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Clean development mechanism of Kyoto Protocol

Contribution of India in climate change mitigation and expectations of Indian project proponents

Anil Gupta

Hydro Mechanical Design Department, SJVN Limited, Shimla, India

Abstract

Purpose – This paper aims to review the developments in India with respect to clean development mechanism (CDM) of Kyoto Protocol to assess the achievements during first Kyoto Protocol period (2008-2012) in climate change mitigation and suggest measure for better participation during the second commitment period. The paper further makes an attempt to explore the experience, concerns and expectations of the Indian project proponents of green projects registered with CDM Executive Board.

Design/methodology/approach – This paper employs two methods: informal interviews with executives of World Bank, Designated National Authority (DNA) of India for CDM, leading international CDM consulting firms and a questionnaire survey of Indian CDM projects proponents.

Findings – During first commitment period valid up to December 31, 2012, India remained active participant in the CDM, the only mechanism of Kyoto Protocol where developing countries can participate and join in mitigation of climate change, through the development of green projects and thereby earning additional revenue in terms of carbon finance by sale of carbon credits. The study finds out that in the global CDM experience, India's role is striking with its second highest share both in terms of number of projects registered worldwide and in generation of Certified Emission Reductions (CERs).

Originality/value – This paper provides several recommendations for strengthening the institutional frame work in India with respect to CDM as well as suggestions to policy makers for consideration while charting out future policies and programs addressing climate change mitigation and adaptation oriented towards better participation in climate change mitigation during the second commitment period of Kyoto Protocol.

Keywords Kyoto Protocol, Certified Emission Reductions, Clean development mechanism, Greenhouse gases, United Nations Framework Convention on Climate Change

Paper type Research paper



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1. Introduction

Scientists worldwide accept that climate change or global warming is manmade phenomenon due to industrial growth because of increase in greenhouse gases concentration. They advocates strong necessity for reduction in greenhouse gases emission to save the world from this menace of global warming, the main characteristics of which are increase in average global temperature; changes in cloud cover and precipitation particularly over land; melting of ice caps, glaciers and reduced snow cover; and increases in ocean temperatures.

Recognizing the fact that global warming is a complicated problem involving the entire world tangled up with different issues such as poverty, economic development

and population growth and also knowing well that tackling the issue of global warming shall not be an easy task but at the same time ignoring the issue will be disastrous, 189 countries joined hands to frame an international treaty having general goals and rules for confronting climate change. This international treaty is the “United Nations Framework Convention on Climate Change (UNFCCC)”.

UNFCCC is an international legal framework adopted in June 1992 at the “Rio Earth Summit” to address issue of climate change. The objective of formation of UNFCCC was to begin considering, what can be done to reduce global warming. The UNFCCC entered into force on March 21, 1994 and enjoys near universal membership of 192 countries who have ratified it.

Even after the adoption of the UNFCCC in 1992 the greenhouse gases emissions levels continued to rise around the world. It became increasingly evident that only a firm and binding commitment by developed countries to reduce emissions could send a signal strong enough to convince businesses, communities and individuals to act on climate change. Accordingly, member countries of the UNFCCC began negotiations on a protocol, i.e. an international agreement linked to the existing treaty.

Kyoto Protocol adopted in 1997 divided the world in two groups:

- (1) the “Annex-I countries” consisting of highly industrialized countries who have historically contributed the most to climate change; and
- (2) “non Annex-I countries” consisting of developing and under developed countries.

This protocol provides for legally binding emission reduction commitments for the Annex-I countries. Each industrialized country has been assigned individual emission reduction targets, so as to reduce the total greenhouse gases emission by at least 5 percent below the 1990 level during the commitment period 2008-2012. An option has been given to meet the emission reduction targets through one of the three mechanisms provided under the treaty (UNFCCC, 1998). Out of three mechanisms of Kyoto Protocol, the CDM is the only mechanism where developing countries can participate and join in mitigation of climate change. The CDM allows emission reduction projects in the developing countries to earn CERs which can be purchased or used by industrialized countries to meet a part of their emission reduction targets under Kyoto Protocol. As per UNFCCC (2006), for a project to be considered for registration under CDM, it must contribute to the sustainable development of the host country; results in real, measurable and long term benefits in terms of climate change mitigation; and the project should not be business as usual but needs to be an additional project. In CDM terms the additional project is the one that results in real reduction of emissions. A project has to undergo rigorous process documentation and approval as specified under the CDM modalities and procedures before the same is registered as CDM project.

The Kyoto Protocol came into force on February 16, 2005 after ratification by 192 of the UNFCCC parties and was valid up to December 31, 2012. This protocol has created a new globally traded commodity that is carbon credits expressed in tons of Carbon dioxide equivalent which has a market value similar to other commodities like wheat or oil and which can also be traded across borders on the market. The revenue realized by sale of carbon credits is generally termed as carbon finance.

Recognizing well that if the world fails to renew the global warming agreement of 1997, i.e. Kyoto Protocol, a huge part of the global emission trading regime will be disrupted,

the efforts were on worldwide for its extension by carbon market proponents like parties to UNFCCC, NGOs, and climate change activists, etc. In the absence of carbon finance revenue the basic viability of most of the already registered CDM projects shall get adversely affected resulting in wastage of investment of billions of dollars in these projects.

The historic decision to launch a second commitment period of eight years “2013-2020” commencing from January 1, 2013 was taken at UN Climate Change Conference in Doha, Qatar during December 2012 by the countries which are Parties to the UNFCCC and Kyoto Protocol (UNFCCC, 2012), just couple of days ahead of the date by which the Kyoto Protocol was valid as per original agreement. With this the uncertainties about the future of Kyoto Protocol, the greatest ever international agreement adopted in the field of environment and sustainable development, are over.

Considering the climate change as a global challenge, India is a party to both UNFCCC and the Kyoto Protocol. As a non-Annex 1 country, India has no binding emission reduction targets under the protocol. However, India is an active participant in the CDM established by the protocol.

India's economy is growing at the rate of 8-9 percent every year for the past few years and a high growth rate is projected for the years ahead. Thus, India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change. Presently, India is the world's fourth largest economy (IMF, 2011) and fifth largest GHG emitter accounting for about 5 percent of global emissions. India's emissions are on increasing trend and are projected to grow further. However, despite being the fourth largest economy, India's per capita greenhouse gas emission level of 1.6 is 67 percent below world average of 4.90 and 90 percent lower than 17.3 of the USA (European Commission, 2011).

2. Objectives of the study

This paper aims to review the developments in India with respect to CDM of Kyoto Protocol to assess the achievements in terms of climate change mitigation and suggest measure for better participation during the second commitment period. This overall objective has been studied with the help of the objectives outlined below:

- To study the contribution of India, in making the CDM successful leading to mitigation of climate change, through status of the Indian projects registered as CDM projects with UNFCCC since inception to end December 2012 along with assessment of the volume of Certified Emission Reductions (CERs) generated and corresponding value of Indian carbon finance market through transactions of CERs.
- To present the experience and concerns of the Indian projects proponents.
- To analyse the sector or technology wise distribution of CDM registered Indian projects to find out the sectors which are not reaching their full potential in spite having scope to generate CERs as CDM projects.

3. Research methodology

For accomplishing the objectives of the study both primary and secondary data has been utilized. The primary sources includes:

- informal interviews with executives of World Bank, Designated National Authority (DNA) of India for CDM, leading international CDM consulting firms; and

- data collected from 82 respondents by administering a pre designed questionnaire sent through post and e-mail to Indian CDM projects proponents to explore their experience of dealing with CDM, concerns and expectations.

The secondary sources includes various regulations related to climate change in place, books, news paper coverings, internet resources specifically the web site of UNFCCC, publications of UNFCCC, various reports of World Bank on carbon finance for sustainable development, and various publications of Intergovernmental Panel on Climate Change (IPCC).

The survey questionnaire consisting of over 30 questions were sent to 130 Indian project proponents. The sample size has been chosen on the basis of convenience and feasibility to collect data on the random basis. All the respondents were asked the same questions in the same fashion and they were informed of the objectives of the research. Confidentiality was ensured to facilitate honest responses and it was informed to send them a summary of the findings of this study in case they requests for the same. The survey was initiated on November 1, 2011 and was closed on April 30, 2012. A total of 82 responses have been received.

The response rate of 63 percent can be considered reasonable but with a view to make the research more meaningful detailed telephonic discussions have been made with 20 respondents out of total 82, who volunteered to spare time for the same. These discussions have helped in framing and finalizing suggestions, made in this paper, to the policy makers for further development of Indian carbon finance market during the second commitment period of Kyoto Protocol.

4. Literature review

IPCC (1990), is an essential reference for all who are concerned with climate change and its consequences. This report of IPCC is sponsored jointly by the World Meteorological Organization and the United Nations Environment Program. In preparation of this assessment report most of the active scientists working in the field have been involved. One hundred and seventy scientists from 25 countries have contributed to it, either through participation in the 12 international workshops organized specially for the purpose or through written contributions. Many previous reports have also addressed the question of climate change which might arise as a result of man's activities. However, particular attention was paid to the problem of global warming or climate change only after publication of the Scientific Assessment Report of IPCC in 1990. This report concluded that Carbon dioxide has been responsible for over half the enhanced greenhouse effect in the past, and is likely to remain so in the future. The report predicts a rate of increase of global mean temperature during the present century of about 0.3°C (with an uncertainty range of 0.2-0.5°C per decade), which is greater than that seen over the past 10,000 years. This will result in a likely increase in global mean temperature of about 1°C above the present value by year 2025 and 3°C by the end of the century. The report observes that global sea level has also increased by 10-20 centimeter over the last 100 years. These increases have neither been smooth with time, nor uniform over the globe.

This report has led to formation of UNFCCC in June 1992 with ultimate objective of stabilization of greenhouse gases in the atmosphere at a level which would prevent dangerous intervention with the climate system.

IPCC (1995), points out that considerable progress has been made in the understanding of climate change since 1990. The report concludes that greenhouse gas concentrations have continued to increase over the past century and the climate is expected to continue to change in the future. The report suggest that a carefully selected portfolio on national and international responses of actions aimed at mitigation, adaptation and improvement of knowledge can reduce the risks posed by climate change to ecosystems, food security, water resources, human health and other natural and socio-economic systems. There are large difference in the cost of reducing greenhouse gas emissions among countries due to their state of economic development, infrastructure choices and natural resource base. International cooperation in a framework of bilateral, regional or international agreements could significantly reduce the global costs of reducing emissions and lessening emission leakages.

An assessment of vulnerability because of climate change on a regional basis concludes that there are potential direct effects of climate change in all the regions on ecosystems, water resources, food production and human health. However, the impacts vary from region to region. The regions considered for detailed research are Africa; Polar region; The Arctic and the Antarctic; Arid Western Asia, i.e. middle east and Arid Asia; Australasia, i.e. Australia and New Zealand; Europe; Latin America; North America; small Island states like Malta and Cyprus; and Temperate Asia, i.e. Asian countries between 18°N and the Arctic circle. The study in its finding has given the details of effects of climate change region wise (IPCC, 1997).

IPCC (2001) draws together and integrates for the benefits of policy makers and others, information that has been approved or accepted by the IPCC. This study is intended to assist governments, individually and collectively, in formulating appropriate adaptation and mitigation responses to the threat of human induced climate change. The study conducted through question and answer format consisting of nine broad policy relevant questions suggests that properly designed climate change policies can be part and parcel of sustainable development, and the two can be mutually reinforcing. Sustainable development paths can reduce greenhouse gas emissions and reduce vulnerability to climate change. Projected climate changes can exacerbate poverty and undermine sustainable development, especially in least developed countries. Mainstreaming climate change mitigation is thus an integral part of sustainable development.

While evaluating the progress under clean development mechanism (CDM), Michaelowa (2004) observed that industrialized countries have been astonishingly slow in providing incentives for their private sectors in CDM projects or to buy CERs. The study reports that seven years have passed since the CDM was agreed at the Third Session of the Conference of the Parties to the UN Framework Convention on Climate Change in Kyoto and only one CDM project has been registered. The study also reports that the World Bank has played a catalytic role with its carbon finance program to harness project proposals. Besides the bank, only a limited number of governments have been active in investing in funds and setting up procurement programs. The World Bank's program is expanding and the bank is the largest actor in the CDM Market.

Figueres (2005) assessed the state of global CDM market and observed that in just a short time the CDM has raised global awareness of climate change issues, and has fostered the emergence of a rich body of learning in many developing countries. From the perspective of the market, there is no doubt that the level of project – based

emission reduction transactions, i.e. CERs is growing. At the same time, despite the awareness, institutional preparedness and increased market activity, the CDM is far from delivering its full potential. The study proposes a programmatic approach that would provide a real incentive for developing countries to enact policies and measures that make relevant sectors (energy, industry, transportation, etc.) less carbon intensive over time, thus successfully mainstreaming climate considerations into their economic growth.

UNFCCC (2007) highlights the concerns and needs of developing countries in adapting to the adverse affects of climate change. It outlines the impact of climate change in four developing country regions, i.e. Africa, Asia, Latin America and Small Island developing states. The vulnerability of these regions to future climate change; current adaptation plans, strategies and actions; and future adaptation options have been discussed. The publication points out urgency for developing countries to find ways to implement the adaptation plans finalized.

Christopher and Rosembuj (2008) examined the growth of the international carbon market with focus on CDM of Kyoto Protocol and summarized several lessons learned. The study concludes that the international carbon market has grown tremendously over the past several years. Prior to February 2005, when Kyoto Protocol came into effect, the market was relatively inactive, particularly within the private sector. Early market activity was largely prototype buying by sovereigns and international financial institutions like the World Bank. With the entry into force of the Kyoto Protocol, the international carbon market grew to US\$ 30 billion in two years. The volume of credits generated by projects that reduce greenhouse gases has increased four times during the period 2004 and 2006. The international carbon market has so far been dominated by two types of market-based mechanisms:

- (1) trading of allowances allocated to regulated entities; and
- (2) CERs from wide variety of CDM projects including hydro-electric, wind energy and energy efficiency projects located throughout the developing world.

The study concluded that for growth of the market in the long run, market continuity is a significant issue.

Asian Development Bank (2008) has examined the role of a regional approach in developing financing architecture for climate change and concludes that climate change is a global issue but it has strong regional features and consequently regional institutional and financing arrangements play an important role in its mitigation. The financing needs of climate change mitigation are uncertain and large. The main dedicated source of funding for climate mitigation at global level includes the CDM and various funds managed by Global Environment Facility (GEF)/World Bank. However, the arrangement are lacking at regional levels.

The World Bank (2008) while reviewing the state and trends of the carbon market indicates that carbon market during 2007 has been valued at US\$ 64 billion with transaction of 2,983 million ERs (tons of carbon dioxide equivalent) of various types including 874 million CERs generated from project based CDM. Biggest success of carbon market so far has been to send market signals for the price of mitigating carbon emissions. This, in turn, has stimulated innovation and carbon abatement worldwide, as motivated individuals, communities, companies and governments have cooperated to

reduce emissions. The study further pointed out that the buyers also continued to show a strong appetite for primary project – based emission reductions, i.e. CERs.

Bosi *et al.* (2010) have evaluated the role of the World Bank in carbon finance from a practitioner's perspective. As per the study, the activities of the World Bank engaged in addressing climate change are intrinsically linked to its mission of poverty reduction and support sustainable development in its client countries. The role of the World Bank has been to catalyze a global carbon market that reduces the cost of achieving green house gases reductions, supports sustainable development and benefits the poorer communities of the developing world.

MERCER (2011) evaluated broad ranging impacts of climate change on economies and financial markets over the coming decades. The report identifies a series of pragmatic steps for institutional investors to consider, including allocation to climate-sensitive assets and the adoption of an early warning risk management process. This research was supported by Carbon Trust and International Finance Corporation (IFC) in partnership of Government of Italy, Norway, The Netherlands and Luxembourg. The report suggest that to manage climate change risks, institutional investors need to think about diversification across sources of risks rather than across traditional asset classes. Mitigating climate change risk will require a new approach for investors.

Detailed review of the literature found out that so far no research work has been carried out to study the development of carbon finance market in India and in that sense the present study is a pioneering work in the field of carbon finance in India.

5. Projects registered with CDM executive board with India as host country

Kyoto Protocol came into force on February 16, 2005 and immediately thereafter the project for greenhouse gas emission reduction by thermal oxidation of HFC 23 was registered by the CDM Executive Board on March 8, 2005 to be set up at district Panchmahals, Gujarat with India as its host country. This project was registered for annual emission reductions of 3,000,000 metric tons of CO₂ equivalent. The Annex-1 countries involved with the project for purchase of CERs are Switzerland and the UK.

Number of projects registered during various years from 2005 to 2012 along with expected annual generation of CERs is presented in Table I.

As on December 31, 2012 a total of 1,106 projects from India have been registered as CDM projects by the CDM Executive Board which are equal to 18.48 percent of all the projects (5,982) registered globally. As per estimates of UNFCCC, the expected average annual CERs from these 1,106 registered projects have been estimated at 75,653,994.

The project for GHG emission reduction of HFC 23 located in the state of Rajasthan, India registered on December 24, 2005 is the one registered for highest emission reductions of 3,833,566 per annum, whereas, project for solar steam for cooking and other applications located in the state of Gujarat, India registered on August 22, 2006 is the one registered for lowest emission reductions of 562 per annum.

6. Sector wise distribution of CDM registered projects in India

To date, the energy industries (renewable/non renewable sources) sector has attracted the largest number of CDM projects in India with percentage of registration as 81.98 percent. Manufacturing industries and waste management sectors are the other most popular sectors with percentage of registration as 7.33 and 2.91, respectively. Analysis of distribution of registered projects activities by sectoral scope indicates that

Table I.

Number of projects
registered during
2005-2012 along with
expected annual
generation of CERs

S. no.	Year of registration	Number of projects	Expected annual generation of CERs
1	2005	17	7,255,854
2	2006	124	5,303,994
3	2007	161	15,734,320
4	2008	82	4,417,004
5	2009	94	7,483,975
6	2010	134	9,510,310
7	2011	189	14,461,080
8	2012	305	11,487,457
	Total	1,106	75,653,994

Source: Compiled by summing the expected annual generation of CERs as given in registration details of individual project downloaded from UNFCCC web site: <http://cdm.unfccc.int/>

the sectors which have not reached their full potential include energy demand, construction, mining/mineral production, transportation, metal production, forestry and solvent use. The details of technology or sector wise distribution of the CDM registered projects in India are given in Table II.

The study shows that municipal waste is an area which can contribute to CDM revenue of India in a big way, more particularly through the Municipal Corporations. As of now most of Municipal Corporations do not treat the wastes, but dump the solid wastes having organic contents around 40 percent in the earmarked sites. The dumping

S. no.	Sectoral scope	No. of registered projects	% of total
1	Energy industries (renewable/non-renewable sources)	928	81.98
2	Energy distribution	0	0
3	Energy demand	43	3.80
4	Manufacturing industries	83	7.33
5	Chemical industries	7	0.62
6	Construction	0	0
7	Transport	6	0.53
8	Mining/mineral production	0	0
9	Metal production	2	0.18
10	Fugitive emissions from fuels (solid, oil and gas)	6	0.53
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	5	0.44
12	Solvent use	0	0
13	Waste handling and disposal	33	2.91
14	Afforestation and reforestation	7	0.62
15	Agriculture	12	1.06
	Total	1,132	100

Note: The total number of registered projects have been shown as 1,132 as against 1,106 actually registered because of the fact that some of the projects can be linked to more than one technology type or sector

Source: Compiled from information downloaded from the advance search link of CDM link of UNFCCC web site; CDM-Statistics link of UNFCCC web site: <http://cdm.unfccc.int/statistics/index.html>; CDM-Advanced search link of UNFCCC web site: <http://cdm.unfccc.int/Projects/projsearch.htm>

Table II.

Technology or sector
wise distribution of the
CDM registered projects

of wastes not only generates odor but also landfill gas. Landfill gas contains approximately 50 percent methane and this gas creates greenhouse effect. It is inflammable and hence also poses fire hazard. Methane can be captured and flared, which would mitigate the greenhouse gases emission or could be used to generate energy. Municipal Corporations could perhaps think in terms of manufacturing compost or use the methane for power generation depending on its volume. It would be a good idea for the Municipal Corporations to join hands with private sector to share the cost of such arrangements. Equity participation by the central and state governments and soft loan by bilateral and multilateral agencies would go a long way in enabling the state to turn the waste into gold. In India there are more than 600 Municipal Corporations and not more than 20 have gone in for CDM registration. Legislation by Government of India (GOI) to make it compulsory for all the Municipal Corporations to implement waste treatment plant can help. Beside, the transport sector is another area which also needs the attention of GOI.

The analysis of the data related to type of CDM projects registered during various years indicates that hydro-electric power projects are the most popular projects in the CDM followed by non conventional energy generation projects like wind power, bio mass based and rice husk based electricity generation projects. Other prominent projects are GHG emission reduction by thermal oxidation of HFC 23, methane recovery and energy efficiency improvement projects. Small projects like energy efficiency in residential buildings through distribution of CFL also have significant presence in the CDM registered projects. The analysis do not suggest any evolution along the period analyzed on the type of CDM projects as above stated projects have dominated the CDM portfolio since beginning till end of the year 2012.

7. Details of CER issued by Indian projects and value of corresponding carbon market

Further, the projects which have commenced commercial production, out of total CDM registered projects of India, have generated and issued 162,807,670 CERs as on December 31, 2012, i.e. equivalent to 14.10 percent of the total CERs issued by the CDM projects registered worldwide. The year wise details of the CERs issued by Indian projects along with corresponding value in the international market is given hereunder at Table III.

S. no.	Year	CERs issued	Value in million US\$
1	2005	48,230	0.34
2	2006	12,950,789	138
3	2007	21,200,249	286
4	2008	20,067,879	336
5	2009	18,742,370	238
6	2010	9,325,031	118
7	2011	44,132,446	507
8	2012	36,340,676	305
	Total	162,807,670	1,928

Source: CERs issued year wise: compiled from daily report of CDM secretariat, UNFCCC in respect of CERs issued by various registered projects worldwide during above years; value: computed by multiplying the CERs issued in a particular year by the weighted average rate per CER in the international market for the respective year

Table III.
Value of Indian
carbon market

The value of Indian carbon finance market through sale of CERs has increased from US\$ 0.34 million in the year 2005 to US\$ 507 million in the year 2011 and then declined to US\$ 307 in the year 2012 based on the weighted average rate per CER (primary) in the international market for the respective years. The decrease in the year 2012 is because of lesser generation of CERs by the Indian projects coupled with decline in the rates of CER in the market. In total, transactions worth US\$ 2 billions have been made since inception till end December 2012 through sale of CERs generated by Indian CDM projects.

8. Experience and concerns of Indian projects proponents

Primary study has been conducted to have the first hand information from Indian project proponents about their overall experience of dealing with CDM registration process and in sale of issued CERs. In addition, the specific problems faced in registration of their projects as well as suggestions for further development of carbon finance market in India, have also been sought from project proponents. The issues like significant time taken by DNA in host country approval, non involvement of insurance companies in providing risk cover to CDM projects, high cost of registration beyond capacity of small scale sector of India and absence of dedicated institutional set up to support CDM in India, etc. have been pointed out by project proponents.

It has also been informed that most of the projects registered from India are unilateral projects and CDM has not led to technology transfer from industrialized to developing countries, at large, as far as Indian experience is concerned. Indian projects are, however, benefited by sale of CERs to earn carbon finance.

A majority of project proponents are satisfied with the overall CDM registration process but have informed that there is no centralized government agency helping in development and registration of CDM projects in India. There is shortage of available UNFCCC's approved validators required to be engaged mandatorily for validation process. The attitude of the validators has been found cooperative but the validation process involves much more time than stipulated by UNFCCC of around five months. Only 21 projects out of 82 numbers studied, have been validated within five months. Time ranging seven to 12 months have been taken by the validators for completing the validation process in case of other projects from whom information have been collected.

Beside above, one of the major concerns of all the project proponents contacted was the uncertainty about sale of CERs beyond December 31, 2012 the end of the Kyoto Protocol period. The same has since been addressed as countries which are Parties to UNFCCC have already decided to go in for second commitment period of eight years commencing from January 1, 2013. Indian project proponents expect GOI to work actively with the international communities for survival of CDM in all times to come.

9. India's stand on post-Kyoto Protocol regime

For the last three years the carbon market proponents worldwide were fast at work ensuring that the Kyoto Protocol's emission offsetting system survive longer than the treaty itself as well as in adoption of a new package of decisions that set all governments more firmly on the path towards a low – emission future. For post-Kyoto Protocol regime, one of the popular view emerged around the world

was for binding climate targets even for developing countries like India and China. However, since beginning it was made very clear by the India that being a developing country with its economy growing at the rate of 8-9 percent, India is not ready to accept any legally binding emission reduction targets. The statements issued on behalf of GOI from time to time indicates that India has been more engaged and open to the idea of implementing domestic policies and measures that will help reduce its greenhouse gas emissions. The National Action Plan on Climate Change (NAPCC) and its eight national missions announced in June, 2008 was a first step in this direction. Further, the government is ready to adopt a voluntary target to cut carbon intensity by 20-25 percent from 2005 levels by year 2020. In this connection, India is determined that its per capita greenhouse gas emissions will at no point exceed that of developed countries even with pursuing its development objectives. Considering the plea of GOI, no binding targets have been introduced for India during second commitment period of Kyoto Protocol.

10. Suggestions

The following suggestions are made to the policy makers aimed at better participation in climate change mitigation during the second commitment period of Kyoto Protocol. The feedback received from the Indian project proponents have been considered well while framing the following suggestions:

- It is the necessity of the day to establish a strong institutional framework to help Indian entrepreneurs and industrialists in development of CDM projects including consultancy services from development of project design document (PDD) to registration by CDM Executive Board as well as to assist the registered CDM projects in trading of generated CERs.
- Government may provide financial incentive to the potential projects to be registered as CDM projects by way of bearing total cost or a part thereof involved in registration which mainly include fees for preparation of PDD, cost of engaging designated operational entity (DOE) for validation process and fee to be deposited with UNFCCC for registration. The expenditure incurred by the Government may be recovered from the sale of CERs generated. In case of rejection for registration by CDM Executive Board, the cost needs to be borne by the government, thus providing risk coverage to the project developer.
- The process for the Host Country approval by the DNA needs to be simplified. The frequency of DNA meetings may be increased so as to cut down the time taken in host country approval. Presently DNA consists of high officials mainly of Ministry of Environment & Forests, GOI, who otherwise are very busy in various other important assignments of the ministry. It would be more appropriate to revisit the constitution of the DNA so as to make it dedicated to host country approvals mainly. In no case, the time taken for host country approval be more than two months.
- Establishment of a financial institution dedicated to provide financial assistance to CDM projects, is the need of the hour. A public sector financial institution in line with Power Finance Corporation established by government to look after the financial needs of power sector projects needs to be considered.

- The insurance companies may be encouraged to provide for risks associated with development of CDM projects and trading of generated CERs. If necessary, change in the legislation be made for this type of coverage by the insurance companies.
- The emerging low carbon global economy presents challenges and opportunities for businesses of all kinds. It demands alternative business tools, fresh ways of thinking, and a new generation of managers. There is a great need to introduce a new MBA course in strategic carbon management in the leading Business Schools of India, which focuses on business management in general and carbon management in particular as the two go hand in hand. Norwich Business School of University of East Anglia, UK has launched the world's first MBA in strategic carbon management in the year 2007. India being one of the biggest beneficiaries of carbon revenue through sale of CERs, a similar action is required here also.
- At present, one third of India's total energy consumption is from oil of which 70 percent is imported. It has been estimated that this number could become as high as 90 percent by year 2025. Increase dependence on foreign and dirty sources of energy is not a long term sustainable option, economically as well as environmentally. Building the economy on a climate friendly way, i.e. generation of energy through hydro and other renewable resources will not only provide for energy security but also offer climate benefits.
- At present the CDM projects get themselves registered and once they commence operation, the CERs are verified, certified and issued, where after they are sold in the international market and the revenue realized. At best, the CDM revenue goes to repay the loan. Instead, if the CDM revenues can be considered as a source of finance to meet the cost of project, it could help the promoters to bring down the loan component and also save the interest. This could go a long way in improving the overall viability of the project. This would involve estimating the eligible CERs on ceteris paribus condition and selling them in advance (as forwards) to a Qualified Institutional Buyer (QIB), who would pay upfront the benefit. QIB could, in turn, sell it forward or await the realization and sell thereafter to realize a better price.

However, one problem that is likely to occur is the uncertainty. QIB has to take a risk of advancing the money based merely on paper registration. Though CDM benefits securitization faces same amount of uncertainty as any securitization of receivable faces, the risk is slightly higher in the case of CDM projects because the projects may not be registered as Greenfield project. This would call for minimizing, if not altogether eliminating the risk. The only option to achieve this is to go in for insurance. General Insurance Corporation (GIC) of India needs to introduce specific insurance schemes to take care of CDM related risks, in line with Swiss Re and Munich Re who have already formulated insurance schemes to provide insurance cover to projects leading to climate change mitigation.

- The projects originate in financial institutions, in the sense that but for their financial assistance project activity could not have become a reality. While appraising the project itself, the financial institutions need to educate the project proponents about the CDM benefits and take up a sort of appraisal to ascertain

the eligibility of the project as CDM. This may provide more confidence to project proponents leading to their willingness in taking the risk of investing in CDM activities.

Likewise, while estimating the preliminary and pre-operative expenses, the financial institutions may provide for CDM consultancy, validation and registration fees in the cost of project so that the project proponents are well informed about the expenditure to be incurred to get the additional cash flow. The financial institutions thus can play major role in development of carbon finance market in the country.

11. Conclusion

The study of CDM in context to India finds out that the portfolio of registered projects with India as host country is dominated by unilateral projects, i.e. the investors are Indian parties, employ locally available technologies, and use domestic financial resources. Industrialized countries have not participated significantly in project financing and remained concerned with the purchase of generated CERs only, the project risks are mostly taken up by the host industries.

The contribution of the Indian carbon finance market with 1,106 CDM registered projects equal to around 18 percent of the total projects registered globally and having contributed more than 14 percent of the total CERs generated worldwide, thus helping the world in reduction of emission equivalent to 163 million tons of carbon dioxide, can be considered to be remarkable in mitigation of climate change. In the global CDM experience, India's role is striking with its second highest share both in generation of CERs and in terms of number of projects registered worldwide, followed by Brazil. The largest player in the field is China with its share more than 55 percent.

This achievement becomes more significant keeping in the consideration the constraints it faced in terms of poor institutional set up in place in India for assistance in CDM registration and in trading of CERs as well as lack of general government support.

India has a well-developed policy, legislative, regulatory, and programmatic regime for promotion of energy efficiency, renewable energy, fuel switching, energy pricing reform, and addressing GHG emissions in the energy sector. However, India needs to setup an institutional framework dedicated to assist the development of CDM projects and needs to ensure economic growth and development in a sustainable and low carbon way. The participation of India in climate change mitigation in terms of its share can definitely be improved with commitment and through intense and concerted effort.

It has been argued by some that India should concentrate on economic growth and development rather than dealing with climate change by investing resources in curtailing greenhouse gas emission. It is suggested that India does not need to make choice between the two, in fact the both can go hand in hand. In charting out a developmental pathway which is ecologically sustainable, India has wider spectrum of choices precisely because it is at an early stage of development. India's approach need to be open and must also be compatible with its role as a responsible and enlightened member of the international community, ready to make contribution to the solution of a global challenge, which impacts the humanity as a whole.

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About the author

Dr Anil Gupta is a Mechanical Engineering graduate with First Class Honours from National Institute of Technology, Kurukshetra, India of the year 1983. He also has an MBA from IGNOU, New Delhi, India with specialization in Finance. In the year 2012, he has been awarded his PhD in carbon finance by Himachal Pradesh University, Shimla, India. He has researched and authored various articles and papers in the area of carbon finance, project appraisal systems, modified IRR, and working capital finance, etc. Dr Gupta is presently Head of Hydro Mechanical Design Department of SJVN Limited, Shimla, a Public Sector Power Corporation of India. Besides operation of already executed 1,500 MW underground Nathpa Jhakri Hydro Power Station, the largest in India, this corporation is also engaged in the implementation of a large number of hydro power projects in India and neighboring countries like Bhutan and Nepal. Prior to this, he was positioned in the Corporate Planning and Carbon Finance Department of this corporation as Dy General Manager where he has significantly contributed in the registration of 412 MW Rampur Hydro Electric Project of the corporation as CDM Project for annual emission reduction of 1.41 million CERs. Before joining the SJVN in the year 1996, he was Appraisal Officer with State Financial Corporation where he has appraised large number of small and medium sector projects for ascertaining technical and financial viabilities. Anil Gupta can be contacted at: friendsfort@gmail.com

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