NATIONAL STRATEGY STUDIES

CDM Implementation in India

The National Strategy Study

Summary






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The Energy and Resources Institute

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PREFACE

The Kyoto Protocol to the United Nations Framework Convention on Climate Change comes into force on 16 February 2005, after seven years of rigorous negotiations. With this, there is a renewed vigour for mechanisms such as the CDM, which will not only help Annex 1 Parties to meet their binding emission reduction commitments, but also provide for implementing projects that contribute to sustainable development in non-Annex 1 countries. It thus becomes important for developing countries, particularly India, to explore various possible opportunities for emissions reduction, which align with our development priorities as also provide an enabling environment for implementation of CDM in the country.

The NSS (National Strategy Study) for CDM implementation is an important effort in this context, and has provided an outline of a strategy that India should adopt to capitalize on the opportunities that CDM offers. It has given due recognition to the current vibrancy in CDM project development in the country, new national and international developments, and the need to channelize and synergise all efforts to maximize the benefits to India and Indian project promoters. The NSS has also made immense contribution in outreach and capacity building through various means such as workshops and conferences across the country, stakeholder consultations and surveys, and web-based information dissemination, thus making it a truly participative exercise.

I sincerely thank all those who have contributed to this significant study, especially our partners IDFC, INFRAS AG, Ernst Basler + Partners Ltd, LASEN-EPFL, and all the national and international reviewers including the members of the Technical Advisory Group and the Steering Committee set up for the project. The support and guidance provided by the World Bank, the State Secretariat for Economic Affairs, Government of Switzerland, and the Ministry of Environment and Forests, Government of India, has ensured that this very relevant project was undertaken for India and its timeliness needs no underscoring.

(R K Pachauri)
Director-General, TERI

ACRONYMS/ABBREVIATIONS

CDCF	Community Development Carbon Fund
CDM	clean development mechanism
CER	certified emission reduction
CERT	certified emission reduction trade
CERUPT	certified emission reduction unit procurement tender
CF-Assist	capacity building and technical assistance for carbon finance
COP	Conference of the Parties (to the United Nations Framework Convention on Climate Change)
DBC	divided blast cupola
DNA	designated national authority
DOE	designated operational entity
EB	Executive Board
ECN	Energy Research Centre of the Netherlands
ETrACS	energy tracking and control systems
EE	energy efficiency
ERPA	emission reduction purchase agreement
ERU	emission reduction unit
ETS	emissions trading scheme
EU	European Union
GHG	greenhouse gas
GTZ	German Technical Cooperation
GWP	global warming potential
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
IDFC	Infrastructure Development Finance Company Ltd
IGCC	integrated gasification combined cycle
JI	joint implementation
LASEN-EPFL	Laboratory of Energy Systems, Swiss Federal Institute of Technology
LULUCF	land use, land use change, and forestry
M&P	modalities and procedures
MAC	marginal abatement cost
MoEF	Ministry of Environment and Forests
MOP	Meeting of the Parties (to the Kyoto Protocol)
MSW	municipal solid waste

NCA	National CDM Authority
NEDO	New Energy and Industrial Technology Development Organisation
NGO	non-governmental organization
NSS	National Strategy Study
OECD	Organisation for Economic Cooperation and Development
PCF	Prototype Carbon Fund
PDD	project design document
PFC	perfluorocarbon
PIN	project information note
PIAD	Pembina Institute for Appropriate Development
SICLIP	Swedish International Climate Investment Programme
SME	small and medium enterprise
SSC	small-scale CDM
TAG	Technical Advisory Group
TERI	The Energy and Resources Institute
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States dollar

EXECUTIVE SUMMARY

The National Strategy Study for implementation of the CDM (clean development mechanism) in India analysed opportunities associated with emerging international markets for greenhouse gas offsets, evaluated India's CDM potential through 2012, and investigated key methodological issues related to the CDM from the perspective of India. The open call for CDM project proposals conducted under the study attracted 68 PINs (project information notes) across the energy, industry, building, agriculture, and transport sectors. Four project design documents were prepared from these PINs, while another was prepared as a case study. The PDDs (project design documents) included two on power generation (small hydro and rural electrification), two on energy efficiency (small-scale industry and municipal street lighting), and one on waste pelletization.

Based on the analytical results and experience gained through this study, and considering both the evolution of the international CDM regime and the particular national circumstances of India, this report outlines India's CDM approach that

- is proactive and takes advantage of the favourable enabling factors (such as a good technical base, the institution of a DNA [designated national authority] approving projects in a time-bound manner, a large number of projects at various stages of development), which have placed India well in the international carbon market to tap CDM opportunities emerging early during the first commitment period; and
- underscores sustainable development benefits of CDM, by ensuring the contribution of CDM project activities to sustainable development priorities of India.

The recommended approach is based on the following main insights gained from the methodological case study and modelling work undertaken by the study team.

- India's CDM potential represents a significant component of the global CDM market.
- High quality CDM projects must be developed within the next two years (2005 and 2006) for India to capitalize on its CDM potential during the first commitment period 2008–12.

- Implementation of the CDM in India can deliver significant local, economic and sustainable development co-benefits. Notwithstanding the above, project types most in demand at this time tend to yield lower sustainable development co-benefits (non-CO_2 industrial projects) or are otherwise commercially feasible only with government subsidies (renewable energy).
- A higher level of effort is required in the large energy consuming public and private sectors to harness CDM in support of national strategies and sectoral programmes.
- Enterprises face a number of challenges and barriers to CDM development and implementation in practice, such as inadequate capacity, a time-consuming and costly process to obtain approval of baseline methodologies and uncertainties about the legal and regulatory framework. Based on the PDDs and case study prepared, the study provides guidance to project developers, bundling organizations, and financial institutions.

Finally, the study proposes a number of recommendations for decision-makers to enhance CDM implementation, including the following.

- *India's CDM strategy, policy and implementation plans* Adopt a proactive and sustainable CDM policy. This involves policy guidance on unresolved issues such as the sharing of CERs (certified emission reductions) between project proponents and utilities, as well as advice to ministries on how best to leverage CDM financial flows to achieve government priorities in sustainable development and how to ensure that progressive policies and regulations do not stand in the way of demonstrating the additionality of legitimate CDM projects.
- *India's NCA (National CDM Authority)* Strengthen the NCA through an 'action plan' emphasizing organizational strengthening, inter-ministerial coordination, capacity building at state and regulatory body levels, as well as information dissemination and outreach.
- *Further steps to facilitate CDM transactions* Cooperate with potential investors and stakeholders from the public and private sectors to establish facilities for risk management and project financing. This could take the form of a national CDM fund, that supports the enhanced development of good quality and highly relevant CDM projects for the first commitment period.

- *Longer term considerations* Undertake follow-up analysis on key issues (related to market barriers, procedural complexities, and prices), and thereby contribute to the evolution of the carbon market with enhanced attractiveness for project proponents, for a post-2012 period.

The study pursued an analysis of the prevailing circumstances in India through top-down and bottom-up approaches. On this basis, the study presents a comprehensive package of conclusions and recommendations for consideration by the Government of India, potential project proponents, and the interested national and international audiences.

CDM implementation in India
The National Strategy Study
SUMMARY

The NSS (National Strategy Study) for CDM (clean development mechanism) implementation in India was launched by the World Bank; the State Secretariat for Economic Affairs, Government of Switzerland; and the MoEF (Ministry of Environment and Forests), Government of India in October 2003. The study was executed by TERI (The Energy and Resources Institute), New Delhi in partnership with the IDFC (Infrastructure Development Finance Company) Ltd, a national legal expert, and appointed Swiss experts Infras AG, Ernst Basler + Partners Ltd, and LASEN-EPFL (Laboratory of Energy Systems, Swiss Federal Institute of Technology).

NSS-India: context, objectives, and process

The broad aim of NSS-India was to assess the issues and opportunities presented by potential international markets for GHG (greenhouse gas) offsets through the CDM, and evaluate processes and methodologies to facilitate the CDM project cycle. Recognizing that significant developments were already taking place nationally and internationally as the CDM evolved from idea to fruition, the NSS-India study was oriented in line with the new World Bank capacity building programme, CF-Assist (capacity building and technical assistance for carbon finance). It was designed to build upon the considerable body of existing knowledge on the subject, and to focus more on facilitating the operationalization of the CDM in India through strategic analysis, capacity building, and development of CDM projects.

This study has examined the international demand for CERs (certified emission reductions), the supply potential from India and the application of CDM methodologies in the Indian context by developing five project design documents. Furthermore, elements of a facilitative framework for CDM implementation in India are presented.

The study framework excluded consideration of LULUCF (land use, land use change, and forestry) CDM projects. Also, the selection of five projects developed as PDDs (project design documents) was undertaken in consultation with the TAG (Technical Advisory Group) of the NSS. The selection reflects an emphasis on small-scale projects, which is not an indication of the Government of India's intent to promote projects of this scale only. Rather, it is an indication of the

importance the TAG accorded to using public funding to analyse issues, and garner new knowledge in areas and for projects that would not normally be addressed by commercial operations. A case in point is the case study on rural electrification and its development into a PDD. In addition, the PINs (project information notes) that were submitted to the open call for projects, under this study effort, had significant representation from the small-scale sector, skewing the final selection of projects.

Stakeholder involvement and dissemination at various stages of the study was achieved through various forms of outreach, including participation in workshops and other events, electronic communication, interaction with individual stakeholders, and technical inputs and consultancy. The NSS-India has been an open and participative process, and has helped forge an informal alliance among different stakeholders in the country.

International developments related to the CDM were constantly monitored and assessed during the course of the study. Given the pace at which the CDM is evolving, there will always be some developments, which will not find mention in this study by the time it comes into print.

International demand for CDM

The Kyoto Protocol will enter into force on 16 February 2005. The Annex B countries to the protocol have to collectively reach a targeted reduction of 713 $MTCO_{2eq}$ (million tonnes of carbon dioxide equivalent) from their 1990 emission levels in the first commitment period. A review of the National Communications submitted by Annex 1 countries reveals that the total demand for Annex 1 (EU15 [European Union 15] + OECD [Organisation for Economic Cooperation and Development]) countries is 846 $MTCO_{2eq}$ per year (with an uncertainty range of 415–1250 $MTCO_{2eq}$ per year [Table 1] [Grubb *et al.* 2003]). This estimate takes into consideration the emission trajectories of these countries and domestic action to reduce emissions since 1990.

India can capture 10% or more of the global CDM market during the first commitment period, earning up to 100 million USD per year.

For meeting a CER supply level of 15 $MTCO_{2eq}$ by 2010, a few large or several medium- to small-size projects would need to be in operation in India by 2007.

The supply potential for hot air and JI ERUs (joint implementation emission reduction units) is estimated to be in the range of 365–1070 $MTCO_{2eq}$ per year (Grubb *et al.*

Table 1 Summary of projected demand for carbon offsets (carbon emission reduction trade model and literature-based analysis)

Global carbon market (Grubb 2003)	415–1250 $MTCO_{2eq}$/year
Global market carbon price range	1.3–6.1 $/$TCO_{2eq}$
Global CDM volume	37.8–264.0 $MTCO_{2eq}$/year
Volume of Indian CER exports[a]	3.7–26.4 $MTCO_{2eq}$ /year
India's export revenue	4.8–106.6 million $/year
Share of India in CDM	10%

[a] The global CDM market volume and market price, the volume of Indian CER exports, and India's export revenues and market share summarize the results of various CERT scenarios. The CER price of the scenario with the highest Indian CER exports is 4 USD/TCO_{2eq} only. Therefore, the resulting export revenues are 106.6 million USD.

2003). This implies that the global CDM market size could be between 50 and 180 $MTCO_{2eq}$.

India faces a potential CDM market that has become but a fraction of its originally envisioned size, primarily due to the rejection of the Kyoto Protocol by the United States, which is the largest emitter of GHGs in the world, accounting for over a third of all Annex 1 CO_2 (carbon dioxide) emissions, and would have had significant demand for offsets to meet its Kyoto target. The significant existence of huge amounts of 'hot air', mainly from Russia and Ukraine (now possibly also from Kazakhstan), and the rules concerning the inclusion of sinks in the Marrakesh Accords have further exacerbated the situation.

In fact, discussions summarizing different market projections (Ellermann, Jacoby, and Decaux 1998, Grubb *et al.* 2003) focus on the issue of whether to expect a low or high surplus scenario. On the other hand, there are barriers in the hot air market as well. They may, as one among other factors, explain why the interest from investor side in CDM projects in India observed during recent months exceeds the level projected by economic modelling.

India's policy-makers thus need to strategically assess opportunities in the emerging carbon offset market at the macro and micro levels. The potential supply and demand for CERs in the global carbon trade market, carbon price trends, priority areas for carbon finance investments (especially in the energy-related sectors), and how best to bring Indian CERs to the market are the issues addressed in chapters 2, 3, 6, and 7 of the study.

To answer some of the market-related questions, a carbon market equilibrium model CERT (carbon emission reduction trade) was used. The model estimates future carbon emission and applies marginal abatement cost curves for different regions in the world, to estimate their share in the carbon market, equilibrium carbon prices and the possible carbon trade. CERT-based projections are, however, severely limited in their ability to simulate specific market conditions anticipated to prevail in the short or long terms. This is because the marginal abatement cost curves do not appropriately reflect the favourable cost structure in the non-CO_2 market segment and assume a market equilibrium, which, for reasons of supply-side constraints, is unlikely to be established within the short time span left up to 2010.

Table 1 summarizes the range of CER volumes and prices estimated by CERT. They indicate that India is likely to capture 10% of the global carbon market during the first commitment period. The country's volume of CER exports in 2010 may range between 3.7 $MTCO_{2eq}$ and 26.4 $MTCO_{2eq}$, bringing in revenue in the range of 5–100 million USD (US dollar) per year. For meeting a CER supply level of 15 $MTCO_{2eq}$ by 2010, a few large and several medium- to small-size projects would need to be in operation in India by 2007. Price leadership of eastern Europe and former Soviet Union and hence the Russian ratification of the Kyoto Protocol is the main factor leading to a significant CDM market size as well as carbon offset price in the projected range of 4–6 USD/TCO_{2eq}.

CERT results consider potential CER volume and price, but not crucial enabling factors such as institutional arrangements, project preparation and technical capacity, related transaction costs, risk profile of country/project, transaction types and contractual arrangements, or host country CDM policies, which determine the relative competitiveness of a host country. These factors seem to make India quite attractive at present, particularly with respect to China.

The EU ETS (European Union emissions trading scheme), along with the Linking Directive, creates some demand for CER and ERU purchases by private enterprises, in addition to carbon offset tenders floated by Annex 1 governments.

CER exports from India closer to 20–25 $MTCO_{2eq}$ per year range could be achieved, if India takes a proactive approach towards the CDM, and if prospects for an extension of the Kyoto regime beyond 2012 emerge in the coming years. Currently, the emphasis is on contractual obligations of purchases for the first commitment period only.

The EU ETS (European Union emissions trading scheme) along with the Linking Directive creates a large and presumably stable market for CERs and ERUs. Nine of the EU 15 countries have declared that they plan on using CDM/JI for reaching their Kyoto commitment[1] (Zetterberg, *et al.* 2004). Table 2 sums up the current announced government commitments, and plans to purchase CERs and ERUs and the minimum demand by industry in Europe under the ETS (emissions trading scheme). The lower bound figures (Natsource 2003) are more realistic given the assumption of low MACs (marginal abatement costs) for China[2] assumed by Criqui and Kitous (2003). Further, the increase in oil prices since 2003, assuming these remain high, makes domestic action in Annex 1 countries more cost-effective, and may reduce demand for the CDM.

Table 2 Estimates of total demand ($MTCO_{2eq}$) for Kyoto units in 2010

	Government demand		*Industry demand*		*Total demand*	
	Natsource (2003)	*Criqui and Kitous (2003)*	*Natsource (2003)*	*Criqui and Kitous (2003)*	*Natsource (2003)*	*Criqui and Kitous (2003)*
Australia and New Zealand		12		23		35
Canada	12.0–81.8	74	22.4	20	34.4–104.2	94
European Union 25	53.9–462.8	113	45.0–173.7	111	98.9–636.5	224
Japan	17.7–217.6	26	34.8–92.4	34	52.5–310	60
Norway and Switzerland		16		10		26
Total demand	83.6–762.2	241	102.2–288.5	198	185.8–1050.7	439

Source Haites (2004)

The current early CDM market is a buyers' market. Accordingly, prices do reflect the buyers' willingness to pay, project type, type and size of transaction, transaction costs, risks and modalities for sharing them between buyers and sellers, premium for sustainable development contribution, and other factors. The investors perceive India as an important CER supplier, when deals are transacted in the form of CER purchase agreements (as opposed to investment deals).

[1] Austria, Belgium, Denmark, Finland, Germany, Ireland, Italy, Luxembourg, and The Netherlands

[2] The China CDM Study (World Bank 2004) came up with a significantly steeper MAC curve for China than assumed by earlier studies

Price would not be the only consideration deciding purchases of CERs, ERUs, and ETUs by Annex 1 project participants or governments, and price, itself, depends on many factors.

High ratings by independent rating services are based on the fact that a significant number of transactions have already taken place and basic CDM infrastructure is operational in the country. Furthermore, India has a potentially large supply of CERs and a good number of proactive market participants with the capacity to implement viable projects.

Potential for CDM in India

For India to capture a large share of the CDM market and to sustain its present leading position as host country, it is essential to promote the preparation and implementation of CDM projects at a higher rate than its competitors. Other factors that may enhance India's attractiveness are outlined in the section on facilitative framework, which comprises strengthening the capacity of domestic institutions (including the DNA [designated national authority], financial institutions, key sector organizations) and project developers, providing clear guidance about project eligibility and sectoral baselines, and promoting domestic operational entities.

India should adopt a proactive approach by promoting preparation and implementation of CDM projects at least on a pace equal to its competitors.

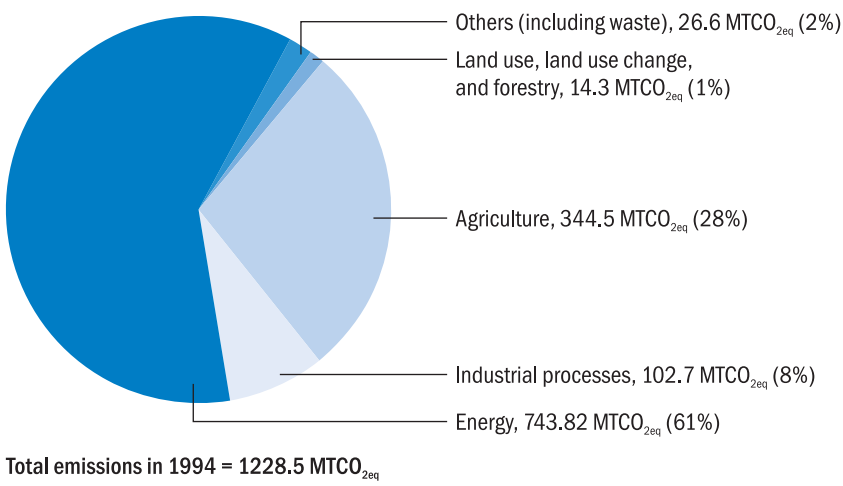

Figure 1 Sectoral GHG emissions in 1994
Source National Communication (2004)

According to India's first National Communication (2004), the energy sector contributed the largest share of total GHG emissions in 1994 (Figure 1). This is the latest available official estimate of GHG emissions from India.

A comparative analysis of GHG emissions from the energy sector (fuel combustion in different sectors) in 1994 with the estimates for 2000 shows an increase from 744 to 922 $MTCO_2$. Bulk of this increase is in the energy and transformation sector, which primarily includes fuel consumed for power generation (Figure 2).

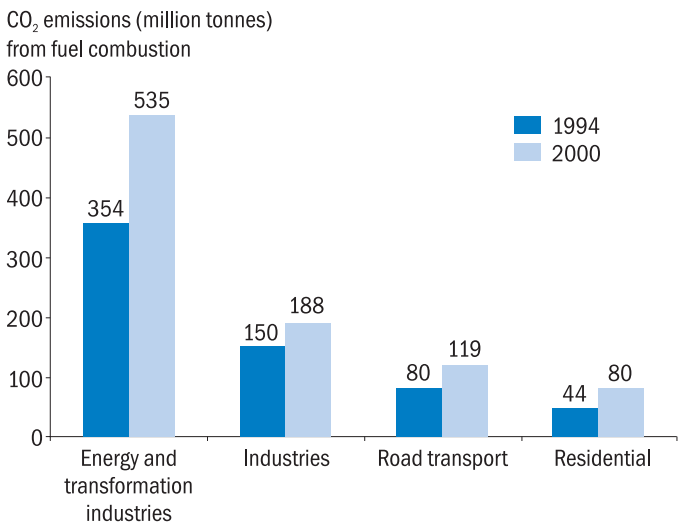

Figure 2 GHG emissions from combustion of fuel

Given the predominance of the energy sector, an analysis of key technological and management options to mitigate GHG emissions was undertaken in the conventional power, renewable energy, industry, and transport sectors. Further, scope for mitigation in municipal solid waste and industrial gas sectors up to the year 2012 was also estimated. This potential aggregates to 417 $MTCO_{2eq}$ and is presented in Figure 3.

The GHG mitigation potential in the power sector lies in adoption of technologies such as super critical power plant, IGCC (integrated gasification combined cycle), and through renovation and modernization of existing plants. Together these options can achieve a cumulative GHG emission reduction of about 102 million tonnes by

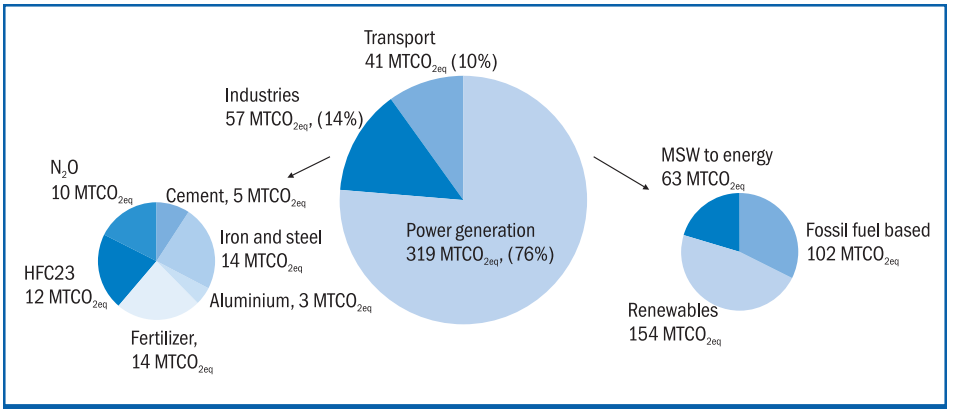

Figure 3 GHG mitigation potential (total 417 $MTCO_{2eq}$) in key sectors till 2012

2012. In addition, power generation through renewable energy sources and municipal solid waste offers substantial potential for emission reduction.

In the renewable energy sector, grid-connected power generation options such as biomass-based power generation, wind energy, and small hydro have been considered. The renewable energy targets for the next 10 years (up to 2012), which are likely to be achieved, form the basis of a mitigation potential of 154 million tonnes.

The industry sector estimates include options such as energy efficiency and fuel switching in fertilizer, cement, iron and steel, and aluminium industries. In the industrial gases category, the options considered are HFC (hydrofluorocarbon) waste stream incineration and N_2O (nitrous oxide) emission reduction through thermal and catalytic destruction processes in adipic acid production.

In the transport sector, the mitigation potential is primarily calculated assuming the increased penetration of public transport from the current level of 43% to 55% by 2012, as improvements in fuel efficiency of vehicles are already integral to the dynamics in this sector. The mitigation potential is 41 $MTCO_{2eq}$, which is relatively small compared to opportunities in the energy and transformation sector.

The CDM projects approved by the NCA and the PINs submitted to the NSS mirror the high mitigation potential offered by renewable energy sources.

The sectoral mitigation potential described above is only the technological potential based on various interventions that are at different stages of planning. However, their economic evaluation and CDM eligibility needs to be analysed in detail. Thus, these may, at best,

represent a theoretical short-term potential for CDM. The long-term mitigation potential is significantly larger and was identified at 865–1080 $MTCO_{2eq}$ by the ALGAS (Asia Least-cost Greenhouse gas Abatement Strategy, India) study (ADB, GEF, and UNDP 1998).

The CDM project portfolio currently approved by the NCA (National CDM Authority) is dominated by small-scale projects mainly from the renewable energy sector (Figure 4), which mirrors the mitigation potential estimated above. The call for PINs under this study also reflected this trend of high submissions from the renewable energy sector (Figure 5).

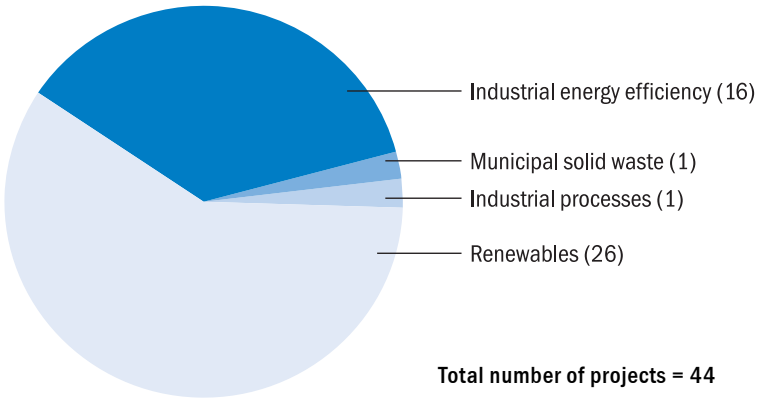

Figure 4 Projects approved by the National CDM Authority
Source NCA, India

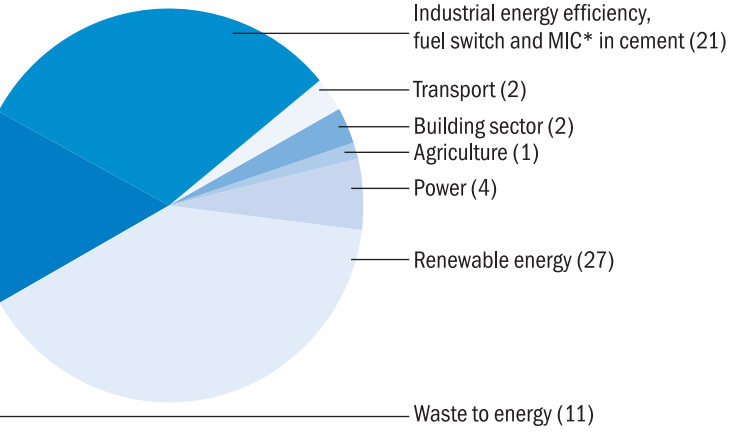

Figure 5 Project idea notes received under the National Strategy Study

An analysis of the CER generation potential of the PINs received under the NSS call, however, reveals that even though much of the enthusiasm emanates in the small project category, a few large projects can overwhelm the likely share of India in the CDM pie.

Issues and concerns related to project preparation and approval

The CDM project development in India is induced by consultants' preferences and/or donors' capacity building programmes. It is not a self-propelled exercise.

At present, the development of CDM projects in India is largely consultant-driven and/or influenced by international donors' capacity-building initiatives in support of PDD development (Table 3). These initiatives, however, do not propose to buy the CERs, as the funding for these initiatives is through ODA (overseas development assistance). Thus this is an 'induced' project preparation market and not completely self-propelled.

Project financing aspects are often not equally developed as the carbon market related project preparatory activities.

Table 3 Project design documents funded by international donors in India

Sector	*Donor agency*							*Under call for CDM tenders*		
	GTZ India	*Canada: PIAD*	*FCO, UK, eco securities*	*Japan: NEDO*	*EU: IT power: ECN*	*IDFC: PCF*	*Rado India*	*CERUPT*	*SICLIP (Sweden)*	*Finland*
Renewable energy					■					
Wind power	■	■					■	■		
Small hydro	■	■								
Biomass		■					■	■	■	■
Cogeneration						■				
Waste to energy	■					■				
Solar		■								
Energy efficiency	■	■	■	■		■				
Transport	■			■						
Fuel switch	■					■				
Coal-bed methane	■									
Power sector	■									

GTZ – German Agency for Technical Co-operation; PIAD – Pembina Institute for Appropriate Development; FCO – Foreign Commonwealth Office, United Kingdom; NEDO – New Energy and Industrial Technology Development Organisation; EU – European Union; ECN – Energy Research Centre, The Netherlands; IDFC – Infrastructure Development Finance Company, PCF – Prototype Carbon Fund; CERUPT – certified emissions reduction units procurement tender; and SICLIP – Swedish International Climate Investment Programme

Although there is vibrancy in India for PDD development, there are several outstanding issues constraining wider participation of project proponents, as highlighted below.

Facilitative framework for CDM implementation in India needs to take cognizance of issues emanating at each step of the project cycle.

The CDM project cycle has been defined in the Marrakesh Accords (2001). At each step of the cycle, there are ambiguities in interpretation and unresolved issues. Major issues related to CDM project cycle are listed in the Table 4.

Table 4 CDM project cycle-related issues

Project steps	*Key issues*
Project conceptualization	The project developers are often not sure whether a project being undertaken by them will be eligible for CDM
Host country approval	The MoEF (Ministry of Environment and Forests) has brought out interim approval criteria, but greater clarity is required to understand the application of these criteria
PDD (project design document) preparation	■ Availability of limited number of approved methodologies is a bottleneck ■ Consolidated methodology approved by the EB (executive board) may be difficult to comprehend and apply in a developing country context due to data constraints ■ Demonstrating additionality crucial yet difficult
Validation of PDD by DOE (designated operational entity)	■ Choice of validator function of mutual consent of buyer and seller, but buyer may exercise his preference for an internationally renowned DOE, which may lead to higher transaction costs ■ Government of India keen on a national DOE due to a perception of higher charges by international DOEs* ■ However, the liabilities attached to the accreditation as a DOE may pose a barrier in emergence of national operational entities
Registration with the CDM EB (Executive Board)	■ Only one project has been granted registration by the EB until now, which is being perceived as a protracted international process for registration.** ■ Request for reviews by the EB on projects that have cleared all requisite stages for registration may dampen the project submissions
Project implementation	■ Integration of CDM revenues in project financing lacking; most financial institutions do not yet know how to properly value the CER revenue stream in carbon purchase transactions ■ Risk of non-delivery of CERs due to non-performance necessitates risk management measures

Continued...

Table 4 CDM project cycle-related issues (*continued...*)

Project steps	*Key issues*
Monitoring	Rigorous monitoring and verification contribute to transaction costs, which can make smaller projects financially unviable, although rules for small-scale projects provide some relief.
Verification and certification of emissions reduction	Lower frequency of verification, as suggested by some stakeholders, lowers transaction costs but may reduce the current market value of CERs, as the buyers would provide a discounted price for such CERs
Issuance of CERs	Once the request for issuance of CERs is submitted to the EB, the only issue remaining may be the time taken for actualization of revenues from CERs

* ICFRE (Indian Council for Forestry Research and Education) is preparing its application for DOE status for the LULUCF sector.

** According to one estimate, the CDM EB must approve about 1700 projects by 2010 to meet annual global demand for CDM credits of 428 $MTCO_{2eq}$ (RFF 2004)

A CDM project has to generate at least 4000 CERs per year in order to cover the transaction cost alone.

All the steps in the project cycle have associated costs, which contribute to the aggregation of transaction costs. In some cases, given the prevailing prices of CERs, these costs may not be offset by the CDM revenues. This may dampen the supply of projects. IDFC's experience reveals that the transaction costs today range between 65 000 and 250 000 USD in India, and at a price of 5 USD per CER, a threshold of 4000 CERs need to be generated per year to break even.

Further, of the nineteen methodologies submitted from India, only two have been approved. This low success rate indicates the level of understanding and the quality of PDDs being prepared and the scope of improvement in skills of consultants. This high drop-out rate establishes a considerable barrier to further market development. It is linked to the uncertainties of the emerging policy framework as well as to the very project-specific approach to development of methodologies for approval by the EB (Executive Board).

Only two of nineteen methodologies submitted by India have been approved by the Executive Board.

Application of CDM methodologies to projects in India

Under the NSS effort, five projects were selected for PDD development.

- Energy efficiency improvement in small-scale foundry units in Rajkot, Gujarat
- Grid-connected run-of-river small hydro (renewable energy) in Kullu, Himachal Pradesh
- Recycling of MSW (municipal solid waste) into refuse-derived fuel in New Delhi
- Energy efficiency in municipal street lighting in Bangalore
- Rural electrification by decentralized distribution generation systems through mix of renewable technologies in Orissa

The geographical distribution of the PDDs is shown in Figure 6 and the summary of the PDDs is given in Table 5.

The sectors in which the PDDs were developed offer very high replication potential.

The scope for supporting the projects on small-scale foundries and rural electrification under CDCF (Community Development Carbon Fund) should be examined by the World Bank. These projects are very relevant from the perspective of sustainable development and directly subscribe to the underlying principles of the CDCF on reaching out to projects for poor rural communities and SMEs (small and medium enterprises).

The Community Development Carbon Fund may want to examine PDDs for foundry cluster and rural electrification since they are in line with the funds priorities.

The lessons learnt by reviewing the existing pipeline of projects in the country, as well as the development of selected PDDs, are described below.

Lessons learnt

Baselines

The baselines developed for the five projects relied on the approved SSC (small-scale CDM) methodologies, as all the five selected projects fall under the small-scale category. For the MSW to pelletization, and rural electrification projects, a few interpretations were made with respect to the project type and the methodologies to qualify them under the SSC M&P (modalities and procedures).

Access to authentic data is a major constraint for baseline development.

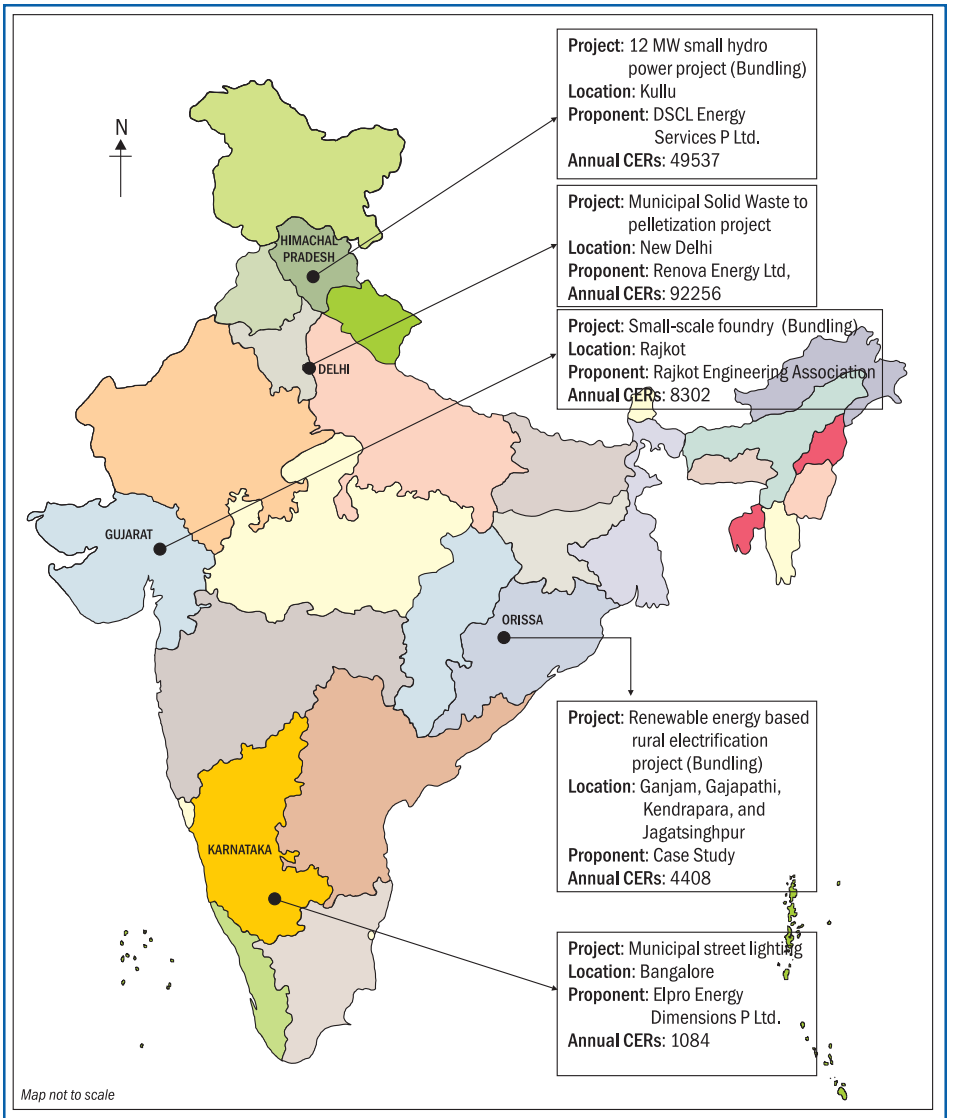

Figure 6 Geographical distribution of NSS PDDs

Further, there is a predominance of static baselines for the projects considered under NSS. This is primarily due to the fact that we expect insignificant changes in the baseline scenario during the considered crediting period. Moreover, this contributes to reducing the transaction cost in updating the baselines annually.

Access to relevant and authentic data is the most crucial factor in developing a successful PDD. Despite the PDDs being prepared under a national strategy formulation, access, availability, and

Table 5 Summary of NSS PDDs

	Actual projects under various stages of implementation				*Case study*
	Small-scale foundry	*Small hydro*	*MSW to pellet*	*Municipal street lighting*	*Rural electrification*
Project description	Energy efficiency improvement in small-scale foundry units	Grid connected run-of-the-river small hydro (renewable energy) project	Recycling of MSW (municipal solid waste) into refuse-derived fuel	Energy efficiency in municipal street lighting	Rural electrification by decentralized distribution generation systems through a mix of renewable technologies
Technology	Energy-efficient DBC (divided blast cupola)	Small hydro turbine-based power generation	Pelletization of MSW into refused-derived fuel	ETrACS (energy tracking and control systems)	1. Biomass gasifiers and bio-oils; 2. Micro hydro; 3. Solar photovoltaics
Scale of project	190 foundries Saving of 0.03 GWh per year	12 MW (three projects)	150 T of MSW per day	Street lights in 110 km long national highway 3500 lights saving 1.4 GWh per year	149 villages Small hydro ~575 kW Biomass ~115 kW, and solar photo-voltaics
Source of emission reduction	Reduction in consumption of coke as fuel	Displacement of fossil fuel based grid power	Avoidance of methane production from the MSW dumped in unmanaged land fills	Reduction in consumption of fossil fuel based grid power	Displacing kerosene for lighting and diesel generating sets for irrigation purposes
Annual emission reduction (TCO_{2eq})	8302	49537	92256	1084	4408
Small-scale CDM project category*	Type II D	Type I D	Type III E	Type II C	Type I A
Baseline methodology	Appendix B: Type II D Article 3 & 4	Appendix B: Type I D Article 7 (b): System Average	Appendix B: Type III E Article 3	Appendix B: Type II C Article 4 & 5	Appendix B: Type I A Article 4
Monitoring methodology	Appendix B: Type II D Article 6 (a, b& c)	Appendix B: Type I D Article 9	Appendix B: Type III E Article 5	Appendix B: Type II C Article 8-10	Appendix B: Type I A Article 8(b)

Continued...

Table 5 Summary of NSS PDDs (*continued...*)

	Actual projects under various stages of implementation				*Case study*
	Small-scale foundry	*Small hydro*	*MSW to pellet*	*Municipal street lighting*	*Rural electrification*
Leakage	No leakage as per article 60 of Type II C	No leakage as per article 30 of Appendix B as it is a new project	No leakage as per article 94 of Type III E	No leakage as no equipment are transferred from another activity	No leakage as per article 30 of Appendix B as it is a new project
Application of methodology	Applicable for all cluster level SMEs (bricks, glass, etc.) engaged in energy efficiency in reducing existing fuel consumption by installation of new furnaces/ systems	Applicable for all grid-connected projects having net export of power from the state grid to the regional grid and projects whose implementation does not delay the implementation of mega power fossil power projects	Applicable for all MSW projects producing fuel out of the MSW and not accounting for emission reductions from fuel switching	Applicable for energy efficiency in lighting projects in industries, university campuses and housing colonies	Applicable for electrification of rural and remote areas deprived of any kind of access to power through a mix of renewable energy technologies

SMEs – small and medium enterprises
* http://cdm.unfccc.int/Reference/Documents/AnnexII/English/annexII.pdf

authenticity of data were limited and inhibited the timely preparation of PDDs developed under the NSS. The team had to exhibit persistence and perseverance to obtain the relevant authentic data. This is an indication of the barriers that project proponents face in India.

Additionality

The additionality assessment of the five projects was based on the guidance/additionality tools[3] provided by the CDM EB for SSC projects. Confining additionality arguments to one of the highly prevalent barriers may elevate the possibility of proving the project additional, as provided for in the SSC M&P. However, arguments on as many barriers as possible were presented in each PDD to demonstrate that the projects suffer from multiple barriers. Since basing additionality on an investment barrier entails rigorous financial

[3] Attachment A to Appendix B of the 'Simplified modalities and procedures for small-scale CDM project activities', Version 03: 30 June 2004

analysis and information, it was not the preferred choice. Barriers due to prevailing practice and institutional barriers were the traditional options for justifying additionality. For projects deploying new technologies (e.g. municipal street lighting PDD), establishing additionality through technology barrier alone is the most suited option, as such departures from the business-as-usual technologies are justifiably additional. Lack or absence of institutional support for streamlining such technologies further strengthens the additionality arguments.

Additionality assessment of the five projects was mainly predicated on barriers related to prevailing practices and institutions.

Bundling

The issues emerging from bundling options in three of the five PDDs are challenging and merit attention and evaluation. Developing a framework for bundling SSC projects and evaluating various bundling options and bundling organizations are quintessential for promoting bundling as a helping tool for reducing transaction costs.

Bundling is limited by prescriptions under the modalities and procedures of small-scale CDM. These limits may require a review.

Limiting the bundling capacity of projects under SSC prohibits bundling of a large number of very SSC projects, beyond the limits specified under SSC M&P (i.e. 15 MW [megawatt], 15 GWh [gigawatt hour] or 15 thousand tonnes). This may result in several bundled projects of a similar type and nature for a location. For instance, a comprehensive rural electrification plan for a state in India may be beyond the limit of 15 MW, and would probably require bundling into more than one project, but as such deserves to be treated as an SSC. Such limitation will increase the transaction cost and will be less attractive for the buyers. Hence, it may be worth re-examining the upper limit for bundled SSC projects.

Also, a monitoring protocol based on benchmarking or statistical approach such as sampling is essential for projects involving a large number of facilities/units (e.g. foundry PDD).

Finally, for projects that are commissioned in phases, even if the cumulative emissions are substantial, the reporting of annual emissions in the ERPA (emission reduction purchase agreement) is useful for both the seller and buyer to clearly delineate the build-up of emission reductions. This is especially relevant for small bundled projects, where there are multiple owners and a phased implementation.

Transaction cost

Application of transaction cost estimates to the PDDs developed reveals that bulk of the transaction cost will be spent on monitoring, verification, and certification (recurring expense cost) as compared to the PDD development and validation costs (fixed expense). This emphasizes the need for a large volume of CERs, to minimize the impact of transaction costs. It also underscores the need for competition among DOEs (designated operational entities) to keep prices for such services as low as possible.

Monitoring and verification costs are recurring and could be more than the price on a per-CER basis for small projects.

According to our estimates of transaction costs, projects generating less than 4000 CERs would find it difficult to cover these from the current prices being offered (e.g. municipal street lighting PDD, where the upfront costs per CER up to the validation and registration stage are 72% of the price of a CER, and the monitoring and verification costs could be as high as 250% of the price on a per-CER basis). For projects generating CERs in the 5000–10 000 range (foundries and rural electrification projects), the upfront costs range from 11% to 18% and the monitoring and verification costs from 33% to 62% of the price on a per-CER basis. It is only for projects generating between 50 000 and 100 000 CERs (bundled small hydro and MSW to pellets projects) that the transaction costs are in a negligible range.

Facilitative framework for CDM implementation in India

For India to capture a large share of the future CDM market and to sustain its present leading position as a host country, it needs to develop and implement a facilitative framework for the CDM. A preliminary effort to design such an institutional framework for CDM implementation was undertaken by the Planning Commission, Government of India in 2003. Subsequently, the DNA has been established. Since then, several national and international developments have taken place.

The NSS has assessed these developments with a view to highlight measures that will enable India to realise its projected share—higher than 10% of the global CDM market.

National CDM Authority

Existing framework

The MoEF is the nodal ministry dealing with climate change and CDM issues. The ministry has established the DNA in December 2003 as the NCA. With an inter-ministerial structure, led by the Secretary, MoEF, it has so far accorded host country approvals for Indian CDM projects in a timely manner.

The NCA has set up a process for granting approvals, which is outlined in Figure 7.

The powers and functions of the NCA, as detailed in the Gazette Notification (2004), relate to approval of projects as per modalities and procedures for CDM specified by the EB, a documentation role

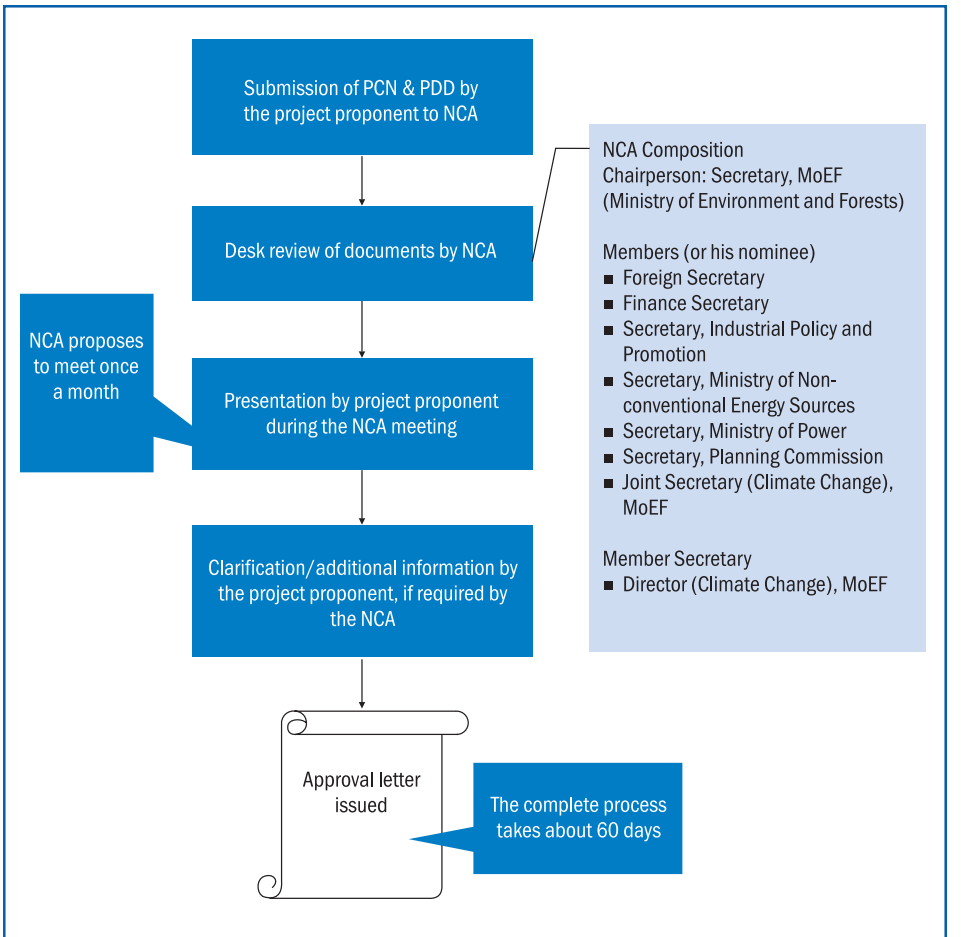

Figure 7 Approval procedure of the National CDM Authority

insofar as maintaining a registry of approved projects is concerned and a facilitative role for information dissemination.

In order to provide the initial momentum to CDM, currently the NCA does not charge any fee for the host country approval.

Short- and medium-term actions

Strengthening the NCA

The NCA is in its infancy and will have to address several emerging issues regarding CDM development in India, including urgent development of a clear action plan for its functioning.

Table 6 lists some of the important issues that need to be addressed in this regard.

Apart from strengthening its functioning, the NCA will have to proactively engage and coordinate activities of other institutions and stakeholders in the country.

The NCA should coordinate the activities of other institutions and bodies such as energy development agencies, the pollution control boards, the energy service companies, consultants, technology providers, industry associations, municipalities, cooperatives and NGOs (non-governmental organizations), etc. and benefit from the synergies thus developed.

The NCA should also establish mechanisms to monitor and review its activities (including the effectiveness of capacity building initiatives) on a periodic basis.

In addition, the study recommends undertaking a coordinated effort to adopt a proactive and sustainable CDM policy and to address unresolved matters such as the following.

- Deliberate and take clear policy stands on issues including ownership of CERs, sharing of CERs between project proponents and utilities, and taxation of CERs.
- Provide strategic advice to ministries on how best to leverage CDM financial flows to achieve government priorities (e.g. in the context of government technology demonstration projects or priority policy programmes such as rural electrification).
- Active participation in international debates at COP/MOP (Conference of the Parties/Meeting of the Parties) on issues such as additionality, methodologies, and unilateral CDM will help Indian project developers. This includes periodical evaluation of EB decisions and their impact on Indian CDM portfolio.
- Support a dispute resolution mechanism to redress or arbitrate, especially for small-scale projects, which may not have the capability to engage in international arbitration.

Table 6 Strengthening the NCA

Issues	*Actions*
Organizational strengthening of the NCA	■ Equip the NCA with a full-fledged secretariat to handle CDM related activities ■ Secretariat to host a **technical unit** comprising 3–5 key sectoral experts (power, renewables, industry, LULUCF (land use, land use change, and forestry)) to oversee and guide project evaluation process ■ Secretariat to also host a **marketing unit** for facilitation (capacity building, information dissemination, and outreach)
Capacity building	■ To build state-level (governments, industrial associations, financial institutions, regulatory bodies, energy development agencies, municipalities, technology providers, etc.) capacity for catalysing CDM activities, across the country.
Information dissemination and outreach	■ Disseminate relevant information for CDM project development, criteria for approval, decisions on approved projects, examples of best practice projects, etc. on a CDM website and through other communication channels ■ Provide links with websites of other organizations which will have relevant data for baseline design, etc. viz. Ministry of Power, Ministry of Non-conventional Energy Sources, Ministry of Shipping, Road Transport and Highways ■ To assist the proponents of NCA approved projects in marketing CERs through carbon forum, carbon bazaars, apprising the visiting delegations of Indian CDM portfolio ■ To promote the development of an Indian CDM community and interactions among key players in the CDM project cycle namely proponents, investors, DOEs, consultants, NGOs (non-governmental organizations) to improve quality of PDDs
Inter-ministerial coordination	■ Coherence between sectoral policies and CDM rules and regulations is required for encouraging CDM project development ■ To build capacity in member ministries to enable NCA to expedite scrutiny and approval of projects ■ To jointly approve a positive list of technologies that do not require explicit proof for sustainable development contribution ■ To establish a coordinated process to resolve conflicts and contentious issues in a timely manner (such as states claim on CERs)

Note NCA should focus on coordinating and supplementing all existing and forthcoming efforts (Table 3) in capacity building, and information dissemination and outreach

Policy issues

India has a number of proactive laws, policies, programmes, and goals for the promotion of sustainable development and cleaner technologies, which could conflict with interpretations of additionality for CDM projects. This is not always justified, as statements of intent do not automatically translate into implementation, due to a range of technical, financial, and institutional constraints in developing countries. Further, the withdrawal of subsidies to CDM projects should be avoided, as this would remove the incentive for these projects to secure carbon revenues. In many cases it would render the project unviable, as CDM revenues alone would not sustain such projects. Instead, it should be emphasized that CDM revenues can, despite low prevailing carbon prices, help attract financing for such projects, serve as an incentive for performance, and encourage developing countries like India to move to a relatively lower GHG-intensive path. In this context, perhaps there is a need for periodic reviews of CDM projects in subsidized sectors to assess the viability of such projects with/without subsidies, and any changes in subsidies on this account should be undertaken in view of such reviews.

A blanket withdrawal of subsidies to the projects availing the CDM benefits is unwarranted. A critical review and analysis of subsidies should be undertaken only after the CDM market has reached a level of maturity in India.

In recognition of concerns of host countries the CDM EB in its sixteenth meeting (*http://cdm.unfccc.int/EB/Meetings/016/eb16repan3.pdf*) categorized policies such that there are no perverse incentives to enlightened policy-making. To ensure that progressive policies and regulations do not penalize CDM projects on grounds of additionality, national/sectoral policies or regulations implemented since the adoption by COP of the CDM M&P may not be taken into account while developing the baseline scenario, as directed by the EB. This is a positive development.

But such an open-ended provision needs to be examined as such policies, if implemented, have a tremendous potential for altering the baseline over a given longer time frame. Also, some of these policies may graduate into the category covering mandatory regulations, which would incidentally reduce GHG emissions, for which no decision has been taken as yet by the EB. Such plausible transitions need careful analysis.

To elaborate, SERCs (state electricity regulatory commissions) in India have a mandate to promote cogeneration and renewables and hence play a major role in mainstreaming renewable energy as per the Electricity Act, 2003. They can also promulgate RPS (renewable portfolio standards). Once such standards come into place, the examination of additionality of renewable energy projects would be subject to closer scrutiny, as this would represent a graduation from a policy to a mandated regulation.

Financing

The critical barriers to CDM projects are given below.

- Inability of new promoters to bring in equity to be able to avail of financing.
- Lack of development of project ideas and promoters for small community projects

A carbon fund may be considered for developing small and relevant projects, providing equity, and pooling non-delivery risks.

To overcome these barriers, a 'carbon fund' for India may be considered. This fund could serve different objectives as shown in Table 7.

Table 7 Options for a carbon fund

Options	*Purpose*
Small CDM project development facility	To develop projects that have direct community benefits and will bring them up to financial closure and implementation
CDM project equity fund	To provide equity to CDM projects, mezzanine capital and guarantees
Carbon pool	To cover non-delivery risk

Other options could be explored under this fund to support CDM project implementation in India.

The architecture of this carbon fund for India requires an in-depth analysis, which would require a detailed market analysis, business plan, and identification of promoters, investors, and their roles and responsibilities.

Short- and medium-term strategy for India

If India has to capture and retain a significant CDM market share of the order of 15–25 $MTCO_{2eq}$ per year, it would have to adopt a proactive strategy. This strategy would comprise the following points.

- Encouraging the submission of a significant number of good quality projects to the EB for registration by 2006
- Replicating the use of approved methodologies in sectors with significant mitigation potential
- Supporting preparation of methodology for projects for CDM approval in sectors where the country has a large potential and which match sustainable development needs

CDM beyond 2012

The shape of the international climate policy regime for the post-2012 period will determine whether CERs generated after 2012 have value for India and other host countries. With the Kyoto Protocol in force, negotiations on commitments for subsequent periods for Annex 1 parties will be launched by the end of 2005, which will take the form of amendments to Annex B of the Kyoto Protocol. If this path is followed and commitments can be negotiated successfully, the CDM will likely be part of the future policy mix, under a continuation of the Kyoto regime. Otherwise, the validity and value of CERs after 2012 is uncertain.

Projects have to be operational by the end of 2005 to capture the full value of eligible CERs during the first commitment period. This implies that the larger projects with long gestation period may not enter an investor's portfolio.

As a result, at present, investors are only interested in making financial commitments to CDM projects for CERs generated through 2012. If we assume that the CDM projects to be implemented by India have a seven-year crediting time, these projects would have to be operational by the end of 2005 to capture the full value of the project's eligible CERs during the first commitment period. As large power projects generally have construction times of several years or more, it is clear that some of the value of the potential CDM projects would not be generated in time to enter into investors' calculations. The rating of a host country and the options for carbon offset investment opportunities across project types with their associated sustainable development benefits will influence the investors' decisions. To be competitive, therefore, India may consider acting

rapidly and focusing on projects that can be implemented over the next couple of years, and have crediting times that do not extend far beyond 2012.

Further, India's CDM strategy, policy, and implementation plans to adopt a proactive and sustainable CDM policy, also assume importance from a longer-term perspective. The strategic option of developing a national framework for application of sectoral CDM (e.g. for the power sector) should be investigated further. There is scope to use CDM investment (or proceeds from sales of CERs, depending on the transaction model) to supplement government initiatives to introduce advanced technologies (clean coal, new and renewable technologies, energy efficiency), without expecting initially the full recovery of incremental cost.

Currently, CDM is implemented on a project-by-project basis. This has allowed a prompt start under the framework established under the Marrakesh Accords. However, in the mid term, this is likely to lead to inconsistencies in the methodologies, with transaction costs remaining at high levels. Also, CDM in its current form provides disincentives to developing countries to implement binding environmental policies, as such policies and measures lead to tougher baselines and therefore less CERs per project.

Sectoral CDM would be a mechanism that enables the implementation of sectoral policies or regulations by providing financial and other resources in exchange for the resulting CERs. With sectoral CDM, a larger volume of reductions is possible with lower transaction costs than in the classical project-by-project based CDM. However, sectoral CDM poses challenges for additionality assessment and monitoring. There is an urgent need for further development of the concept of sectoral CDM both on UNFCCC (United Nations Framework Convention on Climate Change) and country level, as it poses an opportunity to make use of the full potential for GHG reduction and sustainable development in host countries.

With sectoral CDM, large volumes of emission reductions are possible with lower transaction costs. On the other hand, there may be challenges in additionality assessments and monitoring and verification of emission reductions.

CDM and sustainable development

The contribution of CDM projects to GHG emission reductions and to the protection of the global climate system will assist India in meeting its environmental foreign policy commitments under the

UNFCCC, in particular, to promote technology transfer and to adopt national programs for mitigating climate change. Yet the main driver for India's participation in the CDM is the promise of local sustainable development benefits.

The assessment of such external benefits and the contribution to production of global common goods should be embedded in the sustainable development criteria, applied to CDM projects. Given the prevalent CER prices in the carbon market, market incentive from CDM is not adequate to tip the balance significantly in favour of clean technologies. However, such benefits may, in combination with other government policies, provide an impetus and play a vital role in promoting projects with significant co-benefits in terms of sustainable development.[4] Table 8 provides a grouping of CDM projects on this basis.

Table 8 Capabilities of different CDM project types to co-produce global common goods

Types of CDM projects	*Benefits internalized*	*External benefits, global common goods co-produced by CDM*
HFC (hydrofluorocarbon), PFC (perfluorocarbon), N_2O, as industrial gases, plus methane recovery: low hanging fruits, large GWP (global warming potential) leverage	▪ Straight-forward business deals. ▪ Industrial gas based CDM projects yield low level of sustainable development benefits. ▪ Important role in Kyoto compliance market as they help Annex 1 countries meet their commitments comparatively cheap, which reduce barriers for Annex 1 policy-makers to comply with Kyoto targets. ▪ China has proposed to ensure sustainable development benefits of such projects through sharing of benefits between project proponents and the state,	While methane recovery projects in the waste sector contribute to leverage much needed investment into urban waste management, HFC23 has been under controversial debate due to its potentially adverse impacts on implementation of the Montreal Protocol A significant external cost may result from implementation of HFC23 projects: ▪ HFC23 projects subsidize HCFC22 (hydrochlorofluoro-carbon 22) price in international market ▪ disincentive for non-Annex 1 countries to phase out HCFC22 in time ▪ disincentive for technology transfer in ODS-free technology

Continued...

[4] Rural energy and municipal projects (energy from municipal waste, EE (energy efficiency) in municipal street lighting, water pumping, EE in buildings)

Table 8 Capabilities of different CDM project types to co-produce global common goods (*continued...*)

Types of CDM projects	*Benefits internalized*	*External benefits, global common goods co-produced by CDM*
	with funds reinvested in other activities in support of sustainable development.	■ Increased consumption of HCFC22 contributes to global warming, though not accounted under UNFCCC
Energy efficiency in industry and large potential in energy sector public enterprises (clean coal)	■ Few proven business cases from India, prevailing barriers in large-scale power sector[a] ■ Better prospects for energy efficiency	To bring large-scale power sector projects to market would mainstream technology transfer, modernize, partly, outdated capital stock and encourage developing country participation with a view to post-Kyoto deals.
Renewable energy	■ A number of renewable energy CDM projects from India are well placed in the CDM project pipeline. ■ The significant number of straight-forward mainstreamed CDM business cases could give boost to the renewable energy sector, mitigation potential of these at global scale, however, still limited. ■ Projects prone to adverse regulatory barriers[b]	Strong sustainable development benefits; in some cases additionality difficult to demonstrate due to regulatory framework
Small-scale sector projects such as rural electrification and small-scale foundry	■ In most cases not assessed feasible as commercial business deals need clients ready to pay premium for sustainable development contribution, such as higher CER price paid by CDCF	Significant contribution to sustainable development, CDM cases to demonstrate convergence between development agenda/millennium goals and environment agenda

[a] Improvement in efficiency of generation is not revealed by the power generator as there is an ambiguity in sharing the benefits of lower cost of generation with the consumers

[b] Additionality uncertain due to domestic regulatory framework and low carbon prices

Special focus is required for rural electrification projects given the national importance being accorded to this sector and the high scope for sustainable development benefits.

Besides small-scale sector and rural energy projects, the sector of energy efficiency merits attention, as more methodologies may emerge soon and significant sustainable development co-benefits are achievable through this sector.

Within the segment of renewable energy, special focus is warranted for rural electrification CDM projects given the national importance being accorded to this sector, as also scope for enhancing sustainable development through these projects.

Additionally, recalling the spirit of Article 12 of the Kyoto Protocol, which envisaged CDM as a tool to assist developing country parties in achieving sustainable development, while aiding the countries with commitments to use this mechanism to achieve the same, the over-reliance on the market to canalize funds into projects with high sustainable development characteristics has not materialized so far. A case in point is the relative ease with which an HFC project reached the final stage of registration, though such projects could have adverse effects in the context of sustainable development. A relative assessment of co-benefits of projects across the portfolio is essential. In this context, the Gazette Notification establishing the NCA in India has enunciated clearly that the NCA will take a view on prioritization of projects in the event they are in competition for the same source of investment, based on sustainable development benefits, and likelihood of success. Although this prioritization mandate is in a limited context, developing a broad consensus on relative importance of sectors/projects from the country's perspective is desirable.

The National CDM Authority may wish to develop a broad consensus on relative importance of sectors/ projects from the country's perspective.

Further, efforts to obtain sanction for unilateral CDM projects should become a part of a proactive strategy to move towards lower GHG-intensive development pathways, which are coincidental with sustainable development pathways. This could become very relevant also in the context of demonstrating the country's willingness to take part in any international effort to mitigate climate change. In fact higher involvement in CDM can be construed as meaningful participation by India in such efforts.

India may want to intensify its efforts to get sanction for unilateral CDM projects, as they are also indicative of the preparedness to move towards lower GHG-intensive development pathways.

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Significant developments have taken place nationally and internationally as the CDM (clean development mechanism) has evolved from idea to fruition. In recognition of this, the NSS-India study was designed to be in tune with the new capacity-building programme of the World Bank, namely CF-Assist (capacity building and technical assistance for carbon finance).

The study builds upon the considerable body of existing knowledge on the subject, and focuses more on facilitating the operationalization of the CDM in India through strategic analysis, capacity building, and development of CDM projects. The study examines the international demand for certified emission reductions, the supply potential from India, and the application of CDM methodologies in the Indian context by developing five project design documents. It also presents the elements of a facilitative framework for CDM implementation in India.

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