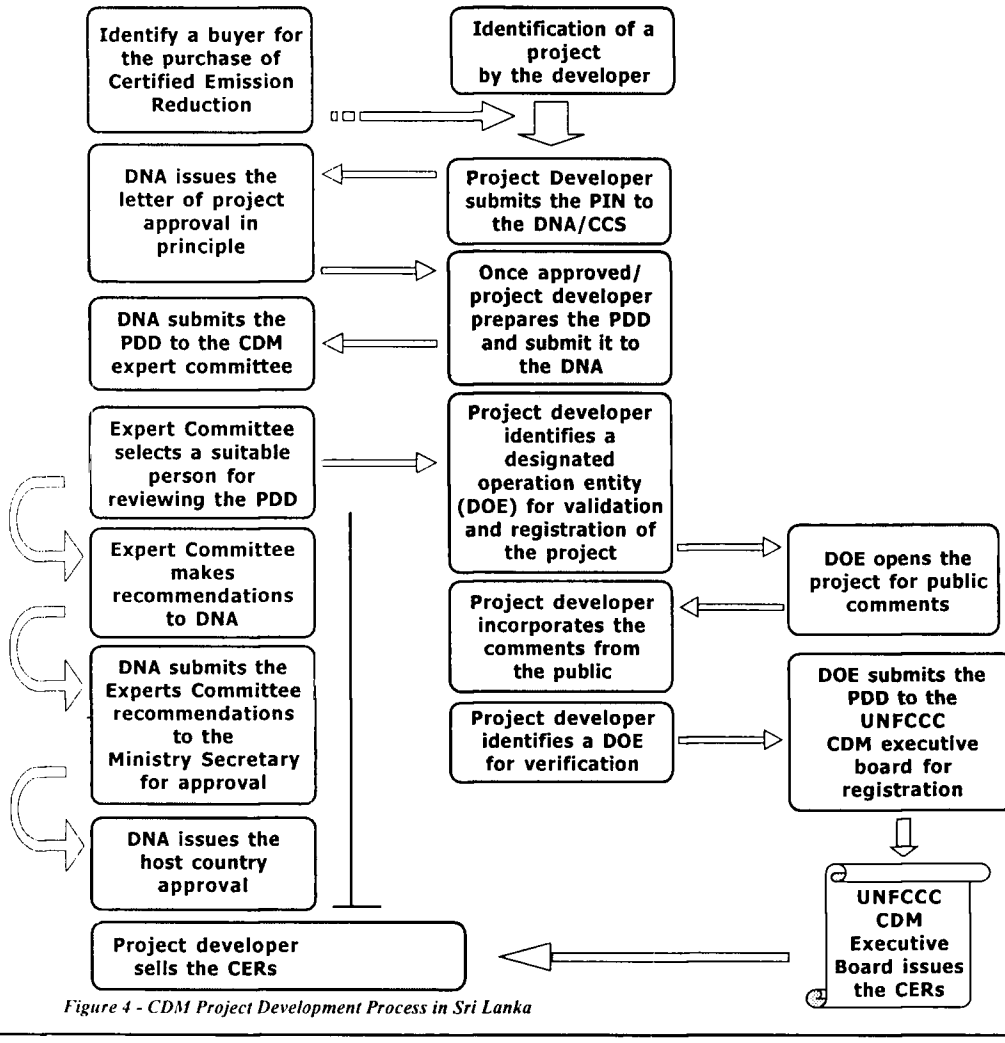

Figure 4 - CDM Project Development Process in Sri Lanka

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