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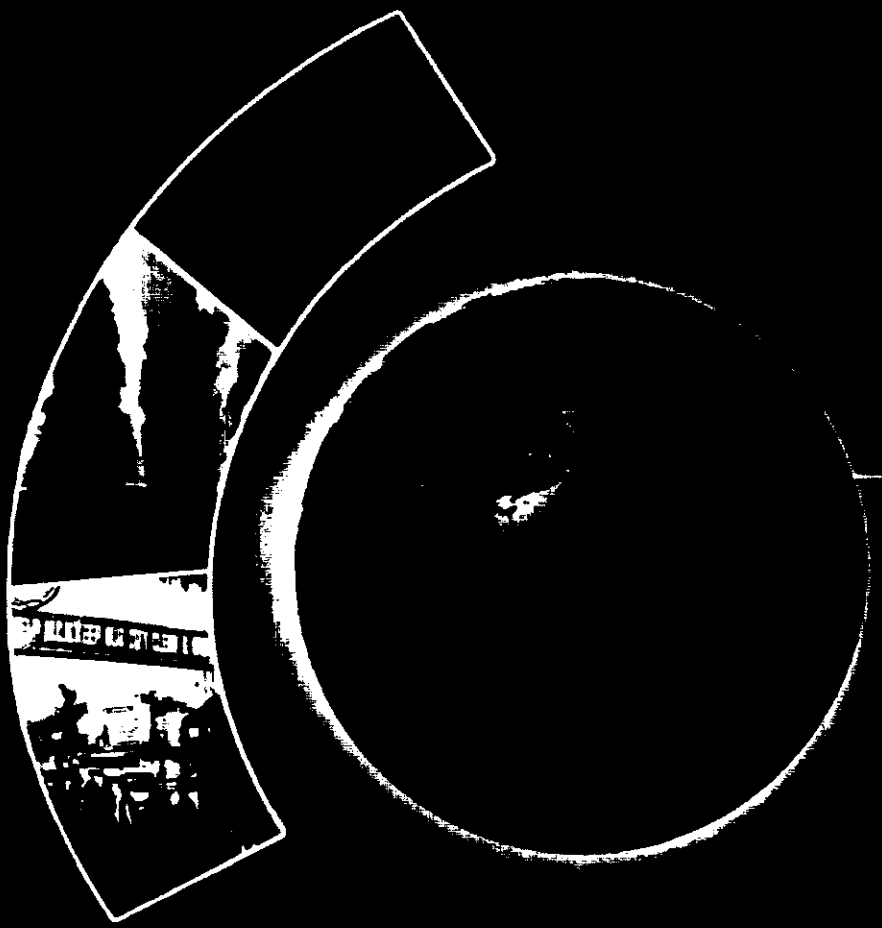

Greenhouse Gas Pollution Prevention Project – Climate Change Supplement

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Contract No. 386-C-00-00-00058-00
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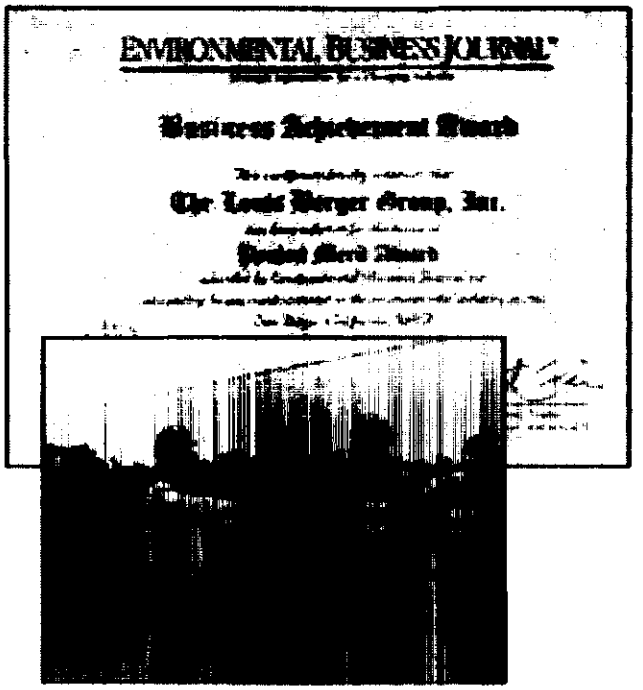
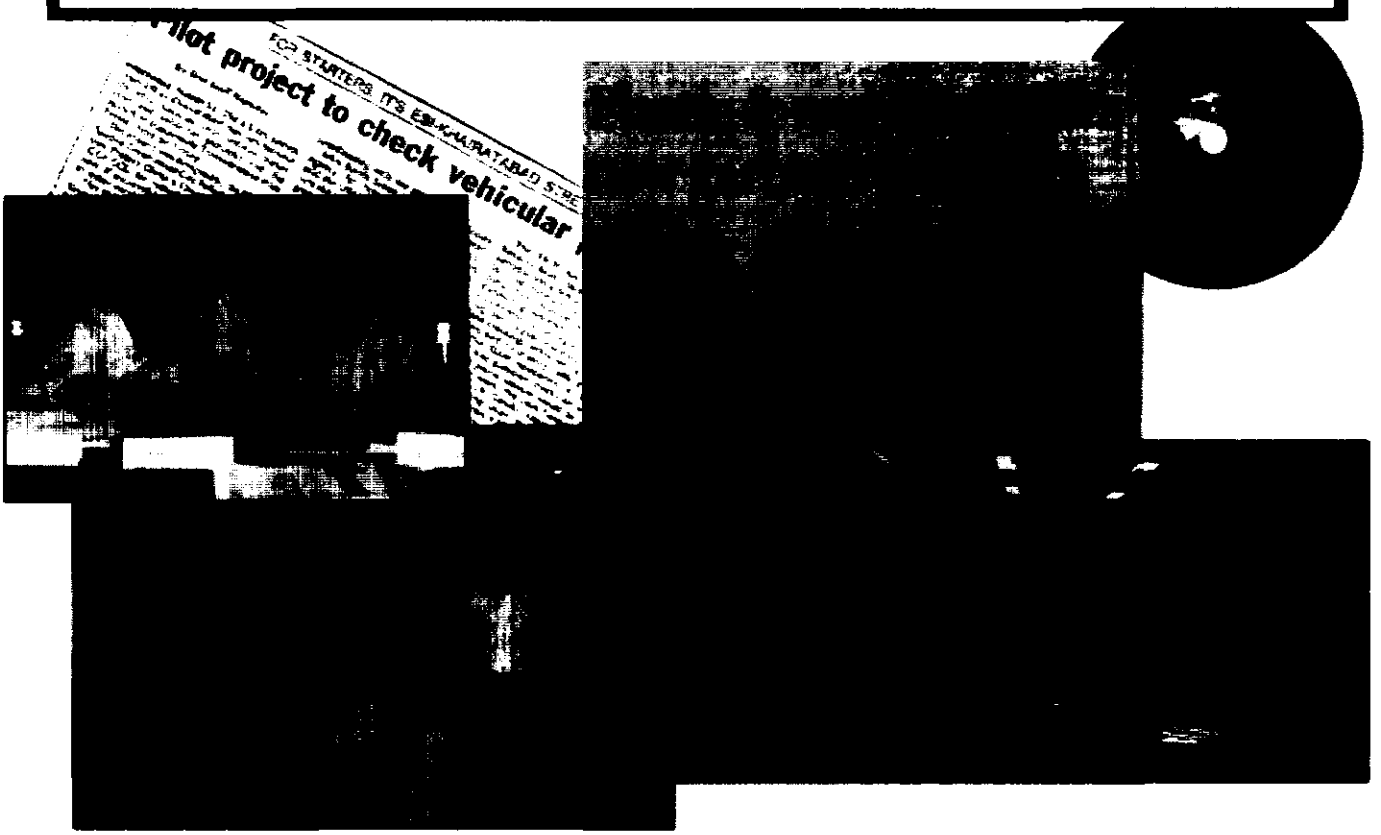


In recognition of the outstanding leadership of the USAID India E3 team, whose visionary project design for the GEP-CCS project will serve as a model to be emulated globally; with other countries and multilateral assistance agencies following the USAID lead. Without the excellent guidance of Dick Edwards, Glen Whaley, John Smith-Sreen, Sandeep Tandon and Kavita Sinha, the impact of this project would not have been as far reaching.



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LIST OF ACRONYMS AND ABBREVIATIONS

ADB	Asia Development Bank
ASCI	Administrative Staff College of India
BATF	Bangalore Action Task Force
BEE	Bureau of Energy Efficiency, Ministry of Power,
BMC	Bangalore Municipal Corporation
BOB	Bank of Baroda
CCC	Climate Change Center
CCMP	Climate Change Mitigation Projects
CCOA	Climate Change Outreach and Awareness
CCS	Climate Change Supplement
CENPEEP	Center for Power Efficiency and Environmental Performance
CEP	Clean energy project
CGG	Centre for Good Governance
CII	Confederation of Indian Industries
CMAG	City Managers Association of Gujarat
COP	Chief of Party
CoP 8	Eighth Conference of Parties (UNFCC)
CPCB	Central Pollution Control Board
CRISIL	Credit Rating Services of India Limited
CTI	Clean Technology Initiative
DA	(The Society of) Development Alternatives
ED	Environmental Defense
EE	Energy efficiency
EIC	Econergy International Corporation
EMD	Environmental Management Division
EMS	Environment management systems
EMU	Environmental Markets University
EPRI	Electric Power Research Institute
ERT	Environmental Resources Trust, Ltd.
EU	European Union
EWI	Energy Wise India
FI	Financial Institutions
FICCI	Federation of Indian Chambers of Commerce and Industry
FIRE	Financial Institutions Reform and Expansion Project
GCC	Global Climate Change
GEP-CCS	Greenhouse Gas Pollution Prevention Project – Climate Change Supplement
GHG	Greenhouse gas
GEP	Global Energy Partners, LLC
GOI	Government of India
GRI	Global Reporting Initiative
HUDA	Hyderabad Urban Development Agency
HUDCO	Housing and Urban Development Corporation Ltd.
ICICI	Investment Credit and Industrial Corporation of India
IDFC	Infrastructure Development and Financial Company, Ltd.

iDeCK	Infrastructure Development Corporation of Karnataka
IFC	International Finance Corporation
IGIDR	Indira Gandhi Institute of Development Research
IL&FS	Infrastructure Leasing and Financial Services
IIE	International Institute for Education
IIEC	International Institute for Energy Conservation
IIM	Indian Institute of Management
INDAL	Indian Aluminum Company Ltd.
IPP	Independent Power Producers
IREDA	Indian Renewable Energy Development Agency
IRR	Internal rate of return
ISO	International Organization of Standardization
LBG	Louis Berger Group, Inc.
LBNL	Lawrence Berkeley National Lab
LBSNAA	Lal Bahadur Shastri National Academy of Administration
LfG	Landfill gas
LMOP	Landfill Methane Outreach Program (EPA)
MACE	Mahindra Acres Consulting Engineers
MCD	Municipal Corporation of Delhi
MCH	Municipal Corporation of Hyderabad
METRO	Portland Metropolitan Planning Organization
MOEF	Ministry of Environment and Forests
MOU	Memorandum of understanding
MOUD	Ministry of Urban Development
MP	Madhya Pradesh
MSW	Municipal solid waste
MSWM	Municipal solid waste management
NGO	Non-governmental organization
NIUA	National Institute of Urban Administration
NSDART	National Society for Promotion of Development of Administration Research and Training
OHSMS	Occupational Health and Safety Management System
PDD	Project Design Document
PUC	Pollution under Control
PFC	Power Finance Corporation
RE	Renewable energy
RIPA	Rajasthan Institute of Public Administration
RTA	Regional Transport Authority
RUDO	Regional Urban Development Office
SME	Small Medium Enterprise
SIAM	Society of Indian Automotive Manufacturers
TA	Technical assistance
TISCO	Tata Steel Corporation
TNA	Training needs assessment
TNUDP	Tamil Nadu Urban Development Project
TQM	Total quality management
UADD	Urban Administration and Development Department
UNFCCC	United Nations Framework Convention for Climate Change

USAID	United States Agency for International Development
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
VTA	Vehicle technology assessment
WRI	World Resources Institute
WTA	Waste-to-energy

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I. EXECUTIVE SUMMARY

The Greenhouse Gas Pollution Prevention Project – Climate Change Supplement (GEP-CCS) a four year project implemented by the Louis Berger Group, Inc. (LBG) from April 2000 to April 2004, was focused on capacity building, policy, outreach and greenhouse gas mitigation project development in India and designed to help meet US-AID India's Strategic Objective #4: Increased Environmental Protection in Energy, Industry and Cities. The GEP-CCS project furthered this objective by engaging private, government and non-government stakeholders in India to build their capacity to participate in international efforts to combat climate change while promoting sustainable development.

The GEP project was launched in 1995 with the stated purpose of reducing "the volume of emissions of greenhouse gases by increasing energy productivity and encouraging switching to bio-mass fuels". In 1998, the Climate Change Supplement (CCS) was added to increase awareness, build upon the available information and provide practical examples of actions that could be taken to fulfill sustainable development objectives and at the same time reduce the rate of growth of greenhouse gas emissions. Three target stakeholder groups were identified to be the recipients of the training and technical assistance: government policy makers, the private sector - with an emphasis on electric power providers, and financial sector entities.

Designed as a multi-fold capacity building and awareness/outreach project, the various activities LBG implemented under the two major components, *'Fostering Climate Change Initiatives for Sustainable Development'* and *'Linking Urban Development and Climate Change'* have resulted in a discernable change in attitude and an increased awareness. This change was noted in an explanatory comment made by the original USAID Cognizant Technical officer and GEP-CCS project concept designer, Kavita Sinha, to Deputy Chief of Mission, Bill Martin, during the informal brown bag end-of-project presentation at US-AID on April 5th. Loosely paraphrasing, Ms. Sinha said that before the CCS component was launched, awareness on climate change and greenhouse gas emissions and its impacts on urban and economic development in India was virtually nil with the government and private sector - particularly with financial institutions and project developers. She went on to publicly commend the Louis Berger Group for the tremendous progress made in building awareness during the past four years. This congratulatory remark need also be extended to USAID - for its vision, design and oversight. This project was a first of its kind for India, and perhaps Asia, and will serve as a model for future greenhouse gas mitigation efforts worldwide.

Under the *"Fostering Climate Change Initiatives for Sustainable Development"* component, the LBG-GEP-CCS team built capacity among private, public and government sectors to implement policies and actions that reduce the rate of growth of greenhouse gas (GHG) emissions and promote sustainable development by: promoting technical cooperation to reduce GHG emissions; strengthening efforts to attract/channel private financing into clean technology; creating public private partnerships for GHG reduction initiatives; developing and building human and institutional capacity; developing clean energy projects; and collaborating with potential funding sources to leverage more resources for clean energy GHG mitigation project implementation.

Under the second major component *'Linking Urban Development and Climate Change'*, the team built local municipal level capacity in two areas: sustainable transport interventions that reduce the rate of growth of GHG emissions from vehicular traffic and the integration of sustainable transport planning concepts into urban development planning processes, and providing/introducing best practice municipal waste management for the reduction of methane emissions from the various stages of waste collection, transport and final disposal.

The Louis Berger Group began its implementation of the Climate Change Supplement project by building a base for the successful transference of concepts and ideas. To ensure the institutional strengthening of selected Indian institutions on climate change issues, LBG initially provided capacity building for the private sector through the Confederation of Indian Industries (CII), for the community/public sector through (The Society of) Development Alternatives (DA), and for the government of India through Lal Bahadur Shastri National Academy of Administration (LBSNAA).

Building upon the "Climate Change Outreach and Awareness" (CCOA) activity under AID, the LBG team provided training and technical assistance to support continuing climate change work at CII and DA and to promote the evolution of these institutions into efficient information and facilitation centers on climate change. The curriculum building activities for the Lal Bahadur Shastri National Academy of Administration (LBSNAA) provided the strategically important Indian Administrative Service (IAS) with information on climate change, greenhouse gas emissions and clean energy technologies that would prove an aid in helping government officials to make more informed decisions. LBSNAA is the premier government of India (GOI) training ground for government officials who are India's future policy makers and implementers. LBG facilitated the development of a training program for GOI officials to integrate climate change issues with energy development and urban infrastructure development and engaged GOI officials directly in a collaborative curriculum development effort which included LBSNAA, LBG, NSDART (National Society for Promotion of Development of Administration Research and Training), USAID, IIE and sub-consultants. Training modules were designed and road-tested in workshops with the LBSNN Academic Council and select faculty. This collaborative approach resulted in increased awareness on climate change issues at multiple GOI levels and in many departments.

Key to the GEP-CCS project's success in driving climate friendly development was the institutional strengthening of the financial sector. The LBG team included former bankers and international financial institutions who were able to communicate the issues in terms that the Indian financial community could easily relate to. LBG also collaborated closely with the Investment Credit and Industrial Corporation of India (ICICI), the Government of India partner for the GEP project. Indian financial institutions (FIs) were quick to appreciate the potential ramifications of GHG emissions on a financial institution's portfolio and the economic benefits of encouraging the development of energy efficient, clean energy and renewable energy projects. The emergence of "champions" in the financial industry such as the Infrastructure Development and Financial Company, Ltd. (IDFC), ICICI, the Power Finance Corporation (PFC), the Infrastructure Development Corporation of Karnataka (iDeCK), the Infrastructure Leasing and Financial Services (IL&FS) Ecosmart, and the Indian Renewable Energy Development Agency (IREDA) will help sustain a movement towards the adoption of less GHG emissions intensive practices and policies and the adoption of lending and rating guidelines that more accurately reflect GHG risks and opportunities.

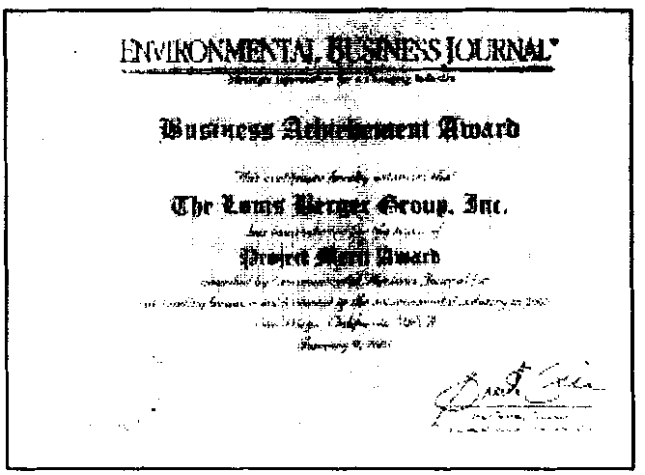
As a result of the LBG GEP-CCS work with the financial institutions and project developers, an increase in number and quality of clean energy and greenhouse gas mitigation project proposals has already been observed, as has a positive change in receptivity by the financial institutions and the government to approving such projects. Some institutions, like IDFC and ICICI, now routinely review the climate change impacts of projects and have reflected the risk and opportunities of GHG emissions in their rating and lending practices. This impact on long term change cannot be underestimated. Other financial institutions like PFC and IREDA, are more cognizant of the GHG risks. IDFC, the intermediary "pre-screening facility" bank for the World Bank, has already prepared and submitted a number of climate change mitigation projects for funding under the various World Bank carbon funds available. IL&FS/Ecosmart is offering services in climate change areas including baseline and PDD services. They have also entered into an arrangement with a European firm to take advantage of the European Union (EU) carbon cap and trade market.

Although not specifically outlined in the contract, but to further the project goal of assisting India participate in the international dialog on climate change and to support the spirit of the US/India collaboration on climate change, LBG went beyond the deliverables to seek out activities to promote the long term goal of GHG emissions reductions. In this spirit, LBG supported activities during the important CoP-8 events and CII technology bazaars in 2002 and 2003 by sponsoring and manning booths and events as well as creating and providing special collateral materials for the occasion. LBG also identified and sponsored speakers to showcase real examples of US/India collaboration during CoP-8 and for USAID Indian partners' events.

In linking urban development with climate change and sustainable transportation concepts, the LBG GEP-CCS partnered with Hyderabad on a sustainable transport pilot to reduce GHG emissions from vehicular traffic. The pilot illustrated select interventions for reducing GHGs that were implementable, tangible, and replicable. To-date, a number of the traffic management interventions and concepts (e.g. road widening, carriageway and intersection improvements, streamlining traffic flows by improved signage, paint markings, and other information devices) have already been replicated beyond the demonstration corridor. As part of the pilot, a partnership was promoted between the Society of Indian Automotive Manufacturers (SIAM) and the Regional Transport Authority of Andhra Pradesh to work on improved vehicle inspection and maintenance. This continuing partnership has resulted in upgraded PUC centers networked through the Regional Transport Authority (RTA) in Hyderabad and improved pollution under control (PUC) testing by the RTA.

The GHG emissions reduced directly from the pilot corridor alone are estimated to be on the order of 1.45 to 2.89 tons per day of CO_2 emissions. This amount is just from the traffic management interventions and improving the avg. speed in the congested corridor. With the additional emission reductions from the PUC enhancement pilot estimated at 16,000 tons per annum (tpa), the potential for improving not only the local air quality but slowing the rate of growth of GHG emissions from urban development in Hyderabad is considerable. Not only are the demonstration corridor interventions being replicated in other parts of the city, but the RTA is planning to network all the PUC centers in Hyderabad as a next step before ultimately going statewide. Polluting vehicles will be able to be tracked electronically. More importantly, the sustainable transport concepts introduced have been incorporated into Hyderabad's *City Development Strategy*, and into the AP State transport policy advisory committee.

The LBG work in sustainable transport in Hyderabad for the USAID project was also recognized by the Environmental Business Journal for a Special Merit Achievement Award in 2004.


ENVIRONMENTAL BUSINESS JOURNAL

Business Achievement Award

The Louis Berger Group, Inc.

Project Merit Award

The second major area of focus linking urban development and climate change was on methane mitigation and use potential from municipal solid waste management. Building upon past USAID efforts, particularly with the Financial Institutions Reform and Expansion (FIRE) project, municipal managers were trained in technologies for best practice municipal solid waste management including methane capture and re-use/energy recovery from solid waste.

Early into the project, USAID, LBG and the GEP-CCS team partners recognized that the uncertainties and lack of municipal 'know-how' and resources for complying with the new Ministry of Environment and Forests (MOEF) Guidelines for MSW collection, treatment and disposal, combined with the current 'open-dumping' practices for municipal solid waste were not immediately suitable for conversion to landfill gas (LfG) to energy systems. The TA was therefore re-focused to assist municipalities take the first step from open dumping to improved collection practices and sanitary landfills that provided for methane mitigation.

Consistent with the other capacity building efforts of the GEP-CCS project, LBG employed a multi-level approach to achieve wider-spread adoption of the concepts. Training activities for city managers on solid waste management/methane capture and re-use strategies also included participants from infrastructure development financial institutions. The training activities were then reinforced with international informational and networking exchanges for key urban managers. Collaborative activities in partnership with USAID's Regional Urban Development (RUDO) office and FIRE further built upon USAID efforts to strengthen urban municipal management. In Bangalore, to demonstrate a methane mitigation approach for municipal waste management, LBG partnered with iDeCK (the Infrastructure Development Corporation of Karnataka), the Bangalore Action Task Force (BATF) and the Bangalore Municipal Corporation (BMC) to develop India's first sanitary landfill.

Positive results of the work linking urban development to climate change: India's first sanitary landfill project is being developed in Bangalore and it is estimated that from that project, approximately 187,000 tons per annum of CO_2 emissions will be avoided (estimating 1,500,000 tons of CO_2 emission equivalent avoided over the first 8 years). The MSW biomethanation project in Lucknow that was part of the GEP-CCS clean energy project pipeline is already selling energy to the grid and trading emissions reductions. A template for calculating MSW project baselines was developed, as were a set of GHG Guidelines for Landfills. More than 125 officials from 50 urban bodies and institutions were trained, and awareness raised for over 400 participants in various MSW roundtables and workshops. The hands-on TA for Bangalore and the technical guidance provided to Delhi and Agra on MSWM and LfG solutions have already

impacted municipal policy and other municipalities involved in the study tours and exchanges are viewing their MSW management options in a more informed manner.

In every project there are always unforeseen factors which can be challenging to the implementers and project sponsors. An internal USAID India Mission evaluation of its projects in process determined that the GEP-CCS project had the most potential to be adversely affected by a change in administration and policies. Despite this perceived potential for increased degree of difficulty in executing some of the components, particularly in the climate change mitigation project development and financing requirements, the LBG team was able to not only meet but to surpass targets set out in the deliverables.

The results of the project can be viewed by looking at the greenhouse gas reduction impact: approximately 900,000 tons per annum of CO_2 emissions avoided from clean and renewable energy project development, from the MSW sanitary landfill pilot in Bangalore and from the transport pilot. Over 141MW of clean/renewable electric power will be produced from the ten projects that already have financial closure, and which represent a total investment of more than US $170 million. This figure doesn't include the additional investments made in Bangalore for the sanitary landfill and in Hyderabad for the PUC networking and sustainable transport improvements.

These numbers are very positive, but perhaps of greater importance are the policy and attitude changes which have the potential for more far-reaching and long lasting results. Some of the more visible policy impacts of the GEP-CCS project have been the Municipal Commissioner of Delhi's "Betterment Tax" proposal for funding municipal solid waste management and the garbage collection pilot, and the development of India's first large municipal sanitary landfill in Bangalore. The government supported energy power purchase from the Lucknow MSW biomethanation project is another example of the proactive stances that are now being taken on renewable energy projects. In AP State, LBG's work with municipal and state officials, urban planners and stakeholders has introduced concepts and examples of integrated sustainable transportation and urban planning that are being used in the decision making process. In Hyderabad, the traffic management interventions and PUC networking have expanded beyond the pilot corridor. Sustainable transport concepts were embedded into the *City Development Strategy* which is also serving as a core document for World Bank funding for city development in Hyderabad. Some of India's top financial institutions, IDFC, ICICI, PFC, IREDA, changed their policies and practices for environmental assessment of projects to consider climate change impact as a direct result of the LBG implementation of the GEP-CCS project. Others, like IL&FS, and IDFC, created new business units and opportunities around clean energy, energy efficiency and GHG emissions reductions.

Indian companies, institutions and government agencies are now participating more actively in the international dialog on climate change. DA emerged as a perceived leader for India on climate change issues and was able to include language on adaptation into the Delhi Declaration at the United Nations Framework Convention for Climate Change (UNFCCC) Eight Conference of Parties in Delhi and also moved to the forefront of international discussions. The Indian private sector is represented and participating in the creation of global standards. Tata Steel is involved with the World Resources Institute (WRI) and the development of protocols and beta testing for the Global Reporting Initiative (GRI). CII's Mr. Nyati was invited to chair a technical advisory working group for ISO TC 207 on GHG emissions protocol standardization and IDFC

has taken the lead for India in developing the credibility for GHG mitigation projects that can participate in global carbon markets.

While it is difficult to quantify the additional and future emissions that will be avoided as a result of the project's development of human and institutional capacity to design and implement policies and projects that reduce greenhouse gas emissions, and the increased technical cooperation between US and Indian entities facilitated through roundtables, exchange visits and the research on key climate change issues, a significant group of GHG mitigation pioneers and champions has emerged. Policies being developed and awareness raised as a result of the efforts of the GEP-CCS project certainly have the potential to slow the rate of growth of GHG emissions in India.

II. SCOPE OF WORK

Background

In 1995, India was the world's sixth largest and second fastest growing source of global greenhouse gas (GHG) emissions. It was determined that within India, the single largest source of carbon dioxide emissions, accounting for 48% of the total, were from coal-fired power plants. These coal-fired plants continue to supply the greater part of the available electric power in an energy deficient country. While India's per capita GHG emission rate is lower than the world average, the rate at which these emissions are growing is over two and a half times the world average. India was therefore identified by USAID as one of ten key climate change countries/regions and a part of the Agency's Climate Change Program.

US AID India's strategic objective #4 calls for *'Increased environmental protection in energy, industry and cities'*. Under this SO, a number of activities were undertaken that focus on reducing GHG emissions from both energy supply and end-use sources. The Greenhouse Gas Pollution Prevention Project (GEP) was launched in 1995 with the stated purpose "to reduce the volume of emissions of greenhouse gases by increasing energy productivity and encouraging switching to biomass fuels in selected utilities". The initial thrust of the project concentrated on two major areas: efficient coal conversion and bagasse co-generation.

In 1998, a new activity begun under the GEP project to create greater awareness spawned the signing of a Project Agreement Amendment of the Greenhouse Gas Pollution Prevention Project on Sept 8th, 1999 to launch the Climate Change Supplement (GEP-CCS). In the CCS, the ongoing efficient coal conversion activities were expanded as the *'Efficient Power Generation'* component and two new elements were added. The new elements were: a.) *Fostering Climate Change Initiatives for Sustainable Development* and b.) *Linking Urban Development and Climate Change.*

Goals and Objectives

The Greenhouse Gas Pollution Prevention Project promotes the development and use of clean energy technologies, directly contributing to the achievement of the USAID SO#4. The Climate Change Supplement furthers this objective by building the capacity of the private sector, the government and the non-government stakeholders in India to participate in international efforts to combat climate change while promoting sustainable development.

Under the component for *Fostering Climate Change Initiatives for Sustainable Development*, the stated objective was "to build local capacity and create a forum for greater dialog and cooperation between the U.S. and Indian government, private, and non-government stakeholders leading to objective assessment and subsequent implementation of actions that reduce the rate of growth of greenhouse gas emissions and simultaneously promote sustainable development." The numerous activities under this component were designed to: promote technical cooperation to reduce GHGs; strengthen efforts to attract/channel private financing into clean technology; create public private partnerships for GHG reduction initiatives; develop and build human and institutional capacity; develop clean energy projects; and collaborate with potential funding sources to leverage more resources for clean energy GHG mitigation project implementation.

The objective of the *Linking Urban Development and Climate Change* component was to build capacity at the local municipal level in two areas: sustainable transport interventions that reduce the rate of growth of greenhouse gas emissions from vehicular traffic; and best practice municipal waste management that considers the reduction of methane emissions from the various stages of waste collection, transport, and final disposal. Activities under this component included partnering with a municipality for a sustainable transport pilot, building on past USAID efforts with projects such as FIRE, and the provision of tools and training for accessing technologies for methane capture and re-use as well as energy recovery from solid waste.

Three specific goals of the CCS were to build local capacity, develop a project pipeline of GHG emissions reduction projects, and increase available information and create awareness among various stakeholders of the issues and challenges related to global climate change.

The scope of work as outlined in the contract states that the contractor "shall be responsible for technical assistance and training for the *'Fostering Climate Change Initiatives for Sustainable Development'* and the *'Linking Urban Development and Climate Change'* components of the Climate Change Supplement to the GEP Project." USAID/India identified three key stakeholder groups: private sector; financial sector; and government policy makers, for the targeted technical assistance, training, communication and outreach. Active collaboration with NGOs and the academic institutions as partners for the delivery of the program was specified as a priority, while emphasizing the technical assistance and training to the three stakeholder groups.

For private sector entities – specifically private industry, manufacturers and related industry associations, the contractor was directed to provide technical assistance and support to develop projects that increased profitability while at the same time decreasing GHG emissions per unit of service or product provided. The highest priority target group for the assistance would be the electric power sector.

With the financial sector: the contractor was directed to collaborate actively with the Investment Credit and Industrial Corporation of India (ICICI), both the financial intermediary institution and counterpart institution for the GEP-CCS effort. The focus of the collaboration was on GHG emissions reduction project portfolio development. With an emphasis on how lending and rating guidelines can drive "climate friendly" development, the contractor would, in collaboration with ICICI, identify, assess and promote various tools and instruments that banks, credit rating agencies and insurance companies can use to assess investment risk and global climate change costs.

Government policy makers: The contractor was expected to introduce Government of India officials to efforts undertaken in other countries to combat climate change. In addition to providing venues for government ongoing participation in dialog on climate change issues in meetings and roundtables, the contractor would facilitate a series of policy exchange visits to and from the US and other developing countries. The participants in these exchange visits would be senior policy level officials, technical specialists and working level officials involved in developing and implementing India's global climate change strategy.

The detailed tasks under each component and how LBG implemented these tasks is described below:

Fostering Climate Change Initiatives for Sustainable Development

CLIN 1: Fostering Climate Change Initiatives for Sustainable Development

The focus of the CLIN 1 task was ocal capacity building and institutional strengthening of selected Indian institutions on climate change issues. The goal of his strategic capacity building was the creation of awareness and a knowledge base on climate change issues in three critical groups who guide India's development path: the government, the NGOs and the private sector.

Under this CLIN, LBG provided training and technical assistance to support institutional strengthening for continuing climate change work at two institutions, the **Confederation of Indian Industries (CII)** and **Development Alternatives (DA)**. CII is the most prominent organization representing medium to large scale Indian industry, while DA has an equally prominent name in the NGO community, particularly noted for its work at the grassroots level in rural areas. Both DA and CII have been longtime USAID/India partners and USAID has funded earlier activities with these institutions as part of the "Climate Change Outreach and Awareness" (CCOA) activity. The CCS was designed to build on these earlier efforts and to support the evolution of these institutions into efficient information and facilitation centers on climate change.

In addition to the capacity building for the private sector through CII, and the community/public sector through DA, the CLIN 1 subtask also called for LBG to facilitate development of a training program for entry level and senior level GOI officials to integrate energy development with climate change issues. USAID in consultation with the GOI selected the **Lal Bahadur Shastri National Academy of Administration (LBSNAA)**, the premier training institution for the Indian Administrative Service, as the executive training academy recipient for this assistance.

Lal Bahadur Shastri National Academy of Administration

As the first step of the support provided to LBSNAA, LBG conducted a training needs assessment (TNA) for the GOI training academy. The first phase of the TNA was carried out in August, 2000. Conducted in cooperation with LBSNAA and other partners, this TNA was specifically designed to: assess the energy sector knowledge gap and training needs of the LBSNAA faculty, assess the clean energy development issues relevant for IAS officers and integrate these issues with global climate change and sustainable development issues, and to determine curriculum development options and identify a training program and a schedule.

Once the TNA was completed (Milestone CLIN 1A), LBG held a series of brainstorming sessions with USAID to discuss the curriculum development approaches laid out in the TNA and to develop a specific methodology for the activity. Subsequently USAID and LBG met with the LBSNAA Academic Council who recommended that the next step should be interactions with

key IAS officers that serve or have served in positions related to climate change, energy and environment for their input on curriculum topics. In response to the recommendations of the Academic Council and the LBSNAA Director, LBG and the National Society for Promotion of Development Administration Research and Training (NSDART), then organized a three-day workshop in Mussoorie to elicit feedback from mid to senior level and retired IAS officers with non-IAS experts in the power sector. This workshop produced a lengthy list of 26 subject topics (including sub-topics). NSDART, initially assigned the role of coordinating the curriculum development effort with USAID, LBG and USAID had a number of meetings to winnow down the laundry list of topics and to outline a scope for the preparation of the climate change curriculum for in-service level trainees. The Credit Rating Services of India Limited (CRISIL) was retained as a sub-consultant to prepare this work under the guidance of LBG. Given the response to the TNA and subsequent interactions between USAID and LBG with LBSNAA which produced interest in a broad range of energy related topics, USAID procured the services of IIE to prepare additional power sector specific curriculum models.

In a collaborative curriculum development effort which included LBSNAA, LBG, NSDART, USAID, IIE and sub-consultants, training modules were designed and structured to be easily collapsed or expanded to the length of time available for their delivery at any type of course at the LBSNAA. Modules were then developed, reviewed, revised and road-tested in workshops and with the LBSNN Academic Council before being delivered in May 2002 in the 71st Foundation Course as "Energy and Environmental Issues" to newly recruited officers from the following Indian Services: Economic, Statistical, Postal, and Police among others. LBG delivered two modules during this course, Climate Change and Clean Energy Technologies (Milestone CLIN 1D).

The Society of Development Alternatives

The Society of Development Alternatives (DA), a non-governmental organization, is primarily engaged in research and advocacy for sustainable development. With the support and assistance of the United States Agency for International Development, DA has been working on climate change issues and in late 1999 launched a Climate Change Center (CCC) to increase awareness among various stakeholders and to facilitate partnerships between Indian and US industry for co-operation on renewable energy and climate change mitigation projects. To implement the CLIN 1 subtask, LBG/GEP-CCS built upon earlier efforts and the USAID partnership with DA. The unique partnership fostered by the GEP-CCS/LBG team provided DA with the opportunity to develop itself as an internationally recognized climate change leader in India and abroad.

The GEP-CCS/LBG project team worked closely with the Climate Change Center, housed at the DA, to build its capacity to become an efficient facilitation center and to better provide support services to its clientele on climate change related initiatives. These capacity building efforts

[redacted]

focused on strengthening the Center's institutional capacity and technical capabilities on climate change related issues and provided them with the tools to use in climate change mitigation project development and to help meet sustainability goals. To reinforce these efforts, GEP-CCS facilitated and mentored the participation of DA in a number of GEP-CCS designed trainings, international fora, study tours and policy exchange visits. These activities provided further "hands-on" learning experiences for the Climate Change Center and also fostered the development of informal partnerships between DA and leading U.S. and international institutions.

The activities of the DA Climate Change Center are focused in three main areas: outreach and awareness building on climate change related issues, provision of technical assistance to develop climate change mitigation projects, research related to modalities and procedures for developing climate change mitigation projects and other issues related to climate change and its impacts. The Climate Change Center was created to provide information to the SME business sector and policy makers to facilitate the development of both policies and on-the-ground projects that will reduce greenhouse gas emissions. With the assistance of GEP-CCS, as a part of its facilitation function, the Climate Change Center provided assistance to the Indian business sector in developing a portfolio of climate change mitigation projects (CCMP), particularly from the renewable energy (RE) sector such as biomass cogeneration, biomass gasification, small and mini hydro electric, wind energy, solar photovoltaic lighting and waste to energy projects from different geographic regions of India. Working with the varying policy environments and the multiple scenarios for climate change mitigation project development that exist in different parts of India, with LBG assistance, the Center was able to identify and gain valuable insights into the project development process from an on-the ground practitioner perspective. The insights gained were then shared with prospective project developers and other stakeholders through guidance documents, tools and outreach events.

The GEP-CCS team has strengthened the institutional capacity of the DA CCC to help them become a Climate Change "Champion". Various methodologies were used to build the credibility and the national and international reputation of the Climate Change Center as an Indian leader in GHG emissions mitigation issues in the following areas:

Climate Change Mitigation Project Development Technology transfer and technical assistance including the development of various tools to assist the Center to provide Climate Change Mitigation Project development assistance through "train the trainer" training, the development of computational toolkits (Milestone CLIN IC), a project developers "Roadmap" and access to international fora and conferences to improve the staff's technical ability, among others. This assistance enabled the CCC to institutionalize a systematic process for developing bankable GHG projects.

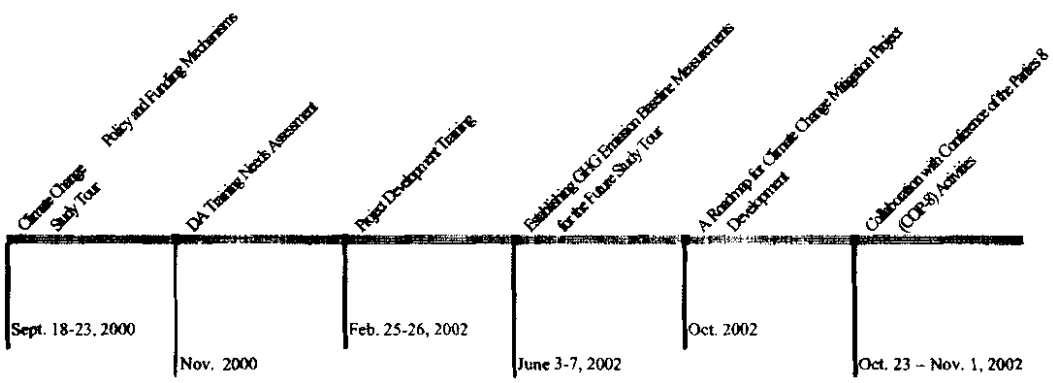
Development and Participation in International Fora and Facilitation and Discussion with the Stakeholder Community LBG led activities that provided the CCC with the

opportunity to develop the skills necessary to interact at the international level with other leading Climate Change organizations and assisted DA to develop the capacity to market to the International and Indian communities.

Climate Change Information Dissemination Multiple activities and efforts supported by LBG provided the opportunity for the CCC to develop its internal research capabilities and to strengthen its ability to promote and disseminate information on climate change issues locally, nationally and internationally. These efforts included the development of a Climate Change website and a project tracking system.

As strategic reinforcement of the capacity building effort in each of these areas, LBG supplemented the assistance by providing the CCC with "hands-on" training through a series of activities such as study tours, trainings, needs assessments, project development activities, and support for the CCC to fulfill its responsibilities as one of the UNFCCC's officially designated NGO hosts during CoP 8 in India.

Table 1: Key Strategic GEP-CCS Support Activities with DA



In preparation for and during the COP 8 event, the GEP-CCS/LBG team facilitated specific meetings between experts from world renowned institutions engaged in climate change and project development work and the CCC staff at DA. These meetings and sustainability tools provided to the CCC included the World Resources Institute and their GHG protocol initiative, the Lawrence Berkeley National Laboratory and the ProForm project assessment software tool, the emissions trading group and tools of the Environmental Defense, the GHG registry of Environmental Resource Trust, and meetings with Econergy International and Global Energy Partners among others.

LBG's technical assistance and institutional strengthening for the Climate Change Center at DA has proven instrumental in solidifying its role as an international climate change leader. The UNFCCC meet in New Delhi, October 2002 for the *Eighth Conference of Parties* (COP-8) was a unique opportunity for DA, and in particular, the Climate Change Center, to be observed as an international climate change policy and research leader in India. In support of this objective, LBG/GEP-CCS provided extensive technical and financial support to DA/CCC to ensure their continuing role as an innovative climate change leader and that its work would be sustained on an international level. Throughout the COP-8 proceedings, DA/CCC worked closely with the

respective GoI ministries in providing representative policy frameworks and approaches; served as the coordinating body on behalf of the widespread NGO community; facilitated a South Asian/ Regional dialogue on adaptation and given the region's particular vulnerability to climate change.

In consultation with USAID, LBG and DA determined that it was critical to engage the champion NGO leaders to provide them first-hand information on the various initiatives of climate change, mitigation tactics and adaptation strategies to ensure a long-term sustainable agenda. To strengthen DA's role as the lead facilitator and apex body for the larger Indian NGO community on climate change issues, LBG worked with the CCC in organizing and providing financial support for a delegation of 20 senior-level representatives from across the country to attend COP-8. The delegate's exposure to the climate change negotiations proved invaluable in their gaining a better understanding of climate change and the complexities of the issues involved. The CCC worked closely with the delegates in devising action plans to integrate climate change issues into their respective activities. As a result, many of the participating organizations planned to organize awareness and outreach programs and district-level consultative sessions to address climate change issues at the local level and have expressed their desire to continue to work through the CCC in shaping climate change policy at the local level - a very positive outcome of the GEP-CCS support.

Rounding out LBG's technical assistance to the Center, a series of recommendations were made to DA for the continued success of the CCC as a climate change leader and to address DA's long term sustainability goals. (Milestone CLIN 1E)

As part of the GEP-CCS strategy, LBG provided the CCC with numerous calculated and structured opportunities to strengthen its national and international presence. These planned interactions helped to build the Center's capacity to actively participate in international fora and organize climate change events, including enabling CCC's important role as one of India's three designated NGO hosts during the 8th Conference of Parties in Delhi in 2002. DA took advantage of the opportunities provided with leading experts from international climate change organizations to emerge as a perceived leader for India on climate change issues. This LBG strategy also provided the CCC the opportunity to showcase its climate change related research, projects, and success stories.

One of the most significant results of the GEP-CCS/LBG team capacity building efforts with DA was that DA was able to get language on adaptation included in the CoP 8 declarations, and more importantly, inserted more prominently into the international dialog on Climate Change.

Other results of the capacity building:

- **The CCC was able to attract substantial donor funding with its higher international profile.**
- **Increased technical capacity for:**
  - **Greenhouse gas mitigation project development**
  - **Data collection including baseline development and GHG assessment**
  - **Organizing national and international events**
  - **Assisting the NGO community with awareness building and the adoption of GHG emission reduction projects and solutions.**
  - **Working collaboratively on GHG issues and solutions at an international level with both developed and developing countries.**
- **Working relationships developed and "hands-on" expertise acquired on GHGs and emissions modeling tools from leading international GHG institutions including:**
  - **World Resources Institute,**
  - **Environmental Defense**
  - **Environmental Resource Trust**
  - **Lawrence Berkley National Laboratory**

The LBG assistance to the CCC supported USAID's efforts that emphasize public/private partnerships, policy integration, sector-based institutional planning, corporate governance, and sustainable development relating to policy development.

The Confederation of Indian Industry

The Confederation of Indian Industry has been a longtime and valued collaborative partner for both USAID and the Louis Berger Group over the years. The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the growth of industry in India: partnering industry and government alike through advisory and consultative processes.

CII, a non-government, not-for-profit, industry led and industry managed organization, was founded over 107 years ago. CII has a direct membership of over 4800 companies from the private as well as public sectors, and indirect membership of over 50,000 companies from 226 national and regional associations. According to CII's count, it has 37 offices in India, 13 overseas in Afghanistan, Australia, Austria, Belgium, China, France, Israel, Italy, Malaysia, Singapore, South Africa, UK, USA and institutional partnerships with 216 counterpart organizations in 94 countries. CII works proactively as a facilitator, catalyzing change by working closely with its membership, the private sector and the government on policy issues. It also provides a platform for sectoral consensus building and networking. Recognizing the global importance of social accountability and the connection between resource management and competitiveness, CII provides a number of services focused around WTO, Climate Change, TQM (Total Quality Management), Green Business, Environment Management, Energy, and Technology to assist industry address on these issues.

Two of the service areas that the LBG GEP-CCS has worked extensively with CII on and provided TA and capacity building assistance for, are the Environmental Management Division (EMD) headed by Mr. Nyati, and the CII Climate Change Center (C4).

The Climate Change Center was established under a USAID supported initiative with the following objectives: to spread awareness of climate change issues within Indian Industry; promote consensus on climate change mechanisms, and to build local capacity to develop Climate Change Mitigation Projects (CCMP). Some of the activities planned were to develop position papers on climate change policy issues and facilitate dialogue between Indian and US business executives for possible collaborations on climate change mitigation projects. As part of the CLIN 1 tasks, the LBG team provided a TNA for the Climate Change Center. (Milestone CLIN 1B)

CII's EMD was an early leader in understanding the global relevance of pollution prevention, environmental management systems and social accountability for Indian industry. The mission of CII's Environmental Management Division (EMD), to promote corporate sustainability management and eco-efficiency within industrial operations and to enable Indian industry address environmental, sustainability issues effectively at a competitive cost, is complementary to the goals of the GEP project.

The Environmental Management Division promotes eco-friendly industrial operations, and provides a wide range of advisory and technical services on environmental policy, and technology options. The EM division provides training on Pollution Prevention and Environment Management Systems (EMS), Occupational Health and Safety Management System (OHSMS), Social Accountability (SA 8000) management tools and facilitates the design and implementation of these systems in industry.

LBG and CII have been frequent and constant partners throughout the four year project. From joint sponsorship of training activities and roundtables, to exhibitions and seminars, individual and group in-house capacity building for CII staff on GHG baselines, registries, greenhouse mitigation project development, financing of clean energy projects, CII has been an energetic and effective partner, able to mobilize both the private sector and GoI.

The first policy exchange and study tour implemented under the GEP-CCS project in September 2000 were designed in collaboration with CII to coincide with the momentum created by the Prime Minister's visit to the US and to facilitate the Indo-US Business Dialogue on Clean Energy sponsored by the U.S. Energy Association and Confederation of Indian Industry with USAID and LBG support. Mr. V. Raghuranman, Sr. Energy Advisor and head of the Climate Change Center for CII, traveled to the US as the first policy exchange participant. Results of these two policy exchanges: the signing of the charter between CII and USEA and the MOU with

the Green Business Institute. An MOU was also signed between CII and the Business Council for Sustainable Development for collaborative activities.

LBG provided the introduction and/or links to network CII with like minded organizations who have complimentary goals and objectives like WRI, and Environmental Defense, and then fostered partner relationship development. One such example was the organization of the multi sector ***Roundtable on "Embracing Climate Change: Using Market Based Mechanisms for Global Competitiveness"*** on September 27-28, 2002 in Delhi. Building upon the foundation of earlier exchange activities, LBG/GEP-CCS had formed a collaborative partnership with Environmental Defense (ED), a prominent U.S. based climate change oriented institution, and brought them together with the Confederation of Indian Industry's Environmental Management Center to complete the partnership collaboration. CII was the institutional champion and India host and co-organizer for the successful roundtable for which they mobilized top level industry participation.

In a true collaboration, CII acted also as the "Indian" host for many of the U.S. to India exchanges. During the policy exchange visit of Pankaj Bhatia of World Resources Institute, for example, CII acted as a co-host, organizing two roundtables to demonstrate the WRI GHG Protocol, one for industry and another for the GoI.

Among the numerous exchange events and activities that CII partnered on were the:

Policy and Study Exchange
Washington, DC ? New York, U.S. September 10 -20, 2000

Climate Change Policy and Funding Mechanisms Study Tour
Washington, DC ? San Francisco, U.S. September 14 -22, 2000

"Clean Power - A Roundtable on Strategy for the Power Sector" May 9, 2001 India Habitat Centre, New Delhi, CII was the principal partner.

The GHG Protocol and Opportunities for its Adoption by Industries and Electric Utilities in India Policy Exchange New Delhi ? Mumbai, India, April 1- 4, 2002

Establishing GHG Emission Baseline Measurements for the Future: Study Tour Washington, D.C. ? San Francisco, CA, June 3-7, 2002

Multi-sector roundtable ***"Embracing Global Climate Change: Using Market-Based Mechanisms for Global Competitiveness"*** September 27-28, 2002. CII was the institutional host and co-organizer.

Ernest Orlando Lawrence Berkeley National Lab Policy Exchange
Delhi Mumbai, India October 14 - 22, 2002 Software demonstrated at CII technology bazaar

Environmental Resources Trust GHG Registry Policy Exchange
Delhi, India March 1 – 11, 2003. CII hosted a special presentation at the Habitat Center to an industry audience and a special technical session for staff at their offices.

Promoting Sustainable Urban Waste and Landfill Gas Management Policy Exchange New Delhi ? Agra, India, November 9 – 16, 2003. Exchange participants and materials were resources for the CII Climate Change technology Bazaar and Conference.

CII also provided natural leadership for several of the Indian study tour delegations. Rhaul Khstrepal of CII's Energy Division led the industry participants during the first study tour in 2002. During the meetings in the US during the U.S Study Tour: *Establishing GHG Emission Baseline Measurement for the future* in June of 2002, Mr. Nyati was able to ably articulate various issues that were relevant to the Indian private sector as a whole. He also took the lead for the delegation in a daily synthesis of what they observed and learned in preparation for the next days meetings. As result of his leadership and consensus facilitation expertise, Mr. Nyati was invited to chair a technical advisory working group for ISO TC 207 on GHG emissions protocol standardization.

Maintaining the capacity building and collaborative spirit of the project, GEP-CCS and LBG also supported CII events and activities, providing speakers, experts, sponsorship, collateral materials, etc. as needed. For example, LBG provided speakers, publications, hand-out CDs and booths for the 2002 and 2003, CII Climate Change Technology Exhibitions as part of the US-India Cooperation on Climate Change.

CLIN 2: Institutional Strengthening of the Financial Sector

The financial sector, as the prime funding source for power projects, urban infrastructure and the private sector, is in a key position to shape India's development. The long term goal of CLIN 2 is to transform the way financial institutions evaluate and fund projects to better reflect climate change impacts.

Under this task, the contractor was directed to conduct specially designed workshops for the financial sector and to provide focused technical assistance to build the capacity of the financial sector to evaluate the climate change impacts of selected bank portfolios. The use of workshops and the focused TA were designed to assist financial institutions to reflect the potential cost of GHG emissions in lending and rating guidelines, thus helping to drive "climate friendly" development.

LBG implemented this task by establishing a dialogue with the Indian financial community to: (a) understand the current knowledge of the global climate change (GCC) impact on financial aspects of projects; (b) disseminate information on international technology trends in GCC; (c) identify gaps that hinder GHG mitigation project development; and (d) conduct training on GHG mitigation financing and project development. During this process, LBG conducted specialized financial training for over 100 Indian professionals. A much larger pool of financial professionals were subsequently trained by the FIs themselves following the policy exchange activities and study tour exposure in the US.

To better design and deliver the training workshops, LBG carried out a training needs assessment (TNA) of Indian financial institutions (FIs). The objective of the TNA exercise was to assess the current knowledge of representative Indian FIs on GHG mitigation project appraisal and to identify the capacity of the sector to respond to shifting market drivers, such as the newly emerging GHG emissions trading schemes.

The methodology for the TNA was designed as a two-step process, an initial round of background meetings with selected FIs from July to October 2000 to provide a general idea of existing project appraisal and environmental risk analysis practices, followed by in-depth meetings with 12 different FIs in November 2000 in order to compile a broad picture of Indian FI capacity relating to GHG mitigation financing.

LBG contracted two outside consultants, Global Financial Solutions, LLC, and NATSOURCE to provide additional global perspective on GHG finance issues. Participant FI institutions covered key financial sectors including: commercial banks (2); banking trade associations (1); banking training institutes (1); special purpose financial institutions (3); credit rating agency (1); and development financial institutions (4).

Findings showed that in 2000, the only available financing for clean energy projects was from a limited number of specialty FIs, such as the Indian Renewable Energy Development Agency (IREDA), which receives funding lines extended by World Bank and the Asia Development Bank (ADB). In addition, because of commercial competition, there was a limited supply of

finance for projects dealing with clean but marginally expensive technologies. With higher rates of interest, the result was a low to medium Internal Rate of Return (IRR) for such projects. Furthermore, the risk perception of GCC projects was high, resulting in the demand for a stronger security mechanism, as shown by Independent Power Producers' (IPP) projects in India.

Other findings:

- **A need for more commercially sustainable sources of finance**
- **The concept of environmental risk management was new and not institutionalized**
- **FIs facing increasing pressure to incorporate environmental risk criteria**
- **Consistent perception that investment in GHG projects entail higher project costs**
- **Significant lack of understanding of the technologies used in GHG mitigation**
- **Limited understanding of how to use cash-flow analysis for GH project structuring**
- **Lack of awareness about international sources of GHG project finance**

Based on the TNA, and in consultation with USAID, partners were established, the training materials were developed and the training schedule planned. (Milestone CLIN 2A)

The first training activity was a week long course held in Bangalore, Karnataka in April 2001. LBG tapped renowned experts from partner organizations to develop and present the three modules of traditional financing options for clean energy projects, project preparation, and emissions trading. Two of the trainers, Mr. O'Connor and Mr. Varilek had attended the November 2000 TNA meetings in India. A third trainer was added, Mr. Moscarella, from Econergy International, to provide training from a project developer's perspective. The LBG India office contacted over 80 Indian FIs: commercial banks, development banks, venture capital funds, insurance companies, training institutions and industry associations involved in project identification and funding, to make them aware of the GEP-CCS project initiative with financial institutions and to invite them to the training. LBG received 54 firm and 14 verbal confirmations from participants. Over twenty one different organizations were represented at the training including:

ICICI Limited
ICICI Venture
ICICI Bank
Power Finance Corporation
Industrial Development Bank of India
Small Industries Development Bank of India
Indian Renewable Development Agency Ltd.
Infrastructure Development and Finance Company Ltd
ICRA Advisory Services
Associated Chambers of Commerce & Industry
Infrastructure Leasing & Financial Services
Bank of Baroda
UTI Bank
SICOM Ltd
Industrial and Technical Consultancy Organization of Tamil Nadu Ltd
Federation of Indian Chambers of Commerce and Industry
Industrial Development Services
AJI Engineers
Development Alternatives
Karnataka Bank Ltd.
Indian Bank Training College

The training was divided into three modules, with international experts/practitioners conducting each section. The modules covered existing debt/equity sources of financing for clean energy projects (CEPs), new opportunities in relation to carbon trading, and, lastly, a module which looked in detail at project development as it relates to clean energy (carbon avoiding) projects.

In the post training survey, 98% of the participants rated the training excellent or good. Recommendations from the survey also helped LBG further improve the modules for the second round of training. (Milestone CLIN 2B)

Between July and August 2001, a Louis Berger Group team consisting of Mr. Ted Yoder, Mr. Vinay Deodhar and Mr. Craig O'Connor, President Global Financial Solutions, LLC, implemented the next stage in the financial institution strengthening process: a portfolio review and technical assistance task with ICICI and the Infrastructure and Development Finance Company (IDFC), two of the leading Indian FIs involved in environmental lending. Specifically this task sought to identify what project risks the FIs face by not addressing carbon/climate change impacts in their financial decision-making. Similarly, what cost/benefits should the FI take in consideration when developing a carbon mitigating project that has "potential" future carbon sale opportunities. The TA team therefore focused on: identifying portfolio projects with the highest GHG emissions as they equal the highest future potential risks; communicating the current status of international climate change markets; updating the FIs on the status of international equity buyers of carbon reducing projects; identifying strengths/weaknesses of specific projects and recommending restructuring; sifting through the portfolio for the best carbon mitigating projects for possible future carbon sales. (Milestone CLIN 2B)

This task also provided important feedback for the next FI training. To maximize the momentum created, the TA team targeted institutions that attended the April training and by doing so was able to elicit the cooperation of prominent Indian FIs whose experiences would provide valuable insight for other FIs who may have more limited time and resources.

By August 2001, it became apparent that certain assumptions within the GEP-CCS contract, as related to project financing, had shifted significantly since project inception. Neither market-based carbon-trading nor the formation of international environmental equity institutions represented near-term financial options for Indian FIs seeking to finance clean energy projects in India. This ground reality and new challenges were addressed by thinking outside of the box.

To maximize the next exchange and portfolio review process, the portfolio review activity was designed in two phases. The Phase I involved visits from July 29 to August 3, 2002 to key US based organizations to learn and share experiences on environmental and GHG assessments of projects. Phase I had a "train-the-trainer" orientation, with the Phase II segment focus on GHG reviews of portfolios onsite at participating institutions in India during August 9 – 14, 2002.

In consultation with USAID and based on the interest and the proactive approach the FIs demonstrated during earlier training programs and interactions, and the ongoing initiatives in the urban transport and municipal waste sectors, GEP-CCS identified five FIs for possible participation in the review program, of which three were then selected for the on-site portfolio review.

The Phase I presentations focused on presenting various GHG assessment models and tools, as well as hands-on familiarization with the review process and analysis tools that would be used in the Phase II portion of the activity of the model. Live cases from the respective FI portfolios and the portfolio of pipeline projects to which GEP-CCS provided TA were employed in the Phase I demonstration and "train the trainer" activity. Through LBG's collaborative partnership with Lawrence Berkeley National Lab, an exclusive India version of the ProForm Software was

developed, demonstrated and identified as a valuable tool for pre-screening GHG mitigation projects. The FI delegates who participated in the Phase I visits took a lead role in the portfolio review process and shared the experiences and applied the lessons learned from the US visits during the Phase II review meetings. (Milestone CLIN 2D)

Upon the conclusion of the Portfolio Review process, all of the FIs expressed keen interest in adopting procedures for the GHG assessment of their projects. This interest was driven in a large part by the FIs recognition that by doing so, they would be in a better position to take advantage of the potential to monetize carbon offsets generated by projects in their portfolios.

> The portfolio exercise *"Helped improve our understanding of global initiatives for addressing the problem of GHG, highlighted the role of FIs in helping achieve GHG mitigation through suitable interventions ....in project development and appraisal processes, and improved our understanding of "clean" technologies in supporting GHG mitigation measures based on financial evaluation.... We are keen to take the process forward and would incorporate the learnings in our processes".*
>
> Raghu Ram
> IDeCK

The first phase held in the US was a review of the FIs project portfolio documentation and structured interaction with leading US and international institutions models on GHG/environment analysis and structuring. The delegation consisted of representatives from IL&FS, IDECK, and IREDA. LBG/GEP-CCS also invited a senior representative from IDFC, Ms. Solanky, who had participated in the first portfolio review and who was preparing a comprehensive climate change strategy for IDFC. This visit would prove instrumental in providing substantial inputs and partnerships to IDFC's strategy to - in Ms. Bharti Solanky's words - "chart the course for our institution's future"

During the US visit, the delegation profited from exposure to various models and tools in use to track and measure the level of GHG emissions intensity of portfolio projects at financial institutions and insurance companies. The group met with: the International Finance Corporation (IFC), Environment Programs; the IFC-Netherlands Carbon Facility; the Overseas Private Investment Corporation, Environment and Climate Change Programs Division; the U.S. Export-Import Bank, Environment and Strategic Programs; Aon Risk Services, Carbon Risk Management Division; the Lawrence Berkeley National Lab (a U.S. Dept. of Energy Lab); The World Bank Group and ProtoType Carbon Fund; the Environmental Resources Trust GHG Registry and Project Development Services, among others..

A meeting with the Environmental Resources Trust, GHG Registry Program head brought to the fore the importance of having a GHG emissions registry as crucial element in establishing a repository of verifiable GHG emissions that can be traded. IDFC was most interested in this concept as they are the intermediary bank in India for the World Bank's Prototype Carbon Fund. A special interactive session that LBG arranged with the Lawrence Berkeley National Lab (LBNL) brought LBNL scientists and specialists from both coasts to explain and demonstrate the prototype of the ProForm software tool that FIs can utilize when evaluating energy projects. The ProForm software can be considered a "pre-screening" tool as projects are reviewed, perhaps as

the core for a fee-for-service model or a project sponsor requirement at the time of finance. As a result of this bi-coastal video-conference, the Indian FIs were able to contribute a number of additional valuable suggestions for improvement to ProForm and agreed to beta-test the tool for further customization of the software to Indian scenario.

The participants used concepts and examples from these models as they designed programs for their own institutions to manage GHG risk and opportunity potential. Several institutions, e.g. IDFC and ILFS, initiated training activities based on the inputs of the Phase I visit.

An additional group of bank officials were trained from April 23 to 24, 2002. (Milestone CLIN 2E) The training was held in Mumbai, in response to a call for a more central location for the training. Feedback from the earlier TA for the FIs, the Bangalore training in 2001 and various meetings were reviewed with USAID in preparation for the development of the second group training. Responding to recommendations received from the FIs, the five day course as initially developed was condensed into two. Course materials were streamlined to edit back the traditional lending module, structured into six primary sessions that eliminated over-laps and built around a case study exercise which used 10 actual Indian projects that had been submitted for inclusion in the GEP-CCS GHG mitigation project pipeline.

As one goal of the training was to "train-trainers" and to spread an awareness of both the role of the Indian Financial sector in GHG emission reduction projects and the GHG risks and opportunities in such projects, the presence of relevant business associations, e.g. Indian Banks Association, the Loss Prevention Association, FICCI, the Indo-American Chamber of Commerce, was specifically targeted, solicited and encouraged.

A notable result of earlier GEP-CCS interactions was that certain institutions had become committed to learning more and had sent additional officials to be trained. Repeater and champion FIs included IDFC, ICICI, IREDA, Bank of Baroda, SICOM Ltd, and the Power Finance Corporation among others. Attending the training were representatives from the following institutions:

Banks/FIs

Small Industries Development Bank of India
United Western Bank, Ltd.
Bank of Baroda
Power Finance Corporation
IREDA
The Saraswat Cooperative Bank
Infrastructure Development Finance Corporation
UTI Bank
Infrastructure Development Corporation (Karnataka) Ltd.
State Bank Institute of Rural Development
Housing &Urban Development Corporation Ltd. (HUDCO)
ICICI
SICOM Limited
State Bank Staff College

Business Associations

Loss Prevention Association of India, Ltd.
Indo-American Chamber of Commerce
FICCI
Indian Banks Association

The results from LBG's work with the financial sector have been particularly gratifying, with a notable difference observed in the way Indian FIs now approach clean energy/GHG mitigation projects.

Results:

- **A number of "champion" FIs, notably IDFC, IL&FS/Ecosmart, PFC, IREDA, IDeCK, and ICICI, have emerged**
- **An increase in the number and the quality of clean energy/greenhouse gas mitigation proposals referred from project developers and financial institutions for funding**
- **Ecosmart has begun offering a group of services in the climate change areas, including baseline and PDD services, and has entered into an arrangement with a European firm to take advantage of the EU carbon trading market**
- **IDFC in its role vis-à-vis the PFC, has helped prepare and submit a number of GHG mitigation projects for funding**
- **IDFC and ICICI review climate change impacts**
- **Others like PFC and IREDA are more cognizant now of the risks**
- **Tools developed, demonstrated, and further refined with the input of the Indian FIs are being used for the evaluation and analysis of GHG mitigation projects including the Climate Change Risk analysis, the ProForm software, and the DPR worksheet**

CLIN 3: **Project Development and Financing**

The ultimate long-term goal of this task was to enable more GHG emission reduction projects on the ground. The more immediate objective was to develop a pipeline of such projects and assist them to access funding.

USAID determined that significant multilateral resources were available for government, non-government and private sector climate change projects, but project development expertise for climate change projects was lacking among local stakeholders. One of the goals of the Greenhouse Gas Pollution Prevention Project's Climate Change Supplement was therefore to facilitate financing for new projects in India that mitigate greenhouse gas emissions. The contractor was directed to provide technical assistance for developing a policy framework for operationalizing climate change mechanisms, to provide direct technical assistance to project developers in the preparation of climate change mitigation project proposals and to develop a portfolio of such projects.

The Louis Berger Group, Inc. (LBG) has implemented this task under the GEP-CCS by actively supporting the development of projects that would help mitigate the climate change impact of industry, energy generation and usage and urban growth Under CLIN 3, the LBG GEP-CCS team developed a project tracking format, (Milestone CLIN 3A) and worked with a select group of project developers and international funding agencies to develop and provide guidance on climate change mitigation project (CCMP) development. The process of the development of a clean energy project as a Climate Change Mitigation pilot project in a representative state was demonstrated: a *Roadmap for Climate Change Mitigation Project Development* was prepared based on the pilot, the process and the lessons learned. (Milestone CLIN 3B) This "step-by-step" guidance document was prepared in collaboration with, and as part of the capacity building assistance to, the Climate Change Center at Development Alternatives.

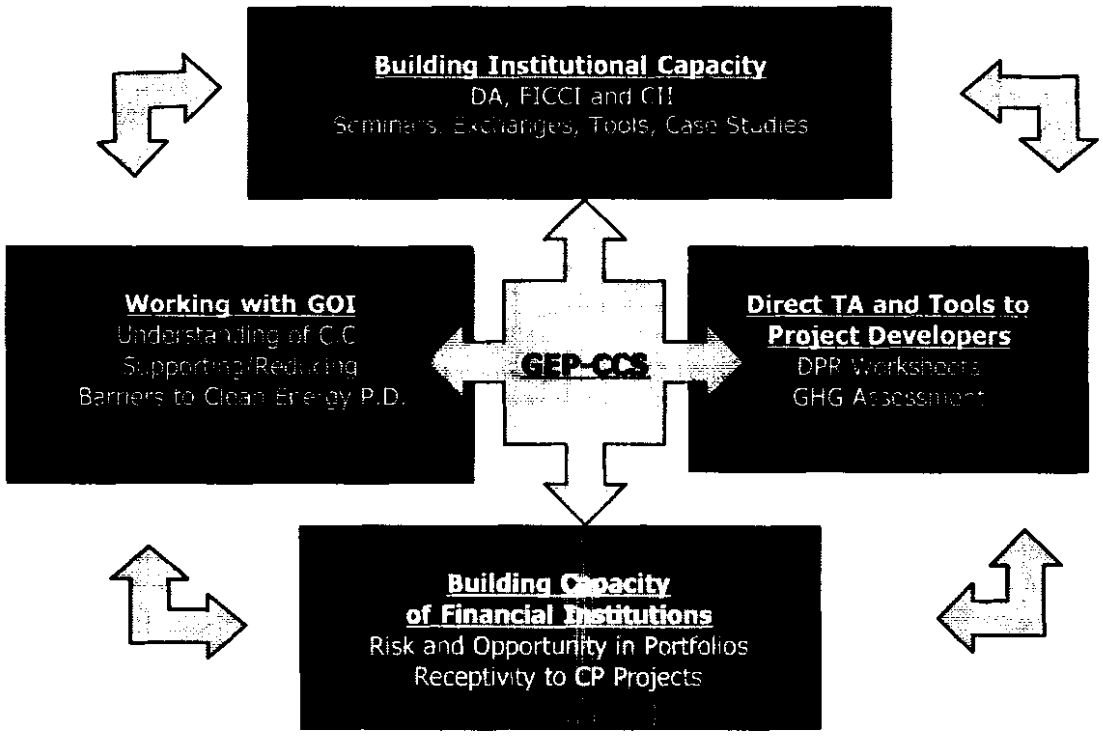
While the international investment community has demonstrated its intent to fund energy efficient and renewable energy development projects worldwide, to-date there has been more demand than supply of qualified quality projects presented. The main reasons cited for the low acceptance rate of projects are the insufficient data, substandard formulation and mediocre structure of the majority of projects presented. To address these deficiencies, LBG conducted a number of capacity building and training activities and has interacted with various stakeholder organizations and individuals to develop and support a "pipeline" of fundable clean energy projects (CEP). The LBG assistance was targeted specifically to help developers to structure CEP projects to better qualify to receive financial support from FIs.

To assist in achieving the goal under the Project Development and Financing task, LBG employed a layered implementation approach with two main capacity building directions. The first, to work with financial institutions (FIs) in India to improve their understanding of a) the value of clean energy projects in reducing GHG emissions and b) the potential value of GHG emission reductions as a commodity that could improve the viability of projects from both the financial and social impact aspects. The second, concurrently implemented, was to work with

other institutions, such as the Climate Change Centre at Development Alternatives and industry groups like FICCI and CII, as well as directly with project developers of both traditional and clean energy projects to improve their ability to identify and evaluate the potential GHG mitigation impacts of their projects. The work with both the institutions and the individual project developers was critical in developing a pipeline of stronger, better structured proposals for viable greenhouse gas mitigation and clean energy projects for submission to financial institutions.

At the same time direct TA and tools provided by LBG helped project developers examine and quantify the GHG emissions reduction potential of their projects, and to structure them in a clear concise way that was more acceptable to FIs. Work with the GoI also helped policy makers better understand the concept and benefits of CE projects.

Figure 1: The Approach on Project Development



The development of a pipeline of a least 15 viable clean energy/greenhouse gas mitigation projects was central to the GEP-CCS project. It was also expected that at least 8 out of the 15 would be funded. To implement this task, LBG developed an overall strategy, selection criteria, detailed approach and laid-out a methodology for CEP development and the philosophy for short-listing projects. This strategy was laid-out along with the first 10 pipeline projects identified for the pipeline. (Milestone CLIN 3 C)

During the second period of the GEP-CCS CLIN 3 project pipeline development and financing component, an additional financial resource, the Clean Energy Project Fund (CEPF), was

designed and developed through the initiative of the USAID India Mission. The LBG Finance Specialist assisted in this effort. This fund was developed to assist clean energy projects that met the GEP-CCS/AID criteria for CEP, and to access funding through two designated partner financial institutions, ICICI Bank and IDFC. The success of the multi-layered capacity building approach, and the availability of the CEPF in the second half of 2003, resulted in 14, instead of 5 new projects being identified for the pipeline.(Milestone CLIN 3D)

During the GEP-CCS project, the LBG/GEP-CCS team worked very closely with various FIs, including ICICI, IDFC, IREDA, Infrastructure Leasing and Financial Service (IL&FS), the Infrastructure Development Corporation (Karnataka) Ltd. (IDeCK), and the Power Finance Corporation (PFC) as well as many banks, such as the State Bank of India, the State Bank of Hyderabad, the Bank of Baroda and others. The direct engagement with the financial institutions during the training activities, seminars, and portfolio reviews was reinforced by study tours, symposium, policy exchanges and meetings. The interaction under CLIN 2 not only assisted the five financial institutions who participated in the portfolio review to assess GHG assets and liabilities for projects already in their portfolios, but has made an impact on the way FIs look at new proposals.

Technical assistance and tools were critical to moving the proposals from concept to funding commitment, in particular, the DPR Worksheet and the GHG Assessment that were prepared with the project developers for submission to the FIs. Developed by GEP-CCS LBG team with inputs from and consultation with domestic/international financial institutions, US consulting firms, an emission brokerage firm and USAID, the DPR worksheet synthesizes crucial project information into a form digestible by domestic and international finance and investment interests. Another tool employed by the LBG/GEP-CCS team was an estimation of the GHG reduction potential for each project entering the pipeline. The GHG reduction assessment includes establishing a general GHG emission baseline (i.e. emissions without the project), and estimating the (reduced) GHG emissions in the presence of the project (i.e., emissions with the project). The difference between these two amounts represents the estimated potential GHG emission reduction for a project. This data was used in the structuring of the projects to strengthen their financial position and thus improve their ability to obtain financing from domestic or international sources.

In addition to the DPR Worksheet, and the GHG Assessment, among other tools developed by LBG and GEP-CCS partners that were very instrumental in moving proposals forward were the *Roadmap for Climate Change Project Development*, and the ProForm software from LBNL.

Constant tracking and monitoring of the projects in the pipeline to identify potential barriers or issues to financing that could be addressed was also critical. In tracking the process from pipeline proposals to project financing, the GEP-CCS/LBG team identified certain gaps and barriers and worked with the multiple project partners to develop strategies to address them. The LBG GEP-CCS Team's capacity building activities undertaken for all the CLINs were helpful in this process, as was the ability to leverage presentation opportunities at partners' events (e.g. CII and FICCI conferences, CoP 8 side events).

As of the writing of this final report, ten projects from the pipeline have received sanction letters which are the first legal documents obligating a financial institution to fund a project, and/or other support documentation demonstrating that a sanction letter has been issued and a commitment of funding has been made. (Milestone CLIN 3E)

The ten projects encompass a range of technologies from small hydro power, biomethanation of municipal solid waste, bagasse based co-generation, waste heat recovery, and bio-mass power using rice husks. Several of the projects have already or are in the process of monetizing their emissions reductions.

Table 2: Project Details in Brief

1	Ambutirtha Power Pvt. Ltd	2 X 10 MW hydel project in Karnataka	A run-of-the-river (Sharavaty) hydro power project for Karnataka grid	25	75,000
2	Coastal Agro Industries Ltd.	4 MW rice husk based cogeneration plant in Andhra Pradesh	Power/steam generation using rice husk for captive use and export to AP grid	3.5	19,000
3	Asia Bioenergy (I) Ltd.	5 MW MSW biomethanation based power/compost plant	In-vessel biomethanation of MSW for power to UP grid and compost	18.5	192,000
4	Globe Cogen Power Ltd.	45 MW bagasse based power project	Bagasse cogeneration plant power for Karnataka grid	42.1	150,000
5	Sainath Power Concepts Ltd	6 MW biomass based power project in AP	Power generation using cotton and maize stalks and rice straw for AP grid	5.8	25,860
6	Pioneer Genco Ltd.	21 MW Small hydropower plant in Karnataka	A run-of-the river (Cauvery) hydro power project for Karnataka grid	20.5	42,000
7	Chattisgarh Electricity Co. Ltd	10 MW Ferro-alloys furnace gas based power generation plant	Power generation from off gases from ferro alloys furnaces to replace coal based power in Chhattisgarh	18.8	57,740
8	Sandur power Co. (P) Ltd.	3 X 7.5 MW Small hydropower plant in Karnataka	A run-of-the river (Varahi) hydro power project for Karnataka grid	30.2	78,880
9	Sterlite Industries Ltd.	WHR based steam generation plant in a sulfuric acid plant	Steam generation using waste heat from sulphuric acid and captive power plants	2.6	17,440
10	Alwar Power Private Ltd.	7.5 MW agro-residue biomass based power plant in Rajasthan	Power generation using mustard crop residues for Rajasthan grid	7	39,200
10	**Projects**	**141 MW plus Steam/compost**		**174**	**697,120**

These ten projects will bring the projected GHG emissions avoided/reduced total to over 700 thousand tons per year from projects in five states: Karnataka, Andhra Pradesh, Uttar Pradesh, Chhattisgarh and Rajasthan (Alwar Power Project).

Results:

- **24 projects developed for the pipeline**
- **10 projects funded with a:**
  - **700,000 CO_2 per annum GHG emission reduction potential**
  - **141 MWs of green/renewable power generated, along with steam and organic compost.**
  - **Estimated cost/investment of the ten projects approx. $170 million**

In addition:

- **Capacity built for the development of fundable clean energy and GHG mitigation projects.**

It is anticipated that additional clean energy projects currently in the pipeline will continue to be evaluated for funding beyond the date of this report.

CLIN 4: **Communications and Information Outreach**

The primary goal of this task was better communication: to promote understanding, cooperation and information sharing on climate change among various stakeholder groups, and a bi-lateral exchange on issues and technologies.

While the U.S. and India have been engaged in activities that promote greater efficiency and lower pollution from energy supply and use, information on and the understanding of the linkages between actions to mitigate climate change and economic development is still lacking among various stakeholder groups. This task was aimed at creating a forum for greater dialog and cooperation between U.S. and Indian stakeholders using the mechanisms of commissioned research and senior policy level roundtables.

The information and outreach task of GEP-CCS facilitated joint research between Indian and U.S. researchers on various issues related to GHG mitigation project development and climate change. In preparation for this task, LBG prepared a shortlist of US and Indian organizations to co-host the forum.

The core team of LBG in consultation with the USAID/India Environment, Energy & Enterprise (E^3) office interacted with several potential institutions known to be working on Climate Change issues, on research, and/or on promotion. The intention was to continue to build upon the work of the CCOA and further interact with the attendees of the round table meetings held previously. These interactions assisted in the identification of a short list of proposed institutions for the forums. (Milestone CLIN 4A)

The Louis Berger Group invited renowned Indian researchers to prioritize the research topics in collaboration with industry, NGO and Government stakeholders. The American researchers were then invited to join the partnership. LBG together with the Indira Gandhi Institute of Development Research (IGIDR), Mumbai co-organized the "Indian Research Forum" meeting on January 22, 2001 in Mumbai to facilitate the multi-stakeholder research and prioritization discussion (Milestone 4B) Twenty-two participants from leading Indian research institutions conducting research on global climate change attended the Forum meeting and prioritized research topics and the suggested lead author(s) for each.

The Forum was attended by many of India's leading climate change researchers from a variety of institutions, as well as other interested stakeholders such as NGOs and representatives from the Government of India. The objective of the Forum was to identify, discuss, and ultimately select critical topics of research that addressed key potential impacts of climate change in India and identify approaches for mitigating those impacts. During the Forum the lead Indian authors for the research topics were selected based on the consensus of the working groups. The participants at the Indian Research Forum also agreed that, under the leadership of a lead researcher, each framing paper would be drafted by a research team, with several researchers providing technical contributions to the final product. The main topic areas were determined to be:

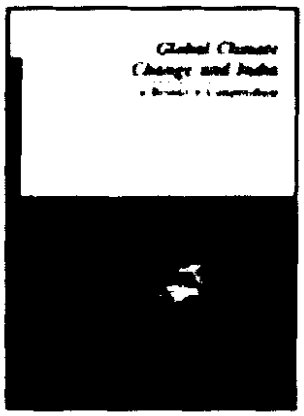
? **Vulnerability/Adaptation**

? **Mitigation in Selected Sectors**

? **Assessment of Carbon Neutral Technologies**

? **Linkages Between Growth and GHG Emissions**

An action plan was also finalized to disseminate the research finding and enable the beneficiaries of the research, i.e. policy makers and GHG mitigation project developers, to have quick access to the insights from the research community. Under the action plan, the joint research teams would complete the first drafts of the papers which would then be peer-reviewed and would also be available for stakeholder comments through a web dialogue hosted by FICCI.



On May 14 -15, 2001, the Louis Berger Group, Inc. in association with the World Resources Institute's Climate, Energy and Pollution Programs, held a U.S. Research Forum at the WRI "Zero Emissions" facility. Part of LBG's continuing implementation of the GEP-CCS project's targeted research component to produce a set of framing papers on key climate change issues in India, the U.S. Forum was the follow-up to the Indian Research Forum held in India in January 2001. Together, the two Forums defined key research issues in climate change in India and developed teams of U.S./Indian researchers who, together, would work to produce high impact research results.

To facilitate the information exchange process, GEP-CCS commissioned a series of "framing" papers on critical climate change issues in India. The papers, which addressed the economic, social, and environmental implications of climate change in India as well as technologies and approaches for mitigating the growth of GHG emissions in India, were prepared by eminent Indian researchers teamed with US researchers. The research papers endured an extensive international review process by institutions intimately involved in climate change related work and/or maintain a key interest in India related activities.

List of research topics and the India/U.S. authors and research teams:

Lead Research Authors
India's Vulnerability to Climate Change

Kirit Parikh
Indira Gandhi Institute of Development Research

Economic Growth, Poverty and CO_2 Emissions in India
Manoj Panda
Indira Gandhi Institute of Development Research

Assessment of the Role of Renewable Energy Technologies
Rangan Banerjee
Indian Institute of Technology – Bombay

Carbon Mitigation for the Indian Power sector
Amit Garg
Indian Institute of Management – Ahmendabad

Energy and Emissions at Global Levels in Urban Transport in India

Jyoti Parikh
Indira Gandhi Institute of Development Research

Municipal Solid Waste management for Climate Change Mitigation
Kalipada Chatterjee
Development Alternatives

Sustainable Practices for the Construction Sector in India
Jyoti Parikh
Indira Gandhi Institute of Development Research

Additional Research Authors

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Indian Institute of Technology – Bombay

P.R. Shukla
Indian Institute of Management – Ahmendabad

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United Nations Development Programme

J.K. Nyak

Indian Institute of Bombay

Prem Pangotra
P&M Consultancy Services

A.K. Varshney
Ministry of Non-Conventional Energy Sources

Ram Shreshtha
Asian Institute of Technology

John Virdin
World Resources Institute

Ashish Rana
National Institute for Environmental Sciences

International Research Forum Contributing Organizations

Indira Gandhi Institute of Development Research: Co-host*
World Resources Institute: Co-host*
Civil Engineering Research Foundation
EPRI
Global Energy Partners, LLC
Institute of Environmental Management
International Institute of Energy Conservation
National Institute of Advanced Studies
Tata Energy Research Institute

The report was first published and disseminated in hard copy: LBG later formatted the research compendium on a CD which was distributed at major activities and events including CoP 8.

CLIN 5: **Senior Policy Level Roundtables**

The primary goal of CLIN 5 was to engage specific power intensive sectors in GHG reduction efforts and to promote interaction between industry and policy makers on climate change.

To implement a critical part of the communications and outreach emphasis of the GEP-CCS project, the contractor was directed to conduct a number of sector specific and cross-sector roundtables to examine opportunities to combat GHG emissions in specific sectors. In addition to the critical electrical utility industry, other GHG emissions intensive sectors such as transportation, waste management, cement, steel and others would be targeted for participation. This component was designed to engage multiple stakeholders and promote interactive sessions between planners/policy makers, NGOs, academia and industry on integrating GHG emissions reduction technologies into economic development plans.

Under this task, LBG brought together relevant stakeholders, e.g. senior government policy officials, industry executives, and NGOs, to actively participate in a series of sector-specific and multi-sector roundtables to promote an exchange of ideas and an evaluation of opportunities to combat climate change in key sectors. LBG conducted five senior policy level roundtables specific to this task, in addition to the many other roundtables and dialogs that LBG conducted in connection with the tasks under CLIN 1, CLIN 2, CLIN 3, and CLIN 7 over the life of the project. The sector oriented roundtables listed below were designed to engage the power utilities, the energy intensive and high emissions producing industries (i.e. cement, steel, aluminum, pulp and paper and fertilizers/chemicals), the stakeholders in municipal solid waste management, and the renewable energy sector. The roundtables held:

1. ***"Clean Power - A Roundtable on Strategy for the Power Sector"*** May 9, 2001 India Habitat Centre, New Delhi Principal partner: CII

2. ***"Capitalizing on Opportunities and Overcoming Constraints - A Roundtable on Clean Energy Technology in Industry"*** August 3, 2001 FICCI Federation House, New Delhi Principal partner: FICCI

3. ***"Renewable Energy for Sustainable Development: Opportunities, Barriers and Solutions"*** August 17, 2001 India Habitat Centre, New Delhi Principal Partner DA

4. **National Workshop on Solid Waste Management** ***"Facilitating ULB Initiatives to Meet MOEF Objectives: What Needs to be Done?"*** December 19-20, 2001 Grand Hyatt, New Delhi Joint organizers: GOI, Ministry of Urban Development and Poverty Alleviation, USAID, GEP-CCS and FIRE projects

The Senior Policy Level Roundtables were one of the tools designed into the GEP-CCS project for fostering dialogue, understanding key issues and developing long-term sustainable solutions. These roundtables met their goals by enhancing the understanding of the roles of various stakeholder groups in climate change, broadening perspectives on the role of clean energy or other technologies in reducing the rate of GHG emissions, and developing recommendations on policy initiatives and action plans for promoting climate change mitigation - especially in the

adoption and financing of clean energy technologies in the targeted sectors. The roundtables also served their purpose in facilitating collaboration between project developers, government decision-makers, finance institutions and other stakeholders for better comprehension of the issues and to develop guidelines which would serve as the basis for appropriate new policy and regulatory instruments, thus enabling an environment for increased environmental protection.

Individual leading companies or institutional "champions" can assist faster and more focused development and policy changes by organizing and actively participating in such sector-specific and multi-sector roundtable conferences. As a first step, therefore, LBG identified a number of these champions and presented an action plan for implementing three sector specific and one multi-sector round table conferences. (Milestone CLIN 5A)

With champions in each sector identified, sector specific policy level round table conferences were organized by one or more of the champions in collaboration with LBG. The champions in the roundtables took the lead in deliberations and discussions so that new ideas on GHG emission reduction projects as well as GHG issues were more effectively shared and more likely to be implemented by others. After the initial assessment and identification of champions, a workplan was prepared and LBG assisted in the development of the steering committees and the development of the agendas for each roundtable. LBG then guided the process: co-organizing the events with the partner 'champion' institutions, identifying and bringing in speakers as needed, facilitating the flow of the events and overseeing the organization of the out-put.

The critical utility sector was the first addressed. LBG and the Confederation of Indian Industry (CII) held a Utility Roundtable on May 9, 2001, with the title, ***"Clean Power: A Roundtable on Strategy for the Power Sector"*** for the purpose of building awareness and defining courses of action to address GHG mitigation in that sector through adoption of clean energy technologies. (Milestone CLIN 5B)

The Roundtable was attended by a diverse group of participants who had a stake in the utility sector or could facilitate clean technology investments and choices within the sector. Discussions focused on a number of clean technology applications and GHG linkages including clean power generation, transmission and distribution and financing. Clean technology options within these areas were discussed and debated. The Roundtable was effective in stimulating discussion among key stakeholders in the sector and disseminating information on approaches to using clean energy technologies as a means to mitigate GHG emissions generation. The Roundtable resulted in:

- an enhanced understanding of the role of the sector in climate change;
- new or broader perspectives on the role of clean energy technology in reducing air and GHG emissions;
- recommendations from participants on policy or implementation guidelines or actions for promoting the use of clean energy technology in the sector; and
- collaboration between GEP-CCS, project developers, the Government of India (GoI), financial institutions and other interests to promote clean energy technologies.

The participants were in accord that the choice of technology for power generation in the future would depend on current and future trends of environmental regulations, the availability of low-cost fuel on a long-term basis, plant efficiency and costs of technologies. Various short-term

technology options for power generation in India and longer-term options were discussed. Participants felt there should also be sufficient R&D efforts for the development of technologies like integrated gasification humid air turbines, integrated gasification molten carbonate fuel cell, development of hot gas cleanup system, high temperature air pre-heaters, new material for ultra-supercritical boilers, etc. Regarding the problems and losses in the transmission and distribution, participants believed that establishment of national grid, higher distribution voltage line (11 KV and above), distribution circuit phase balancing and installation of energy efficient distribution transformers like amorphous core transformers could reduce the various technical and non-technical losses in the system. They also expressed an opinion that more emphasis should be given to demand side management to reduce the losses by introducing policies for: promoting sustainable markets for energy efficiency, removing subsidies in agriculture and the domestic sector, the manufacture of more energy efficient appliances and the labeling and benchmarking of appliances, 100 per cent metering for all consumers combined with utility and information management system and electronic metering system for time of day metering. It was felt that clean technology options can only be realized with support from financial institutions which are sensitized and made capable of evaluating risk in funding these projects. Throughout the dialogue, the link between clean technology options and emissions generation, including CO_2 emissions, was made.

Industrial Sector Roundtable

A prime focus area for the GEP-CCS roundtable series was Indian industry, as key energy intensive industry sectors account for a disproportionate percentage of GHG emissions. The goal of the roundtable was to provide a forum for, and play an integral role in, fostering dialogue on technological and planning applications, primarily in the energy intensive industry sectors: cement, steel, aluminum, electric utilities. The multi-industry forum also facilitated the valuable exchange of lessons learned across industries.

On August 3, 2001, in association with the Federation of Indian Chamber of Commerce and Industry (FICCI), a roundtable event was organized entitled *"Capitalizing on Opportunities and Overcoming Constraints"*. The roundtable was organized to bring together a group of participants with a multi-industry representation to discuss the importance and benefits of clean energy technologies that subsequently lead to improved environmental management and GHG mitigation. The roundtable was structured for a "hands-on" approach to defining and discussing prevalent and/or perceived obstacles and barriers to implementing clean energy technologies. The roundtable also identified opportunities for the adoption of clean energy initiatives, in terms of project development, financing, and technology options. Representatives from the GoI and the financial sector as well as from the NGO and research community also joined this industry oriented roundtable to discuss issues and provide a forum for networking and exploring partnering opportunities.

The roundtable discussion was organized with break-out sessions and industry specific working groups (e.g. fertilizers, cement, metals: steel and aluminum, and pulp/paper). These smaller break-out groups facilitated a more open exchange on the implementation of clean energy technologies in specific industry sector. The groups focused on identifying technological, planning and policy interventions appropriate for the Indian scenario. Each break-out session concluded in identifying next steps and the individual working groups' conclusions were fed back into the overall roundtable output.

Renewable Energy Sector

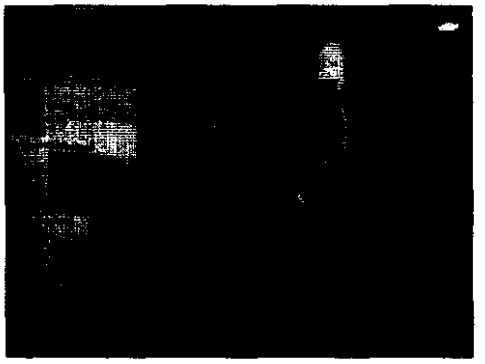
As renewable energy projects are innately GHG mitigating relative to fossil fuel generated energy, the GEP-CCS project had an inherent interest in promoting project development in this sector. A roundtable was organized on August 17, 2001 in New Delhi, entitled, *"Renewable Energy for Sustainable Development: Opportunities, Barriers and Solutions"*. The Roundtable was organized by LBG/GEP-CCS in association with Development Alternatives (DA). The primary purpose of the roundtable was to identify issues that constrain more wide scale adoption of renewable energy technologies and to identify a few actions need to overcome the obstacles. During the proceedings, a number of barriers and constraints were identified: ranging from technological barriers (i.e. lack of established technologies, low conversion efficiency and high costs, lack of maintenance); financial barriers (e.g. difficult to access government programs and financing agencies; lack of availability of funds); to policy barriers – categorized into institutional (e.g. lack of a good privatization policy, duplication and multiplicity of decision making agencies at the national, state and local levels, lack of new technology evaluation mechanism with regulatory authorities) and social (i.e. attitude and mindset of people, lack of robust infrastructure to sustain products, operation and maintenance). Working groups then deliberated to find solutions to these barriers. Solutions and recommendations were presented to the plenary and winnowed down to three main issue areas and a suggested action plan for overcoming these constraints and accelerating the movement towards renewables was laid-out.

The major barrier voiced by all the groups was the absence of a well-defined, comprehensive GOI policy for the renewable energy sector that would provide or promote solutions to the diverse barriers identified. Participants also prioritized the development of an easily accessible web-based database on India and international renewable energy technologies case studies as a key tool to overcoming barriers. This database, they felt, should include detailed financial and technology information to improve project development potential through widespread understanding among project stakeholders on related policy, costs and revenues, risks. The third finding was that full-cost accounting should be adopted by financial institutions and policy makers as the basis for evaluating the merits of renewable energy projects. The participants felt that the social and other sustainable development benefits of renewable energy projects are not being captured in standard project risk and finance evaluations. Hence, they look less attractive to investors than traditional fossil fuel based energy generation projects.

Urban Waste

In India, municipal waste management has not been able to keep up with economic growth and the expansion of urban populations: collection is inefficient, the transportation inadequate, and most municipal waste is ultimately disposed of in open dumps. The MOEF recognized this problem and issued a new set of standards for the collection and treatment of municipal waste to address the escalating issue. The ground-breaking guidelines have presented the opportunity for a paradigm shift in the way municipalities must deliver services while conforming to ambitious targets, extensive reporting and new management measures. Municipal managers are compelled by law to comply and are seeking alternatives in technological and planning applications to do so.

In December, 2001, GEP-CCS and the Financial Institutions Reform Project (FIRE) of USAID, along with the Ministry of Urban Development (MOUD), organized a major national level workshop on municipal solid waste management. The ***"National Workshop on Solid Waste Management"*** drew over 200 high level participants with 98 policy making and implementing entities - ministries, urban affairs institutes and municipalities - represented from 24 states. Seven major development funders, e.g. IDFC, IDBI, ICICI, HUDCO, IL&FS, IREDA, and the Project Development Corporation of Rajasthan also participated, as did ASCI, and several energy, environment and urban research institutes. In addition, more than 30 private sector companies attended.



Prior to the workshop LBG had organized three waste management training sessions to discuss appropriate conversion technology and planning applications with municipal managers. The feedback from the training was very useful in understanding the perceptions and practices of municipalities in regard to the MOEF guidelines and helped frame the sessions and proceedings for this national workshop. The lead technical trainer for the earlier training was Dr. John Benemann of Institute of Environmental Management. LBG called upon Dr. Benemann to present at the National Workshop. He was able to share key observations and also provided recommendations for the GOI to work closely with state and local bodies in complying with the guideline measures. With USAID approval, LBG also invited waste conversion expert Mr. Greg Wikler, Vice President of Global Energy Partners, LLC to present on *"Decision -making Issues for Waste Treatment Options: Weighting Options"*. Mr. Wikler provided a comprehensive overview of various MSW conversion technologies, identified particular waste-to-energy technologies applicable to the Indian scenario and led the audience through a comparative analysis of each technology demonstrating the strengths and weaknesses in each.

The First GEP-CCS Multi-Sector Roundtable Event

LBG/GEP-CCS and Environmental Defense, in association with the Confederation of Indian Industry's Environment Management Center (CII-EMC), organized a multi-sector roundtable on September 27-28, 2002, entitled ***Embracing Global Climate Change: Using Market-Based Mechanisms for Global Competitiveness.*** (Milestone 5C) Building upon the foundation of the earlier held roundtables and exchange activities, LBG/GEP-CCS formed a collaborative partnership with Environmental Defense (ED), a prominent U.S. based climate change oriented institution. To complete the partnership collaboration, LBG brought the Confederation of Indian Industry's Environmental Management Center together with Environmental Defense to organize this event. This partnership created a unique blend of expertise and technical capabilities to organize a roundtable that could actively work with Indian Industry on taking the next steps: the exploration of the basic and interconnected building blocks for the development of comprehensive GHG management programs that can effectively leverage market oriented mechanisms.

LBG also called upon Indian champion companies who had been earlier identified and encouraged under GEP-CCS, to share their experiences with a wider audience. This strategy, i.e. inspiring local champions to share their real life case stories with their peers, has been very

successful in the past. Mr. S.V. Jamble of Indian Aluminum Co. Ltd., Mr. R.P. Sharma from Tata Steel and Dr. Kulkarni, of ITC Bhadrachalam Paperboards Division, all contributed their valuable time and company resources to make presentations and participate with other representatives of their companies in the roundtable.

The member companies of the *Partnership for Climate Action*, an innovative GHG reduction program of Environmental Defense, also participated during the roundtable event by creating a series of corporate best practices and 'lessons learned' from BP International and Entergy for the event. These case studies focused on the process of establishing corporate GHG targets and accessing market-based mechanisms.

The objective of the roundtable was to provide participants with the fundamental building blocks for devising sector specific analytical frameworks and employ problem-solving tools to address GHG mitigation and to leverage international market-based mechanisms. The roundtable was designed to take industry members beyond GHG mitigation practices to an understanding of how to harness the power of markets to address the dual challenges of tempering climate change and securing clean and reliable power. Strategic Government of India (GOI) ministries, leading Indian financial institutions (FIs), and NGOs attended along with industry in this roundtable to ensure that the activity would go beyond a three-day discussion and toward sustained constructive engagement on climate change issues.

The multi-sector roundtable participants collectively addressed policy-oriented approaches, financial instruments and technological advances that build effective corporate GHG strategies. They also enthusiastically engaged in hands-on exercises that helped them understand the cross-cutting issues in building and accessing GHG market-based instruments. Subjects included: corporate GHG target-setting – international and India; advanced GHG management systems; approaches for leveraging international market-based mechanisms; fundamentals of emissions measurement and verification; models of environmental registry systems; co-benefits of GHG corporate and government strategies; sectoral based opportunities to reduce GHG emissions; transparency and fungibility in a growing GHG market place, and multi-pollutant emissions trading scenarios.

The Roundtable Hosts in addition to GEP-CCS/USAID were:

Confederation of Indian Industries - Environmental Management Center (CII-EMC)

Environmental Defense (ED)
ED works on programs that improve global and regional air quality by reducing emissions of greenhouse gases and other pollutants. ED facilitates a multi-national company consortium that shares best practices and develops systematic guidelines for corporate GHG target-setting.

Key Contributing Organizations, US and Indian champions were:

Environmental Resources Trust, Ltd. (ERT)
Environmental Resource Trust (ERT) pioneers the use of market forces to protect and improve the global environment. Working with private and public entities, ERT

designed the GHG Registry^{SM} which records validated greenhouse gas emissions profiles to help create a market that will enable emissions reductions.

Indian Aluminum Company Ltd. (INDAL)

Indian Aluminum Company, Limited (INDAL), an Aditya Birla Group Company, has been a part of India's aluminum industry for over six decades. Incorporated in 1938, INDAL is a totally vertically integrated aluminum business. The Company's Hirakud Smelter-Power complex is the first in the aluminum sector in India to have attained ISO 14001 certification. INDAL has developed an extensive *8 Step Methodology* to identify, quantify, track and trade GHG emissions.

Tata Steel Corporation (TISCO)

Tata Steel strives to strengthen India's industrial base through the effective utilization of staff, materials and resources. Tata Steel employs advanced technology, promotes productivity, and seeks to ensure consistency with modern management practices. An innovative environmental management system approach has been operationalized with visible results in improved business performance and better environmental control of GHG emissions.

ITC Limited – *Bhadrachalam Paperboards Division*

In a farsighted corporate effort to improve its competitiveness in terms of fiber availability while simultaneously enriching the environment, the ITC Ltd. Bhadrachalam Paperboards Division launched a major social and farm forestry program based on cloned eucalyptus plantations. Under this green initiative, it supplies three million saplings every year to farmers in Andhra Pradesh and also obtains a part of its own raw materials from these plantings. Large scale reforestation/tree-crop efforts have been employed on over 7,000 hectares of lands belonging to farming communities, providing both livelihood opportunities and environmental benefits. The company also disseminates its research know-how on best agricultural practices to farmers through free consultancy services.

The British Petroleum (BP) case studies were shown by means of an exclusive video that illustrated live examples of BPs interventions on fuel efficiency and capturing/using flare gas. The case studies provided a corporate perspective of the benefit of reducing emissions = additional revenues, increased community participation, bottomline efficiencies. Below: an illustrative list of the International BP case studies showcased during the roundtable event:

- **Case Study 1: Stopping Reagent Loss at Hull Chemicals, UK**
  At Hull Chemical Works changing compressor seals saved 15,000 tons of CO2 equivalent per year and increased production of acetic acid by 20,000 tons.

- **Case Study 2: Energy Efficiency in Canada Gas**
  Canada Gas engineers evolved many new techniques to make their large reciprocating engines more efficient, reducing CO2 emissions by 27% saving over $1 million per year in fuel costs.

- **Case Study 3: Reducing Flare in the Gulf of Suez, Egypt**
  Shareholder alignment and collaboration was critical in helping deliver improved environmental performance in GUPCO with flaring reductions of 40 million cubic feet of gas per day, air emissions reductions of 35% and enhanced revenue from additional gas production.

- **Case Study 4: Gas Control Valve Replacement in Western Gas, New Mexico, USA**
  By changing a simple controller valve on the 4,000 wells in the Business Unit, Western Gas are reducing emissions by 500,000 tons of CO2 equivalent per year and sending 1.8 million cubic feet more gas to the market every day.

- **Case Study 5: Energy Awareness at Texas City, USA**
  Applying a holistic approach to energy management, Texas City has made gains in efficiency equating to a reduction in CO2 of 250,000 tons per year plus a $2 million energy saving per year.

Entergy is the sixth-largest electric utility in the U.S. In 1998, the Entergy senior management recognized the issue of climate change as a high priority and determined that it should be a focus of the corporation's operations. In November 2000, upon extensive analysis and review by an internal task force, a formal recommendation containing the new Entergy Environmental strategy and action plan was presented to the CEO for approval and was subsequently accepted. The plan included: proposed CO2 emission targets; an oversight executive management committee; a new corporate fund of US$25 million dedicated to internal emission reduction projects and external offset projects; and cooperative relationships like the relationships formed with Environmental Defense and the Partnership for Climate Action to achieve goals and share practices with like minded organizations. The Entergy progress to date has resulted in 38 internal GHG emission reduction projects.

Results of the Roundtables:

- **Cross-sector engagement fostered and linkages created to build India specific climate change strategies and consensus**
- **Support developed for establishing and enhancing corporate GHG strategies.**
- **Industry provided with building blocks for devising sector specific analytical frameworks and problem-solving tools to address GHG mitigation and to leverage international market based mechanisms**

CLIN 6: Policy Level Exchange Visits between U.S. and Indian Counterparts

The primary objectives of the study tours and policy exchanges under this task, CLIN 6, were to provide best practice models, technology, information and a forum for peer exchange. The long term goal is the creation of a group of private sector, NGO and GoI policy makers who are better informed 'champions' for the reduction of emissions.

If India is to succeed in pursuing a less GHG emissions intensive path for the future, it is critical that actions be taken now by senior policy makers to stimulate and promote both public and private efforts to decrease the rate of growth of GHG emissions. Experience has shown that well designed policy level exchange visits between U.S. and Indian counterparts are important in helping to catalyze such actions. Under the GEP-CCS program and in close collaboration with USAID and GoI partners, the contractor was directed to design and implement a series of policy level exchange visits and multi-stakeholder study tours. Priority participants were designated to include key government policy makers and lead representatives in the sphere of international GHG negotiations, power sector officials, and technical specialists. The study tours were developed to focus on technology and best practices, GHG emissions reduction partnership models – public-private, public-NGO, and various regulatory and market instruments that influence investment decisions.

As large Indian urban centers continue to grow at unprecedented rates, municipal urban infrastructure and services have been severely impacted. This reality places an ever increasing series of demands on municipalities struggling to keep pace with their own managerial capacity to meet the growing requirements of their burgeoning populations as well as the health of the environment. Urban leaders and environmentalists, however, are often hamstrung by preexisting conditions that prevent them from expanding vital services while trying to reverse the downward spiral that humans have placed on the environment. Over the life of the GEP-CCS project, LBG worked with Indian state and municipal level officials to enhance/improve municipal transportation systems and solid waste management practices and services to reduce the growth rate of GHG emissions from urban expansion. LBG/GEP-CCS met this objective by among other interventions, the development of a transportation pilot and creation of sustainable transportation guidelines and providing technical assistance for the design and development of a municipal sanitary landfill project. One of the methodologies for achieving these goals has been organizing study tours and policy exchanges to create a core of knowledgeable professionals in India armed with adequate technical information, and to provide linkages to an international network of shared expertise. An important objective of these exchanges is to provide the opportunity for quality interaction between international peers and agencies that are confronting the same GHG issues and problems in the urban sector. The below exchanges and tours contributed to building capacity among key Indian stakeholders by increasing awareness on various climate change issues, including adaptation; facilitating the adoption of improved decision-making tools; and promoting

the development and implementation of necessary policies and institutional systems to support a less GHG emissions path.

Milestone 6A (Study tour and two policy exchanges)

- *Policy and Study Exchange*
  Washington, DC ? New York, U.S. September 10 -20, 2000

- *Climate Change Policy and Funding Mechanisms Study Tour*
  Washington, DC ? San Francisco, U.S. September 14 -22, 2000

- *Solid Waste Management and Landfill Methane Gas Policy Exchange*
  Chicago, Illinois ? San Francisco, California April 2-12, 2001

Milestone 6B (Study tour and one policy exchange)

- *Emerging Climate Change Research and Policy Study Tour*
  Washington, D.C. May 10-15, 2001

- *Integrated Transportation Planning, Management and Technology Policy Exchange* Denver, Colorado ? Portland, Oregon ? Washington, D.C.
  October 15-22, 2001

Milestone 6C (Study tour and one policy exchange)

- *The GHG Protocol and Opportunities for its Adoption by Industries and Electric Utilities in India Policy Exchange* New Delhi ? Mumbai, India
  April 1- 4, 2002

- *Establishing GHG Emission Baseline Measurements for the Future: Study Tour*
  Washington, D.C. ? San Francisco, CA June 3-7, 2002

Milestone 6D (Study tour and two policy exchanges)

- *Ernest Orlando Lawrence Berkeley National Lab Policy Exchange*
  Delhi ? Mumbai, India October 14 - 22, 2002

- *Development Alternatives NGO Study Tour to COP 8*
  Delhi, India October 18 – November 1, 2002

- *Environmental Resources Trust GHG Registry Policy Exchange*
  Delhi, India March 1 – 11, 2003

Milestone 6E (Study tour and two policy exchanges)

- *Developing Sustainable Transportation Policies and Strategies for the Future Policy Exchange*, New Delhi ? Hyderabad, India August 1 – 9, 2003

- *Promoting Sustainable Urban Waste and Landfill Gas Management Policy Exchang*, New Delhi ? Agra, India November 9 – 16, 2003

- *Exploring Landfill-to-Gas Project Development Design and Financing Exposure Trip Study Tour*, Bangkok, Thailand ? San Francisco, U.S.
  January 27 – February 8, 2004

6 A

Policy and Study Exchange
Washington, DC ? New York, U.S. September 10 -20, 2000

Exchange Participant:
Mr. V. Raghuranman
Sr. Energy Advisor and head of the Climate Change Center
Confederation of Indian Industries

The first policy exchange under the GEP-CCS program was conducted to coincide with the momentum created by the Prime Minister's visit to the US and the Indo – US Business Dialogue on Clean Energy sponsored by the U.S. Energy Association and Confederation of Indian Industry with USAID and LBG support. This exchange also supported the GEP-CCS project goal of helping to build the capacity of the CCC at CII. Specific objectives of the exchange were: to create US/Indo partnerships that promote the creation of an enabling environment for the use of clean energy technology to reduce GHG emissions; to provide the CCC's main energy and technology expert with additional tools and information to use in clean technology policy development in India; build linkages with U.S. companies to promote potential technology transfer opportunities; and provide better understanding of international funding for CE projects. These first of these objectives was achieved with the signing of the charter between CII and USEA and the MOU with the Green Business Institute. The Green Business Center in Hyderabad was formally opened in 2003. An MOU was also signed between CII and the Business Council for Sustainable Development for collaborative activities.

An intensive schedule included specific high level meetings with U.S. and Indian Government officials (USDOE, India's MOP), councils (BCSE, The Atlantic Council), strategic NGOs (The Aspen Institute, WRI, UN Department of Economic and Social Affairs) and international funding agencies (e.g. World Bank, GEF, IFC) to identify areas of collaboration.

Climate Change Policy and Funding Mechanisms Study Tour
Washington, DC ? San Francisco, U.S. September 14 -22, 2000

Study Tour Delegation:

Mr. Rhaul Khstrepal
Executive Director, Energy Division
Confederation of Indian Industries

Mr. George Varughese
Vice President
Development Alternatives

Ms. Nalini Bhat
Additional Secretary
Ministry of Environment and Forest

Mr. A.K. Gupta
Director, Central Electricity Authority
Ministry of Power

Mr. Pradeep Madan
Senior General Manager
Kirsolkar Electric Power Company, Ltd.

Mr. Ram Tyagaran
Chairman and Managing Director
Thiru Arooran Sugars, Ltd.

Mr. S. Khasnobis
General Manager
ICICI

This multi-stakeholder study tour to the US was organized in association with Prime Minster Vajpayee's visit to the US in September of 2000. This first study tour undertaken under the GEP-CCS project was important in successfully engaging a diverse group of Indian stakeholders to think about and work on climate change issues. The objective was to provide the delegation with structured interactions with leading US institutions working on climate change issues, GHG reduction strategy and policy development, and also to meet with a variety of financial institutions to gain a better understanding of CE and GHG mitigation project cycles and requirements for obtaining funding. The make-up of the group was calculated to promote cross sector awareness building on GHG issues among the India delegates. The meeting topics and institutions were also carefully selected to provide exposure to a wide range of approaches, models, policies and procedures. US based hosts and collaborative partners for this study tour included, for

example: WRI, Natsource, the Export Import Bank (EXIM), the International Finance Corporation (IFC), Business for Social Responsibility (BSR), Lawrence Berkley National Laboratory (LBNL), the Electric Power Research Institute (EPRI), the International Institute for Energy Conservation (IIEC), the Environmental Enterprise Assistance Fund (EEAF) and the Materials Development Corporation.

One important function of the trip was to enable the participation of the delegation in the Indo – US Business Dialogue on Clean Energy co-sponsored by the U.S. Energy Association and Confederation of Indian Industry with support from LBG, and USAID. John Hammond, Program Manager-India USEA, Tricia Williams, Program Coordinator USEA, V. Raghuraman, Sr. Energy Advisor CII and Robert Randolph, Assistant Administrator USAID, met with the group during this occasion. Held as a part of the visit of Indian Prime Minister Mr. Atal Bihari Vajpayee to the US, the dialogue was attended by a large number of high level Indian industry representatives, Indian and US government officials. Two major agreements were signed at this dialog. These agreements, one between the two Governments, the other between CII and USEA, would enable co-operation between India and US governments and industry respectively. The proceedings during the dialogue provided an opportunity to the members of the tour to interact with Indian and US stakeholders. The agreements signed between the counterpart organizations also provided an opportunity for active co-operation between various agencies.

This study tour successfully initiated a number of Indian-US links that would develop into collaborative activities as well as planting the seeds for changes in thought and actions on GHG reduction. For example: the WRI, CII and Indian Champion companies collaboration on the GHG Protocol; LBNL, ICICI and financial institutions on the customization of the ProForm software for India; Natsource, CII, ICICI and others for GHG brokerage and trading activities.

Solid Waste Management and Landfill Methane Gas Policy Exchange
Chicago, Illinois ? San Francisco, California April 2-12, 2001

Policy Exchange Participant:

> Dr. Mohan
> *Deputy Commissioner of Health and Solid Waste Management*
> Corporation of Chennai

The goal of this policy exchange was to provide the Corporation of Chennai with an understanding of the critical path, including the obstacles and barriers, in designing and planning for a sanitary landfill to ultimately capture methane gas. The objectives of Dr. Mohan's visit were three fold: provide exposure to innovative solid waste management technologies and practices; provide an understanding of landfill methane recovery design and planning; and provide an understanding of integrated waste management planning.

In February, 2001, the Louis Berger Group, Inc. in collaboration with Global Energy Partners, LLC, led a training needs assessment (TNA) mission to 5 short-listed Indian municipalities. The city of Chennai had been organizing an aggressive restructuring of its solid waste management program, and had been on the forefront in the exploration of international best practices for possible adoption. Dr. Mohan, Deputy Commissioner of Health and Solid Waste Management was representative of Chennai's progressive municipal leaders who are continually identifying innovative solutions to provide optimal waste collection and improve the range of services. With the concurrence of USAID and GoI, Dr. Mohan was selected to be an exchange participant to travel to the US for more "hands-on" exposure to innovative landfill practices and to explore relevant landfill design and engineered planning for methane recovery.

Dr. Mohan visited the U.S. from April 2-12, 2001, in an exchange designed to provide him with the opportunity to attend Waste EXPO, the largest solid waste management conference in the world. His visit included in-depth land-fill site visits in Chicago, IL and in the San Francisco Bay area which provided exposure to a wide scope of information and best practices from the initial monitoring and testing of potential methane gas to the actual maintenance of horizontal and vertical pumping systems. Dr. Mohan also met with representatives from the California Environmental Protection Agency- California Integrated Waste Management Board to be briefed on monitoring and compliance issues of California landfill sites. Meetings with the U.S. Environmental Protection Agency and their comprehensive Landfill Methane Outreach Program were a highlight. The exchange provided Dr. Mohan with a better understanding not only of the issues, practical and theoretical of municipal landfill gas and its capture and re-use, but of workable public-private partnerships models.

6B

Emerging Climate Change Research and Policy Study Tour
Washington, D.C., May 10-15, 2001

Study Tour Participants:

Dr. Jyoti Parikh *
Indian Delegation Lead
Indira Gandhi Institute for Development Research

Dr. Dilup Ahuja
National Institute of Advanced Studies

Dr. Amit Kumar Garg
Indian Institute of Management – Ahmedabad

Dr. Kirit Parikh
Indira Gandhi Institute for Development Research

Dr. Anand Patwardhan
Indian Institute of Technology - Bangalore

Dr. Manoj Panda
Indira Gandhi Institute for Development Research

The overall goal of the tour was to increase the level of awareness of Indian researchers on emerging research and practices that could be adopted by India to support greenhouse gas mitigation and climate change adaptation. A specific objective was to maximize the impact of the research framing papers to be prepared by the joint U.S./Indian research teams as part of the upcoming U.S. Research Forum. To maximize the impact of the papers, it was important that the India researchers have as much exposure as possible to U.S. expertise, to sources of technical information on their respective research topics and to networks of U.S. experts who could provide support to the researchers.

The study tour promoted the GEP-CCS objective of building U.S./Indo partnerships. As a result of the tour, a much wider, more diverse network of U.S./Indo research partnerships between individuals and institutions was created than would otherwise have occurred in the absence of the study tour. Such partnerships tend to be longer-term in nature because the study tour format enables counterparts to develop deeper professional and personal relationships. The tour also enriched the U.S. researchers by giving them a better understanding of the Indian perspective thus enabling them to more realistically reflect that perspective in their own research. The tour enabled the research teams to come to the Forum fully prepared and with established, productive partnerships already established. The result was a more productive, more results oriented Forum, and therefore, richer, more technically sound and targeted framing papers.

Integrated Transportation Planning, Management and Technology Policy Exchange
Denver, Colorado ? Portland, Oregon ? Washington, D.C. October 15-22, 2001

Exchange Participants:

Dr. P.K. Mohanty, I.A.S.
Municipal Commissioner and Special Officer
Municipal Corporation of Hyderabad

Mr. A.K. Goyal, I.A.S.
Principal Secretary to Government, Municipal Administration and Urban Development
State of Andhra Pradesh

Mr. P. Ranadhir Reddy, IRTS
Additional Commissioner (T&T) & Project Director (MRTS)
Municipal Corporation of Hyderabad

In support of the ongoing transportation work under the GEP-CCS Project, LBG designed a policy exchange visit for several key City of Hyderabad and State of Andhra Pradesh officials to the U.S. The goal of the exchange was to provide the officials with a better understanding of integrated land use and transportation planning processes and the linkages between transportation planning and economic development and environmental management including climate change. The policy exchange also examined approaches for multi-jurisdictional/multi-stakeholder participation in transportation planning. The policy exchange was crafted to showcase US models in this area and demonstrate how sustainable transport planning can reduce GHG emissions. The following models and practices were showcased to supplement the LBG TA in Hyderabad:

- models of integrated transportation planning
- role of land use planning in transportation planning
- role of environmental planning in transportation planning, including variables related to emissions reductions and climate change
- transportation policy design
- innovative transportation finance mechanisms
- public-private partnerships in transportation planning, finance and project implementation
- vehicle technologies, traffic management and demand management interventions that could be appropriate in an Indian context

The exchange created momentum to support the implementation of the demonstration project in Hyderabad to reduce emissions from urban transportation, as well as providing real examples and models on how municipalities incorporate traffic management and other interventions of a sustainable transportation plan into the urban planning process. As a result of the exchange and LBG's close assistance to Hyderabad, the City of Hyderabad and the State of Andhra Pradesh continued to pursue the development of more advanced transportation planning using sustainable transportation concepts. Influenced by the planning models and technologies observed during the study tour, details and concepts from the exchange subsequently appeared not only in the AP and Hyderabad municipal planning dialog, but also in the plans and physical improvements. For example, the signage and station development for the MRTS commuter rail system, as well as the municipal street signage, paint markings and signaling devices reflected the US visit. The Indian delegation was so impressed by the various models observed that they requested that the Englewood, Colorado, transit oriented development model, and Portland Oregon's unique metropolitan planning model, METRO, be invited to Hyderabad to share these models and best practices in urban transportation planning with a larger audience.

6C

The GHG Protocol and Opportunities for its Adoption by Industries and Electric Utilities in India Policy Exchange New Delhi ? Mumbai, India April 1- 4, 2002

Policy Exchange Resource:

A. Pankaj Bhatia
World Resources Institute

The global community has been trying to develop acceptable, universally applicable international standards to measure GHG emissions intensity. One of the most practical and globally acceptable tools is the GHG Protocol which has been developed in a multi-stakeholder collaboration and promoted by WRI and the WBCSD as part of the multi-stakeholder global report initiative GRI. As a result of the interest in this protocol expressed by CII and other Indian stakeholders during earlier GEP-CCS policy exchanges, and with USAID concurrence, Mr. Pankaj Bhatia was brought to India to provide a larger group of stakeholders with first hand information on the protocol. WRI, a collaborative partner in the GEP-CCS project, was also eager to improve the GHG Protocol calculation tools with the valuable input from Indian industry, and to identify additional companies to "road-test" the protocol.

CII and FICCI partnered with GEP-CCS in organizing a series of industry roundtables for this exchange. These open 'semi-formal' forums provided an ideal setting to discuss the GHG Protocol, the ancillary benefits of the tool, and to identify improvements that would make the tool more easily used by Indian industry. In addition to the CII and FICCI industry roundtables, LBG and CII jointly organized a GoI roundtable in New Delhi. This roundtable was designed to demonstrate how GHG emissions protocols function and their purpose, and how the use of such protocols supports the development of appropriate accounting and policy frameworks for GHG emissions inventories and reduction efforts.

During the exchange, the Center for Power Efficiency and Environmental performance (CENPEEP) partnered with LBG to organize a special roundtable meeting to demonstrate the GHG Protocol to the National Thermal Power Corporation. CENPEEP works closely with USAID to manage the Efficiency Coal Conversion component of GEP, and has been at the forefront in testing and introducing several state of the art coal combustion and power generation technologies with the USDOE and EPRI.

To support the GEP-CCS capacity building for the CCC at DA, Mr. Bhatia also met with the CCC staff and project developers/sponsors to demonstrate the use of the GHG Protocol as a tool in assessing the positive impacts of climate change projects.

The exchange catalyzed the participation of key Indian stakeholders in the development of the project accounting standard. It was determined that corporate standards, such as 'organizational boundaries', would need to be revised for India, and other countries,

depending on national legal definitions and corporate structures. Other necessary modifications in stationary and mobile combustion tools were identified. This exchange was particularly important in engaging the Indian private sector to participate in the development of global protocols and standards that are intended for international application.

Establishing GHG Emission Baseline Measurements for the Future: Study Tour Delegation Washington, D.C. ? San Francisco, CA. June 3-7, 2002

Study Tour Participants:

Mr. K.P. Nyati
Director – Environmental Management Division
Confederation of Indian Industries

Mr. M.A.J. Jeyaseelan
Executive Director – Environmental Business Information Services Network
Federation of Indian Chambers of Commerce and Industry

Mr. R.P. Sharma
Senior Divisional Manager
Tata Steel

Mr. Y.K. Saxena
General Manager
Gujarat Ambuja Cement

Mr. Mihir Moitra
General Manager – Research
Hindalco Industries, Ltd.

Mr. A.K. Ghose
Vice President – Environment
Jubilant Organosys, Ltd.

Dr. H.D. Kulkani
Chief Manager – Research and Development
ITC, Ltd.

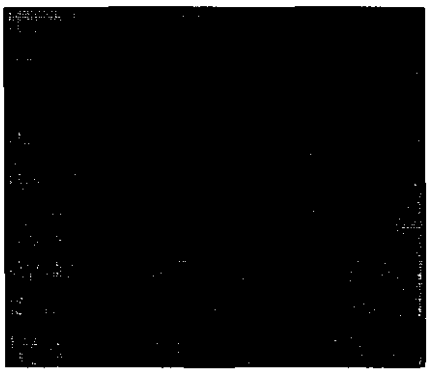
Mr. S.K. Bezbaroa
Environmental Specialist
Corporate – Environment, Health and Safety

Mr. Samrat Sengupta
Technical Manager

Development Alternatives

Dr. Vivek Kumar
Technical Manager
Development Alternatives

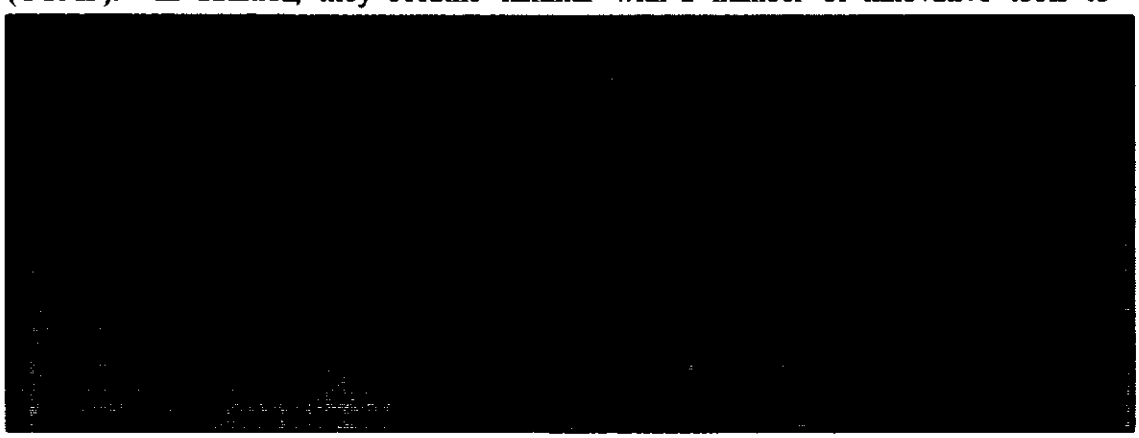
A key global issue in climate change mitigation through climate change mitigation project development is that of project baselines. The international climate change community continues to grapple with appropriate approaches to baseline development. Each approach has significant and multiple implications for a project, region, government, investors, etc, and no consensus on how to address the differing approaches has been reached. This study tour was designed as a mechanism for key climate change interests in India, namely industry associations and industry representatives, and eminent US institutions involved in climate change to exchange information, ideas, tools and approaches for baseline development. Both US and Indian stakeholders benefited from the exchange and the information shared will support and enhance GOI policy formulation and industry strategies and approaches to mitigation project development. LBG provided the platform for this exchange and further utilized the outcomes to promote strategic objectives under GEP-CCS.



The U.S. Study Tour was held from June 3-7, 2002, with meetings organized in Washington, D.C. and San Francisco, CA. The delegation structure was designed to ensure all of the energy intensive industry sectors would be represented: steel, cement, aluminum, chemical, pulp/paper. In addition, representatives from both prominent industrial associations, the Confederation of Indian Industries and the Federation of Indian Chambers of Commerce and Industry participated in the tour. It was critical that these two associations were represented as their combined industry coverage/membership represents a significant percentage of Indian industry.

Under the GEP-CCS program, LBG provided ongoing assistance to project developers and institutions to help them to operationalize the project cycle of clean energy projects. This U.S. study tour therefore focused on the process of establishing baseline methodologies, identified key technical, accounting, measurement issues associated with GHG reduction projects and was planned to ensure that a variety of models at the project, state, national level were examined, as well as approaches and methodologies that can be utilized in the absence of formal accounting guidance on GHG emissions. The delegation was provided with a set of tools and resources that could be utilized upon returning to India to assist them in their GHG emissions reduction management strategies / projects.

As a result of the exchange, the participants increased their understanding of the existing approaches and methodologies for establishing baselines on a project, sector, state, or national level. They were also better able to identify the key technical and measurement challenges related with establishing baselines for climate change mitigation projects (CCMP). In addition, they became familiar with a number of innovative tools to



calculate, account and assess GHG emissions intensity, and more importantly, were invited to collaborate on the refinement and further development of some of the tools. This valuable input from Indian industry will assist in making the tools more appropriate for a global scenario.

Further outcomes of the study tour produced support for establishing and enhancing credible and systematic GHG emission baseline guidelines relevant to all types of projects in India. Work progressed in these areas with the industries developing their own baselines and the associations developing services for their members around baseline development. Specific guidance tailored to project categories and transparency for the Indian scenario is being included in international protocols. Partnerships between US institutions were created with Indian stakeholders to form a network on related climate change issues (e.g. Tata Steel with WRI and the GHG Protocol development, Mr. Nyati's invitation to head an ISO technical working group). The tour also provided inputs for key Indian stakeholder activities in the run-up to COP-8 in October, 2002.

6D

Ernest Orlando Lawrence Berkeley National Lab Policy Exchange
Delhi Mumbai, India October 14 - 22, 2002

Policy Exchange Resources:

Mr. Jayant Sathaye
Senior Scientist
Ernest Orlando Lawrence Berkeley National Laboratory

Mr. William Golove

ProForm Software Project Head
Ernest Orlando Lawrence Berkeley National Laboratory

With the growing recognition of the importance of accurately assessing GHG emissions for developing mitigation projects, the need for innovative project based tools that could facilitate this process, such as *ProForm Software*, was apparent. Accordingly, the aim of this exchange was to demonstrate the *ProForm Software,* a tool designed to provide a basic assessment of the environmental and financial impacts of renewable energy and energy efficiency projects, and to solicit feedback for tailoring the software to the Indian scenario.

A series of meetings and policy discussions was coordinated by the LBG/GEP-CCS team between the Berkeley Lab representatives and the leading stakeholders in India in climate change issues. The ProForm Software was introduced to the Indian stakeholders during a number of structure activities which included meetings held with government agencies, private sector organizations and NGO's viz. Ministry of Power, Bureau of Energy Efficiency (BEE), the Federation of Chambers of Commerce and Industry (FICCI), Industrial Leasing & Financial Services (IL&FS), the Infrastructure Development Finance Company (IDFC) and Infrastructure Development Corporation Karnataka (iDeCK). During COP 8, Mr. Golove gave live demonstrations of the software at the LBG sponsored booth that showcased US-India cooperation on Climate Change at the CII Climate Change Technology Exhibition. Project developers could input their own projects data for an assessment of the environmental and financial impacts.

Through the collaboration with Development Alternatives and the LBG/GEP-CCS team, Dr. Sathaye also participated in workshops and side events leading up to and during the COP-8 event held in Delhi. The software was seen to offer substantial value as a practical tool for GHG mitigation projects.

The response of the stakeholders to the demonstration of this assessment and pre-screening tool was very positive, and the exchange laid the foundation for collaborative activities on ProForm. Potential partners were identified for different aspects of an implementation program for the software. Follow up visits by LBNL continued the dialog and sought to establish formal partnerships for the adoption of the software.

Development Alternatives NGO Study Tour to COP 8
Delhi, India October 18 – November 1, 2002

In consultation with USAID and as part of the institutional capacity building focus of the GEP-CCS project targeted at the development of DA and its Climate Change Center into a credible national and internationally recognized center, it was decided to support a study tour of 20 Indian NGOs to COP 8 in Delhi under the DA mantle. The assistance to DA CCC to fund this study tour was primarily directed at strengthening CCC's role as the lead facilitator and apex body for the larger Indian NGO community. In addition, it was felt that the participation of the NGO's in the COP-8 and related activities would increase their awareness and understanding of the climate change issues – a critical

element in engaging them for future mitigation and adaptation activities at the local community level.

A group of twenty grass-root NGOs from all over India were selected, leveraging DA's extensive linkages in the grass-root sector. The participants represented organizations operating in various parts of the country and in diverse fields related to environment and development. Their participation in the said events, helped not only to deepen their understanding of the climate change issues and negotiation process, but also to network them with like-minded delegates from other parts of the world. Consequent to their participation, several of the NGOs organized outreach and awareness programs and district level consultations to sensitize decision-makers stakeholders at the local level. They also incorporated climate change related components in their regular activities. This increased engagement of community based NGOs offers the potential of partnerships to be harnessed for development and implementation of mitigation and adaptation activities at the local level, possibly as part of a collaborative action at the regional (i.e. South Asian) level.

From the perspective of long term sustainability for greenhouse reduction efforts, USAID, the CCC and LBG/GEP-CCS felt that it was critical to enlist NGO leaders as "champions", and to provide them with first-hand information on the various aspects of climate change. The participation of these grass-root Indian NGOs in the various COP 8 activities resulted in a greater awareness and understanding of climate change issues at the community level. Through exposure to other international NGOs and participation in the Inter-Regional Conference on Adaptation which the CCC hosted prior to COP 8, the study tour group of Indian NGOs was better able to appreciate the links between climate change, GHG reduction and related topics like watershed management, sustainable agriculture and rural energy. This exposure and learning opportunity provided an important informational element and a broader understanding of climate change issues. In turn, the lessons learned from shared experiences between Indian and international NGOs, and in particular NGOs from developing countries who are facing similar conditions, could lead to more effective dissemination practices at the community level and integration of the climate change theme into local developmental activities.

Last but not the least, the involvement of grass-root Indian NGOs contributed to the COP process by bringing the rural and community perspective into the UNFCCC deliberations. This was particularly relevant in the discussions on adaptation – a theme that drew special emphasis during COP-8, largely due to the efforts of DA and the CCC.

Participants under this study tour included the following:

- ? Dr. Joyshree Roy, School of Oceanographic Study, Jadhavpur University, Kolkatta
- ? Professor Sugata Harza, School of Oceanographic Study, Jadhavpur University, Kolkatta
- ? R. Arul, Pasumai Thaayagam, Chennai Tamil Nadu
- ? Amit Kumar, Kumarappa Institute of Gram Swaraj, Jaipur

? Sanjay Rautela, Devoted Organization for Reforming Environment, Almora
? Dr. Erach Barucha, Bharatiya Vidyapeeth Institute of Environment & Research
? Mr. B. Parthan, IT Power India Pvt. Limited, Pondicherry
? Aryn Datta, Consumer Unity & Trust Society, Calcutta
? Bindu Bubbar, Indian Institute of Youth Welfare, Nagpur
? E. Karunakaran, Tamil Nadu Science Forum
? George Joseph, Society for Social Development
? Jagveer Singh, Gram Vikas Nav Yuvak Mandal VIII
? Jasphool Singh, Chaubisi Vikas Sangh Rohtak, Haryana
? Debi Goenka, Bombay Environmental Action Group, Mumbai
? Mr. Yunus Saleem, Karnataka Welfare Society

Environmental Resources Trust GHG Registry Policy Exchange
Delhi, India March 1 – 11, 2003

Policy Exchange Resource:

Mr. Wiley Barbour
Director of Environmental Registry Services
Environmental Resources Trust (ERT)

Outreach activities undertaken as part of the GEP-CCS program revealed a critical gap, a building block for employing GHG market based mechanisms which was not being addressed, the need for the development of a GHG registry. As a crucial mechanism for tracking and trading credible emission reductions in India and elsewhere, the ability to register emissions reductions in a recognized platform is a necessary element to ensure confidence in the process. Accordingly, with the approval of USAID, this policy exchange was organized by LBG/GEP-CCS in partnership with ERT to lay the groundwork for the development of future GHG registry systems in India. The exchange shared the particulars of the various types of registries, presented the benefits of a registry for industry in India, explained the accounting and data collection basics necessary for registering reductions, and provided an understanding of the underlying obstacles/ barriers.

During his visit, Mr. Barbour met with senior representatives from the Ministry of Environment and Forests (MoEF), Central Pollution Control Board (CPCB), BEE, the Confederation of Indian Industry (CII), FICCI, ICICI Bank, IDFC and IL&FS. Interactions with industry leaders also took place in the course of a roundtable organized by CII and Resources for the Future International.

The various interactions confirmed the need for a GHG registry in the Indian context, and emphasized the catalytic role it could play in encouraging emission reductions by industry. The discussions also increased the awareness and understanding of how a GHG registry would work. The exchange also helped identify potential partners, including

hosts, for implementing the registry. Going forward there appeared as a strong potential and strong support for developing a pilot registry tailored to suit the Indian context.

6E.

Developing Sustainable Transportation Policies and Strategies for the Future Policy Exchange New Delhi ? Hyderabad August 1- August 9, 2003

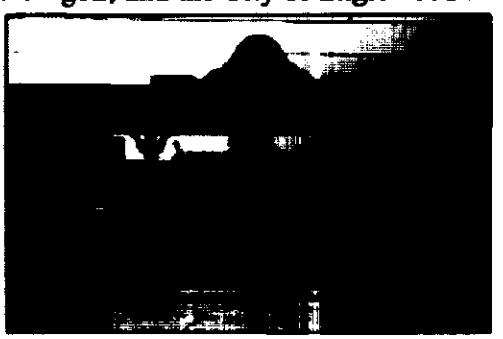
Exchange Resources:

Mr. Andrew C. Cotugno
Planning Director
METRO
Portland, Oregon

Mr. Harold Stitt
Senior Transportation Planner
City of Englewood, Colorado

In response to the increased interest in developing transportation solutions for the future that curb GHG reductions while encouraging economic growth, LBG/GEP-CCS developed and led the policy exchange, ***Developing Sustainable Transportation Policies and Strategies for the Future.*** This exchange provided the GoI, the private sector and other stakeholders with an understanding of the development and implementation of effective transportation policies.

With USAID approval, LBG/GEP-CCS invited Mr. Andrew C. Cotugno, the Planning Director of Metro, and Mr. Harold Stitt, Senior Transportation Planner for the City of Englewood, to India from August 1st to 9th, 2003 under the policy exchange mechanism. David Jarrett, senior transportation planner with the Louis Berger Group, and author of the guidelines on sustainable transport planning that came out of the demonstration project in Hyderabad, also participated as an additional resource during the policy exchange. LBG/GEP-CCS has a collaborative partnership with Metro of Portland (the designated Metropolitan Planning Organization in Oregon) and the City of Englewood in Colorado, both leaders in sustainable transport planning. These institutions had expressed an interest in developing a long-term relationship with Hyderabad subsequent to their interaction with the Hyderabad municipal officials during the U.S. policy exchange/study tour in October 2001 which was focused on *Integrated Transportation Planning*. The interest in furthering the links initiated was reciprocal with the Hyderabad delegation making a special



request for representatives from METRO and Englewood to come to India to share their experiences with a larger audience in India, and offering to co-host the exchange.

GEP-CCS project recognized the importance of increased exposure to more advanced forms of integrated transportation planning. The incorporation of integrated strategies into a comprehensive urban plan would be more cost effective now while most Indian cities are still at relatively early stages of devising integrated urban development plans and have relatively low levels of transport infrastructure development. The exposure to international experience would therefore provide the opportunity for India to further refine its policy development process.

One long term goal of this policy exchange was to create awareness among political leaders, the business community, urban policy makers and civil society groups and to help them develop a mutual understanding for transportation policy planning which focuses on the development of transportation alternatives to control vehicular emissions. These alternatives include: regional transportation planning; long range land-use planning; balancing transportation and land-use plans to protect the livability of a region; transportation guidelines for improving traffic flow and congestion; growth concept strategies planned and implemented on a regional level; financial aspects and economic strategies and transit oriented development.

The immediate objective of the exchange was to actively engage a broad group of stakeholders from government, business and civil society to explore models for collaborative activities in the formulation and implementation of transport policies at a city, regional and national level. The exchange also provided a model of a successful metropolitan planning organization and illustrated the roles and responsibilities it undertakes on a regional level in regard to transportation/land-use planning, allocation of federal funding and serving as a regional forum on cross-cutting issues. The Englewood model for transit oriented development served to demonstrate how municipalities could control and manage their own future expansion by focusing on the transportation aspects to guide development.

Through this exchange, a better understanding of the challenges and barriers – technical, financial and institutional - associated with designing and planning strategies for sustainable transportation was gained by the participants. The result: a better informed group of decision-makers associated with the formulation and implementation of transport policies at a city, regional, and national level. Linkages between Indian decision-makers/ institutions/ professionals were fostered for collaborative relationships and integrated planning. The policy exchanges reinforced the GEP-CCS work in Hyderabad and AP State, further contributing to the adoption of sustainable transportation policy concepts in the City Development Strategy, and in the work and recommendations of the ASCI chaired State Transport Policy Committee.

Promoting Sustainable Urban Waste and Landfill Gas Management Policy Exchange
New Delhi ? Agra, India November 9 – 16, 2003

Policy Exchange Delegates:

Mr. Richard Hays
Director
City of San Diego Environmental Services Department

Mr. Steve Hamilton,
LfG and Landfill Specialist
SCS International Engineers

Under the GEP-CCS project, considerable work has been done to identify and propose viable technology and planning interventions for MSW management to Indian municipalities. In Delhi, currently around 7000 tons of MSW are being generated per day, of which approximately 6000 TPD are collected and dumped on three operational sites. Not only is there a shortfall in capacity to dispose of the MSW generated, but the current methods of disposal are environmentally unsustainable. Interactions with senior officials at Municipal Corporation of Delhi (MCD) indicated both a commitment to and a growing sense of urgency in addressing the capacity shortfall problem.

The need to initiate necessary measures on a priority basis was further evidenced by MCD's MOU with IDFC and proposed plans for new landfill facilities. There was special interest expressed by MCD in acquiring a better understanding of options and strategies for design of disposal projects that are environmentally as well as financially viable. In response to this interest and in continuation of its efforts under GEP-CCS, LBG arranged a visit from Mr. Richard Hays, Director of the City of San Diego's Environmental Services Department and Mr. Steve Hamilton, Sr. Team member, SCS Engineers to facilitate an exchange of information on municipal solid waste management and landfill gas strategies pertinent to the needs of Indian municipalities. In coordination with USAID and the FIRE project, the LBG/GEP-CCS team designed and developed a policy exchange visit to India entitled ***Promoting Sustainable Urban Waste and Landfill Gas Management Policies.*** The policy exchange was designed to provide Indian stakeholders with a comprehensive understanding of the concepts and processes involved in developing sustainable municipal solid waste solutions.

The specific objectives of this exchange were to: actively engage a broad group of key stakeholders in the development of municipal solid waste facilities in Delhi and Agra; identify conventional and hybrid financial approaches and methodologies associated with landfill design and development; and provide an understanding of the obstacles and barriers associated in designing and planning sanitary landfills to reduce/ capture GHG emissions in India.

The exchange outcomes: a better-informed group of municipal policy/decision makers associated with landfill design and development at the city, and regional levels; linkages made between Indian decision-makers/ institutions/ professionals and San Diego's Department of Environment Services and SCS International Engineers which have led to potential collaborative activities; and the possibility of forging a twin city arrangement on waste management being explored between San Diego and Agra..

The exchange was timed to coincide with the CII Climate Change Technology Bazaar and Conference to enable the delegates to support the US-India Cooperation on Climate Change booth and USG sponsored side event. Richard Hays made a presentation on Solid Waste Management and Climate Change during the USG afternoon side event which included presentations by Glenn Whaley, Director Environment, Energy and Enterprise, USAID/India, Harlan Watson, Sr. Climate Change Negotiator, US Department of State, David Garman, Assistant Secretary, US Department of Energy and Prodipto Ghosh, Secretary, Ministry of Environments and Forest, GoI.

The policy exchange was structured to provide a number of intensive technical training activities including a half-day seminar organized in partnership with the National Institute of Urban Administration (NIUA) on the theme of Urban Waste Disposal and Landfill Gas Management – International strategies for the Indian context, held at the NIUA office. NIUA had partnered with GEP-CCS on the municipal waste capacity building efforts under CLIN 8, as well as having been a responsive partner with USAID on other urban initiatives including FIRE project. The objective of the seminar was to provide both a structured interface with decision-makers representing a cross-section of stakeholder interests on municipal waste management and to reinforce NIUA's leadership role. Designed to synergize with the MCD training program scheduled later in the policy exchange program; the scope and audience for the seminar was broader than that of the MCD training program, including infrastructure financial institutions, GoI, NGOs, and academia: approximately 25 participants from diverse organizations such as Ministry of Urban Development, MCD, NDMC, Delhi Cantt. Board, IIPA, HUDCO, IL&FS, IDFC, HSMIS (Lucknow), IIT-Delhi, Lee Associates. Mr. N. Bhattacharjee from USAID RUDO and senior officials from NIUA were also present at the event.

An intensive one-day training program was organized for MCD officials on the theme of *Strategies for Sustainable Urban Waste Disposal and Landfill Gas Management*. Interactions with senior officials at MCD had revealed considerable interest in acquiring a better understanding of options and strategies for design of disposal projects that are environmentally as well as financially viable. The training program was organized specifically in response to this need. Conducted at the MCD office at the India Habitat Centre, the 20 plus participants encompassed senior and mid-level officials from MCD associated with planning and implementing landfill facilities for the city as well as representatives from JICA and IDFC. In preparation for the training, site visits to several MCD landfill facilities provided the visiting experts a better perspective on the landfill operations and practices in Delhi, and the MCD with the opportunity to ask specific technical questions.

Following the training program and site visits, Mr. Rakesh Mehta, Commissioner MCD requested a personal debrief. In the course of briefing the Commissioner raised a number of points for discussion and more details: i.e. San Diego's SW systems, fee structures and infrastructure; their approach to staff management and motivation techniques. Mr. Hays informed the Commissioner that in San Diego, there are performance evaluation systems, as well as a reward scheme for good performers. He added that further reductions in redundant staff were being considered for cost reduction; moreover, they have a system for sharing the savings resulting from such measures.

On the subject of privatization of services, Mr. Hays said if public operations were cheaper and more efficient, there was no argument in favor of privatization. He added that in most big cities of the US, SWM was a public service. Mr. Hamilton clarified that while collection was usually a public service, disposal was more often in private hands. He said that "privatization" was a misnomer since either way, SWM remained a public responsibility – the more appropriate description would be "private sector participation". Mr. Hamilton provided details of the Egyptian experience with privatization including the spread sheet used for determining true costs of MSWM. Mr. Mehta was particularly interested in the Egyptian model adopted that included charges for SWM services on the electricity bill. Mr. Mehta began immediately exploring the possibilities of introducing a similar charge on the electricity bill (this became his "Betterment Tax" proposal).

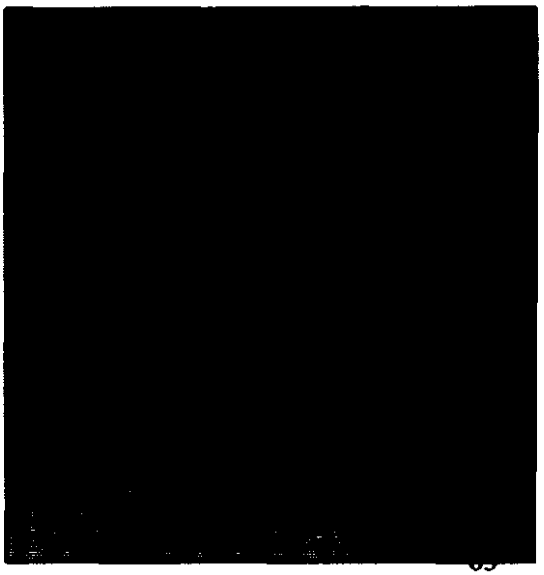
INSERT BETTERMENT NEWS CLIPPING HERE!!!!!!!!!!!

The policy exchange continued in Agra in series of meetings with key municipal officials organized in collaboration with the USAID CTI project. The objective of the Agra portion of the trip was to familiarize municipal officers with waste management models from similar sized cities. San Diego and Agra are of similar size and have similar large seasonal tourist influxes which present waste management issues. Tourists generate waste, but they don't want to see a dirty tourist destination. The delegation was well received and was able to build awareness and engage the interest of the key parties in working on waste management issues.

Exploring Landfill-to-Gas Project Development Design and Financing Exposure Trip Study Tour Bangkok, Thailand ? San Francisco, CA, U.S. January 27 – February 8, 2004

Exchange Delegation:

Rakesh Mehta
Commissioner
Municipal Corporation of Delhi



Subash Lalla
Secretary
Government of Maharashtra

Milind Mhaiskar
Commissioner
Sangli, Miraj, Kupward
Municipal Corporation

M.A. Khan
Secretary
Urban Administration and Development Department
Mantralaya Government of Madhya Pradesh

Dr. Sukhbir Singh Sandhu
Vice Chairman
Mussoorie Dehraden Development Authority

K. Jayakishan
Head Transportation
Infrastructure Development Corporation of Karnataka

In 2000 the Ministry of Environment and Forests (MOEF) developed and released the *"Municipal Solid Wastes (Management and Handling) Rules, 2000"* which set parameters for setting up waste processing and disposal facility including landfills, and in particular, addressed the need for reducing GHG emissions from landfills. Consultations with a variety of officials at the GOI, state and local levels, as well as program experts from USAID/India, confirmed that there existed knowledge gaps among municipal authorities on MSW management that would need to be addressed in order for urban authorities to comply with these requirements. As these new requirements mandated a need for municipalities to develop sustainable urban waste management practices, they also created new interest in waste-to-energy projects throughout India. Responding to the need for improved urban solid waste and LfG management as a critical step in GHG reductions, and in collaboration with USAID and the FIRE project, LBG/GEP-CCS designed and implemented an exposure trip to the U.S. and Thailand on January 27 – February 8, 2004.

The exposure trip/study tour for very senior level municipal officers, ***Exploring Landfill-to-Gas Project Development, Design and Financing,*** was designed to examine best practices in municipal solid waste management operations and appropriate landfill gas technologies. The goal was to provide the delegates with an opportunity to explore innovative landfill gas abatement, reduction, capture and re-use technologies and practices, to identify conventional and hybrid financial approaches to MSW management, and examine various methodologies associated with sanitary landfill design and development. A further objective was to work with key Indian municipalities to help

them gain a better understanding of the obstacles and barriers associated in designing and planning sanitary landfills to reduce and capture GHG emissions.

The outcomes of the exposure trip were a better informed group of local policy makers, partnerships fostered with U.S. institutions for an informal network on related municipal solid waste issues, and a foundation laid for developing credible and systematic landfill gas projects in India. Some immediate results attributable to this policy exchange were the garbage collection pilot and new policies on waste management put into place in Delhi upon Municipal Commissioner Rakesh Mehta's return from the trip.

The delegation was invited based on their key decision-making roles in urban development infrastructure projects and policies. The six person delegation for the exposure trip included five senior representatives from municipalities who have a strong interest in municipal solid waste initiatives and are working on collaborative efforts with USAID/India: the Municipal Corporation of Delhi; the Salngli-Miraj-Kupwad Municipal Corporation, State Government of Maharashtra; Urban Administration and Development (UADD), State Government of Madhya Pradesh (M.P.); Urban Development Department, State Government of Maharashtra; and the Mussoorie-Dehradun Development Authority Dehradun, State Government of Uttrancha. The sixth delegate was from the Infrastructure Development Corporation (Karnataka) Ltd. (iDeCK). IDeCK is a USAID and a GEP-CCS partner in the development of the first sanitary landfill in India (in Bangalore) under the GEP-CCS project.

Linking Urban Development with Climate Change

This component of the GEP-CCS project concentrated upon the links between economic development, urban growth and the accompanying increase in GHG emissions.

CLIN 7: Reduced Rate of Growth of GHG Emissions from Vehicles

The focus of CLIN 7 was on urban transportation and, in particular, promoting sustainable transportation management planning and reducing the emissions from motor vehicle exhausts.

In India, a lack of integrated urban planning acerbates the already rapid growth in CO_2 emissions from transport due to the large and expanding urban population, high and growing numbers of motorized vehicles, the reliance on older vintage vehicles with inefficient internal combustion engines, and the severe traffic congestion. The urban transportation component of GEP-CCS was designed to: look at these factors in partnership with a growing urban center; identify, with USAID, the most optimum

intervention for demonstrating reduction in GHG emissions from vehicles in an urban area; develop a demonstration project; and develop and disseminate transportation management guidelines to serve as an aid to master planners.

CLIN 7 included the following main activities, each of which built upon the other:

? Preparation of a "City Selection" process;
? Preparation of a vehicle technology assessment (VTA) report for a selected city;
? Design of a demonstration project for reducing GHG emissions from vehicles;
? Development of project documentation for seeking finance to implement the demonstration project;
? Development of transportation guidelines for use by municipalities in shaping transportation management strategies for reducing emissions; and
? Dissemination of transportation guidelines developed, among policy makers and decision-makers.

As part of the city selection process, a report was prepared in May 2001 in association with the Society of India Automobile Manufacturers (SIAM), and the city of Hyderabad was selected from a list of six potential cities based on structured selection criteria. The most important criterion was the ability and the willingness of the local government to support such a project. The second ranked criteria were the air quality and availability of alternate fuels.

The Vehicle Emission Technology Assessment (VTA) completed in June 2001 (Milestone CLIN 7A) provided a basis for selecting vehicle technology, fuel and vehicle management options that could potentially be employed in the demonstration project. The report assessed the type of vehicles in Hyderabad, and the emissions per km/person from each. It also assessed environmentally sound vehicle technology options, and looked at vehicle management options that could reduce vehicle emissions.

In the subsequent phase of the project, the Hyderabad Demonstration Project was designed to integrate vehicle technologies and traffic management interventions in order to serve as a model for reducing GHG emissions from vehicles and to promote new transportation interventions. The demonstration project incorporated new applications of existing technologies and transportation management interventions that could be replicated across other urban centers in India. Overtime, USAID suggested that the scope of the demonstration project be refined and limited, re-iterating that the purpose of the TA was to identify a set of options, that is, traffic interventions and technology or vehicles management options, that are or would be available in the short term, and relatively low cost interventions that could be easily managed or implemented by local

authorities – *the over-riding considerations being the ability of the project to be implemented and replicated.*

As the lead agency in Hyderabad responsible for traffic management and planning, the Municipal Corporation of Hyderabad (MCH) was the main partner in the LBG led collaboration during the design of the demonstration project. (Milestone CLIN 7B) The MCH was very proactive in facilitating transportation sector improvements in the city and worked closely with the GEP-CCS team to design interventions that are practical and feasible given local conditions.

A number of options were proposed under traffic management interventions and vehicle technology management. The Municipal Corporation of Hyderabad committed to funding for the physical traffic management interventions based on the LBG TA. Under the three proposed vehicle technology demonstration options, the improved emissions checking systems intervention was adopted, funded and is being implemented by the Regional Transport Authority and SIAM in partnership. (Milestone CLIN 7C) Electric vehicles are being pursued by the private sector, and the third option proposed, the retrofit of the Ambassador cars in the MCH fleet, was not adopted.

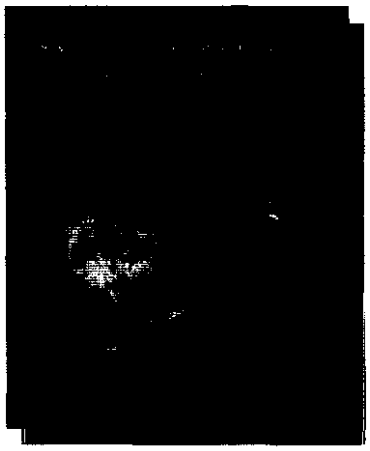
Seven traffic management interventions designed essentially to reduce traffic congestion, improve traffic flow and reduce GHG emissions were proposed and adopted for demonstration:

- ? Treatment of road cross-sections – segregation of non-compatible vehicle streams, to reduce vehicle conflicts;
- ? Improvements of intersections to improve flow and reduce turning movements;
- ? Improved pedestrian and driver control (separation of vehicle movements from vulnerable road users);
- ? Improved signage and information devices;
- ? Improved signalization synchronization to reduce traffic delays and idling at intersections;
- ? Improved control of parking to reduce traffic flow conflicts; and
- ? Inter-modal linkages between road and rail systems.

The city also committed additional resources for carriage way improvement and road widening in the demo corridor. Interventions were implemented in a staggered process over a 12 month period of time in the selected demonstration corridor and have now spread beyond the corridor.

Based on the traffic management interventions in the demonstration pilot, and in collaboration with the MCH and the many other partners, a set of guidelines, the *Sustainable Transportation Guidelines*, was developed for integrating sustainable traffic and transport planning principles into the urban planning process. (Milestone CLIN 7D) These guidelines were then disseminated through meetings and various outreach activities for wider replication in India. (Milestone 7E)

LBG leveraged its association with various local institutions/ organizations to maximize the dissemination of the guidelines, and sensitize the largest possible body of stakeholders so as to encourage adoption of the guidelines in the master plan for the city. These organizations included among others: the Municipal Corporation of Hyderabad, the Regional Transport Authority; SIAM; Hyderabad Urban Development Agency (HUDA); the Centre for Good Governance; the Directorate of Town and Country Planning; the Police Commissioner's office; and the Andhra Pradesh Pollution Control Board. Copies of the guidelines were also shared in individual and small group meetings with Mr. A.K. Goyal, Principal Secretary to Gov't of AP, Municipal Administration and Urban Development Department, Mrs. Chitra Ramachandran, Commissioner of the Municipal Corporation of Hyderabad, Mrs. Lakshmi Parathasarathy Bhaskar, Vice Chairman of HUDA, Mr. Krishna Rao, Commissioner of Police, Mr. Giridhar, Transport Commissioner, Mr. Rajiv Sharma, Member Secretary AP Pollution Control Board, and Mr. Syed Muzaffar Hussain, Director, Directorate of Town & Country Planning, among others.



It was opportune that the draft master plan for the city had been recently released by HUDA and was in the process of finalization based on feedback/ comments received from stakeholders. LBG/GEP-CCS utilized this opportunity to engage key decision-makers at HUDA to encourage the adoption of elements from the Guidelines into the final Master Plan document.

To further promote integrated urban-transportation planning concepts, LBG also leveraged a policy exchange by senior transportation experts with the release of the guidelines and with a policy level brainstorming session cum roundtable organized in association with ASCI and the Centre for Good Governance. This event "Sustainable *Transportation and Land Use Planning Strategies for the Future*", held on August 7, 2003 brought together senior decision-makers/policy-makers from various departments involved with transportation planning/management for the city of Hyderabad and AP state.

One result of CLIN 7 can be observed in the *City Development Strategy*, a collaborative effort with MCH and other city agencies, coordinated by ASCI with the aim of developing a comprehensive urban strategy framework for the city of Hyderabad. This document clearly reflects the capacity building efforts by LBG under CLIN 7. Traffic management interventions implemented in the demo corridor and the sustainable transport planning concepts demonstrated during the policy exchanges were core to the transportation strategy laid out in the final *City Development Strategy* document.

[redacted]

The *Sustainable Transportation Guidelines* were also disseminated at USAID sponsored events held on the theme of urban planning. These included:

- ? National Workshop on "Model Municipal Law" (November 21, 2003 - New Delhi)
- ? International Conference on "Good Urban Governance – Making Cities Work" (November 27-29, 2003 - Hyderabad)

Decision-makers were targeted and engaged to encourage the incorporation of these guidelines (or elements thereof) into the master-planning process of various Indian cities. It is expected that these guidelines will contribute towards development of national guidelines for emulation by various Indian cities, to help ensure that land use planning, transportation planning and development strategy formulation take place in an integrated manner so as to reduce the growth of GHG emissions from urban transport.

EBJ Award:

LBG was recognized for its work in sustainable transportation in Hyderabad, receiving a prestigious award from the Environmental Business Journal in Spring 2004.

Results:

- Estimated reduction of 1.45 to 2.89 tons per day of CO_2 emissions or 530 to 1000 tons per year from the traffic management interventions implemented in the 4.5 km demo corridor.
- Sustainable transport planning concepts incorporated into Hyderabad's *City Development Strategy*.
- Demonstration Corridor interventions being replicated in other parts of the City
- Signage and concept models seen during study tour used in the new light rail stations and plans
- Improved PUC Centers networked through the Regional Transport Authority and supplying critical data.
- Partnership created between SIAM and RTA to work on emissions reductions and improving vehicle pollution testing and maintenance.

GLOBAL ENVIRONMENT PROJECT FROM TOMORROW

Khairatabad-ESI stretch to see drop in emission levels

By I. S. Dhivakar

Hyderabad, March 21: At least one traffic corridor in the State Capital is all set to experience a sharp drop in Greenhouse Gas (GHG) emissions and improvements in traffic flow. The Khairatabad-ESI passageway, one of the busiest in the city, is going to see the Carbon Dioxide emission level falling by 1.45 to 2.89 tonnes per day in the days to come. Besides, the peak time vehicular traffic will save about seven minutes while travelling the 4.5-km long corridor.

This has become a distinct possibility with the Global Environment Project (GEP) taking shape since a year of its conception. The project which is ... to reduce the pollutants. Based on how things work out, the GEP will be implemented elsewhere in the city, it is said.

Studies done by the MCH and the Traffic Police indicate that the present road conditions are a major cause for the "stop and go" movement of traffic. This in turn leads to increased exhaust pollution due to inefficient engine operations and increased travel time. If the traffic moved at a constant speed there will be less fuel consumption, efficient engine burning and fewer pollutant emissions.

The Khairatabad-ESI stretch is the most crowded corridor, ... intersections and ... length of ... long that ... and ... environment ... improve ... off-street parking, improvement of pavements, provision of zebra crossings and junction improvements at Khairatabad, Punjagutta and Ameerpet.

The pride function is ... to be reduced during ... of intermediate parking, reduction of the length of bus stops with bay provision for scooter parking. The average ... length during rush ... is being improved ... cent. This will result ... reduction of emission ... cent. Most of the ... improvements have ... and the junction ... and Ameerpet ... proved. However ... of auto parking ... sion of signage ... ing remains ... intersections ... was ...

US project to curb pollution

From Our Bureau

Hyderabad, March 21: To curb the growing pollution in the city, the Sustainable Transportation Project was launched on Friday at the Regional Transportation Authority office.

The project is part of a United States Agency for International Development-funded Greenhouse Gas Pollution Project -- Climate Change supplement.

The pilot project will be first tested on the 4.5 km corridor between ESI and Khairatabad.

SIAM will provide free pollution checks for vehicles from RTA.

USAID project to curb traffic snarls

Express News Service

Hyderabad, March 21

FOR the first time in the country, a pilot project to study the road conditions for improvisation will be taken on the stretch from Khairatabad to ESI.

The MCH, Road Transport Authority, AP Pollution Control Board, APSRTC and the Society of Indian Automobile Manufacturers (SIAM) have come together to take up the project to check pollution levels and ease traffic congestion on city roads.

Under the project initiated by the United States Agency for International Development (USAID), vehicular movement and pollution levels would be monitored for a period of three months.

Addressing a press conference here today, John Smith Steen of USAID said that the project would be extended to other parts of the city in a phased manner.

Additional Commissioner (Traffic and Transportation) Ramakant Reddy said that Hyderabad was selected from among several cities across the country as the city has had vehicular traffic here had increased manifold over the years.

Steps would also be taken to provide better signal coordination, new signage, lane-marking and reflectors with which ... would be ... uses on ... City ... M.V. ... to ... traf ... to ... U ...

FOR STARTERS, IT'S ESI-KHAIRATABAD STRETCH

Pilot project to check vehicular pollution

By Our Staff Reporter

Hyderabad, March 21: The 4.5-km stretch ... to Khairatabad ... corridor with reduced ... vehicular pollution with the Sustainable Transportation Project ... here.

It was developed by the USAID Greenhouse Gas Pollution Prevention ... Climate Change Supplement ... reducing vehicular pollution ... it would be replicated ...

GEP Project Substance ... that the project was ... the first time in the ... since the MCH, the ... Automobile ... and been actively coordinating with the project.

John Smith Steen of the United States Agency for International Development said the USAID has been working in sectors like infrastructure, health, energy and greenhouse gas mitigation in the transport sector.

Mr Steen said that quality of emissions was the key determinant for ... mortality rate. Efficient burning of fuel, travelling at constant speed would reduce pollution, he said.

The Police Commissioner, Krishna Rao, said that automobile-centred life and low priority to public transport was leading to congestion and pollution. At least, 40 to 50 per cent of commuters should switch over to the public transport system to reduce high density of traffic and heavy congestion ...

The MCH Additional Commissioner, Ramakant Reddy, said the ESI-Khairatabad corridor was a demonstration project with low cost measures to give immediate results. The measures included colour improvements, improvement of intersection ... lane markings, coordination ... lane markings, reflectors, signages, bays and introducing traffic discipline ...

The SIAM representative, Vinay, said select petrol stations would be taken up for free pollution checks for vehicles ... RTA. C.L.N. Gandhi, additional commissioner ... said the measures being taken to reduce congestion and pollution. EPTRI officer Gayam Ramachandran, said the project was a great initiative ... to achieve the aim of clean Hyderabad.

USAID project to curb traffic snarls

From P-1

Police station would also be shifted from Abids to a farther place.

RTA deputy commissioner CLN Gandhi said every year about 1.25 lakh new vehicles were hitting the city roads. About 225 pollution centres in the city would be networked soon.

The Pollution Under Control (PUC) test would cover emission of three numbers of gases, he said.

EPTRI director Gayam Ramachandran and Green House Pollution Project chief Suzanne Young spoke on the occasion.

CLIN 8: Methane Emissions and Re-Use Potential in Cities

The primary objective of the CLIN 8 task was to bridge the vast information gap existing in India on municipal solid waste management and landfill gas.

The second focus area for the *Linking Urban Development with Climate Change* component was the potential global warming impact from methane emissions from uncontrolled urban dumpsites. In 1999, there was no systematic evaluation, nor much awareness, of the significance of methane emissions from uncontrolled urban dumping and unsanitary landfills in India, or for available options for mitigating this important GHG that is about 22% more potent than carbon in terms of heat trapping abilities. Landfills are the major contributor to atmospheric methane emission, and landfill gas build-up also poses a local public heath and environmental hazard, contributing to hazardous air pollutants, VOCs and smog formation, as well as being an explosive and fire hazard.

Under this task, the contractor would train municipal authorities and other organizations working in partnership with city administrators in selected urban areas, to assess methane emissions at the various stages of municipal waste management services. In addition, the contractor would provide training to evaluate options for methane abatement, with a focus on LfG recovery for re-use as a fuel source. As a last element, the contractor was directed to develop, at a selected municipal landfill site, a representative project for GHG emissions reduction funding, and include specific design aspects related to the measuring, monitoring and verification of methane emissions.

LBG used a multi-faceted approach to execute the required sub-tasks under this CLIN: the capacity building of city managers on solid waste management and methane capture and reuse strategies; international informational and networking exchanges for key urban managers; and the development of a project (Bangalore) to demonstrate a methane mitigation approach.

To better guide the implementation strategy and to maximize the impact of the GEP-CCS project and its capacity building focus, a training needs assessment (TNA) was conducted in February 2001 by LBG with the support of Global Energy Partners (Global). It was designed to inform the development of a detailed training plan for municipal authorities and other organizations engaged in solid waste management activities. The TNA was conducted for five cities, Pune, Chennai, Bangalore, Guntur and Jaipur. The choice of cities was determined by the potential for methane recovery and reuse in these cities and the level of interest demonstrated by the city authorities to USAID/INDIA in connection with various urban infrastructure and environmental initiatives.

The interactions with the city authorities revealed a significant lack of understanding about composting and waste-to-energy (WTE) projects, including landfill methane recovery and reuse and biomethanation. Moreover, there were concerns about how to

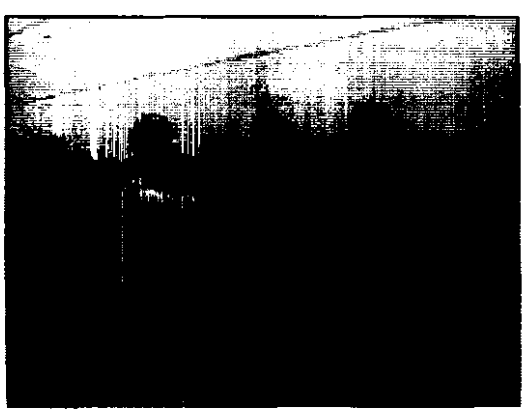
comply with the then recently released *"Municipal Solid Wastes (Management and Handling) Rules, 2000"* by the Ministry of Environment and Forests (MOEF). Identification of these two critical factors: the low potential for capture and re-use in those municipalities and the great uncertainty on how to comply with the 2000 SWM mandates prompted subsequent consultations with a variety of officials at the GOI, state and local levels, as well as program experts from USAID/India, who confirmed these information and knowledge gaps. A decision was therefore taken by USAID to provide more emphasis on the fundamentals of integrated solid waste planning and management in the training, as this would serve as a prerequisite to capturing benefits from utilizing solid waste for productive purposes, including methane gas recovery and reuse.

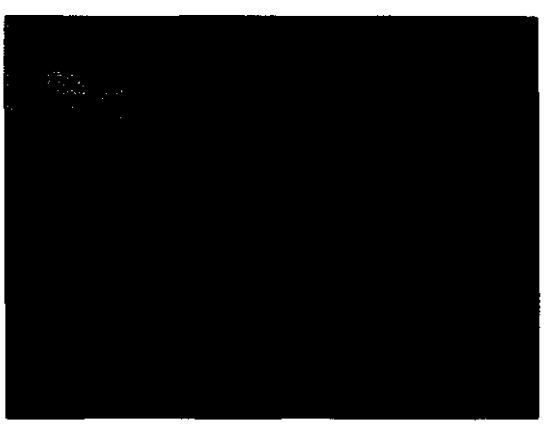
Based on the TNA and subsequent discussions, LBG designed and conducted a series of training activities entitled *"Tools for Improved Solid Waste Management and Treatment"*. Training was held at Chennai, Jaipur and Ahmedabad in December 2001, in partnership with the Tamil Nadu Urban Development Project (TNUDP), HCM Rajasthan Institute of Public Administration (RIPA), and the City Managers Association of Gujarat (CMAG) respectively (all three of which have strong linkages with the USAID RUDO and FIRE projects). The training plan was developed to encompass MSWM fundamentals, with a focus on waste treatment options and LfG mitigation and recovery. (Milestone CLIN 8A)

The training program locations and partners were selected to leverage the previous and ongoing cooperation between USAID RUDO, the FIRE Project and respective municipalities/ partners. This expanded effort trained over 125 participants from 50 urban bodies and relevant institutions. (Milestone CLIN 8B and CLIN 8C).

LBG's implementation strategy for successful capacity building under this CLIN employed the leveraging of other USAID efforts such as the FIRE project and additional resources to reinforce the training activities. For example: in Dec. 2001, LBG co-organized a National Workshop on Solid Waste Management in New Delhi with the FIRE Project. This important national roundtable on solid waste management and disposal practices was attended by over 200 delegates from cities all over India.

The policy exchanges and study tours implemented under GEP-CCS also reinforced the impact of the TA. Policy exchanges brought US. experts and municipal executives to India to share their experience and information on landfills, LfG, and waste to energy





technology, and provided opportunities for targeted study tours like the visit of Dr. Mohan to the U.S. in 2001. Global Energy Partners, the consultancy arm of EPRI, collaborated with the GEP-CCS to provide additional technical expertise on landfill and LfG to energy options, sharing lessons learned around the world. During 2003-2004, two focused MSW policy exchanges, the MSW-LFG Exposure Trip to Thailand and the visit to India of Richard Hays and Steve Hamilton, continued the interactive dialogue with GoI ministries and agencies.

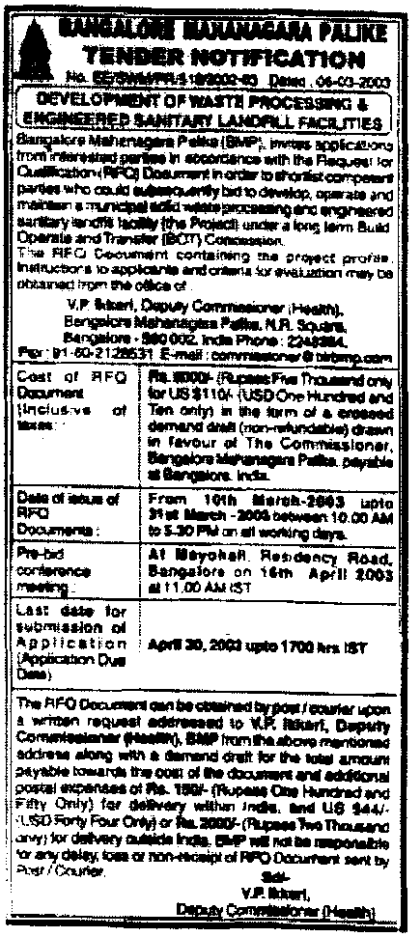
Feedback received in the course of activities under the training needs assessment, the training series, the roundtable and the interactions with other institutional players, prompted discussions between the LBG/GEP-CCS team and USAID/India on reorienting the focus of the demonstration project assignment to suit the ground reality. The consensus that emerged was that the demonstration project would take a holistic approach looking at integrated solid waste management, with nonetheless, a clear introduction to the GHG emission reduction aspects of a MSW project.
The overall aim of the second phase was therefore to take the training implemented in the preceding stages to the next level by actually working with one city (a) to build the capacity for and to provide the technical assistance to complete an integrated SWM project, and (b) to provide guidance on incorporating GHG emissions reduction planning into municipal landfills.

Subsequent to consultations with key stakeholders, and other program experts in the USAID/India Regional Urban Development Office, the city of Bangalore was selected to be the partner city for implementation and technical assistance of this phase.

The City of Bangalore, one of the five cities visited during the training needs assessment, was higher on the learning curve and proactive, with existing disposal plants. There was a professional approach being taken by the municipality with involvement of the Bangalore Action Task Force (BATF), the private sector municipal government collaboration, and more importantly the Infrastructure Development Corporation of Karnataka (IDECK), a financial intermediary. BMC and IDECK were taking proactive stance in sanitary landfill development with a first adopter response to Government Municipal Waste Management directives of 2000 and were interested in exploring options to mitigate greenhouse gases by reducing, eliminating and re-using methane emissions from the landfill. The initiative on the part of the Bangalore Municipal Corporation, in partnership with BATF and iDeCK, to develop two composting/ sanitary landfill projects that would properly treat and dispose of the city's municipal solid waste was a significant factor in the selection of

Bangalore to be the aid recipient. The two project proposals were seen to be at an advanced stage of planning and potential financing thus enabling the technical assistance to be directed to a project(s) with a greater probability of being implemented, thereby reducing the risk of the TA investments getting lost due to the inability of the targeted local urban body, and/ or project promoter to carry an initiative through to implementation. Secondly, the involvement of iDeCK, a financial intermediary, would help address a serious constraint in the Indian context, namely that of project funding. Given that one of the objectives of component was to explore funding options for the project, the involvement of a potential investor – iDeCK - from the inception of the proposal was favorable. IDFC, iDeCK's mother firm and a project partner wanted to explore possibilities of earning carbon credit revenues for the project.

The LBG/GEP-CCS team which consisted of the LBG/GEP-CCS technical team, in association with Global Energy Partners, LLC (Global) provided technical assistance to IDECK and BMC in the design phase of the project including reviewing and identifying information gaps with respect to GHG mitigation in the detailed project reports prepared by MACE. The review yielded several insights on GHG related issues required to be addressed as part of the landfill design, and highlighted specific information gaps that needed to be addressed in future planning with other municipalities. The experience also generated inputs that would enable the preparation of appropriate toolkits/ manuals for use by municipalities/ other stakeholders to incorporate GHG mitigation into landfill projects. LBG provided "best practice" for GHG mitigation, including the design for measurement, monitoring and verification of GHGs, and in addition to technologies that could be applied to these and other landfill sites in India. (Milestone CLIN 8D)



BANGALORE MAHANAGARA PALIKE

TENDER NOTIFICATION

No. SE/SWM/PR-1/8/2002-03 Dated . 06-03-2003

DEVELOPMENT OF WASTE PROCESSING & ENGINEERED SANITARY LANDFILL FACILITIES

Bangalore Mahanagara Palike (BMP), invites applications from interested parties in accordance with the Request for Qualification (RFQ) Document in order to shortlist competent parties who could subsequently bid to develop, operate and maintain a municipal solid waste processing and engineered sanitary landfill facility (the Project) under a long term Build Operate and Transfer (BOT) Concession.

The RFQ Document containing the project profile, instructions to applicants and criteria for evaluation may be obtained from the office of

V.P. Ikkeri, Deputy Commissioner (Health),
Bangalore Mahanagara Palike, N.R. Square,
Bangalore - 560 002, India Phone : 2243384,
Fax : 91-80-2126531 E-mail : commissioner@bbmp.com

Cost of RFQ Document (inclusive of taxes) :	Rs. 5000/- (Rupees Five Thousand only for US $110/- (USD One Hundred and Ten only) in the form of a crossed demand draft (non-refundable) drawn in favour of The Commissioner, Bangalore Mahanagara Palike, payable at Bangalore, India.
Date of issue of RFQ Documents :	From 10th March-2003 upto 31st March - 2003 between 10.00 AM to 5.30 PM on all working days.
Pre-bid conference meeting :	At Mayohall, Residency Road, Bangalore on 16th April 2003 at 11.00 AM IST
Last date for submission of Application (Application Due Date)	April 30, 2003 upto 1700 hrs IST

The RFQ Document can be obtained by post / courier upon a written request addressed to V.P. Ikkeri, Deputy Commissioner (Health), BMP from the above mentioned address along with a demand draft for the total amount payable towards the cost of the document and additional postal expenses of Rs. 150/- (Rupees One Hundred and Fifty Only) for delivery within India, and US $44/- (USD Forty Four Only) or Rs. 2000/- (Rupees Two Thousand only) for delivery outside India. BMP will not be responsible for any delay, loss or non-receipt of RFQ Document sent by Post / Courier.

Sd/-
V.P. Ikkeri,
Deputy Commissioner (Health)

The implementation of the Bangalore demonstration project would provide the basis for the final sub-task, namely – documentation and calculation guidelines for GHG emission reductions for the purpose of potentially receiving funding through available multilateral and bilateral funding sources. In consultation with AID, it was decided that, as the open bidding process and requisite reviews and approvals by State and local government agencies would proceed at a pace independent of the GEP-CCS timeline, the GEP-CCS/LBG team would provide the documentation tools for funding that could be used by either the financial institutions or the prospective landfill developer (as and when the same had been finalized).

Accordingly, a calculation template was prepared using preliminary/ assumed data for the project.

The calculations made in the calculation template were based on the specifications provided in the RFP for the Bangalore project, project specific technical advice from MSW specialists Global Partners, inputs obtained from iDeCK and Mahindra Acres Consulting Engineers (MACE), the design consultants on the project, as well as select assumptions made about the final nature of operations at the project. The proposed calculation approaches were discussed extensively in collaboration with the iDeCK personnel. The LBG team also discussed the approach with IDFC, who have been preparing similar documentation for the GHG emissions reductions and a baseline for the Lucknow MSW project (this project was one of the first GEP-CCS pipeline projects to be funded under CLIN 3).

The final documents prepared for funding (Milestone CLIN 8E) contained: a *General Guidance Document* for quantifying and documenting GHG emission reductions; a *Calculation Template* for quantifying the GHG emission reductions; the *DPR Worksheet*[1] format which may be used by the project developer for presenting DPR information – including GHG emissions related information - in a structured format so as facilitate review by domestic/ international financiers; and the *GHG Mitigation Guidelines* for the project. These Guidelines had been developed based on the reports/ reviews of the draft RFP documents, undertaken by LBG and its technical partners, in the preceding stages of CLIN 8.

During the GEP-CCS project, outreach opportunities to share information on MSW and methane capture and re-use were actively solicited and employed. For example in 2003, the GEP-CCS CoP and a iDeCK senior staff professional made a joint presentation on the Bangalore pilot to a national seminar on Municipal Solid Waste Management in Hyderabad that was attended by more than 150 persons.

Although Delhi was not ready in 2000 to be a partner for the MSW pilot, having heard about the work being done in Bangalore under the USAID funded GEP-CCS program, the Additional Commissioner of the Municipal Corporation of Delhi, Mr. Negi, approached LBG for assistance in Spring 2003. LBG shared the information that had been developed under the project and used in the earlier technical trainings. In response to their request for additional TA and in consultation with USAID, LBG was able to leverage the remaining two policy exchange activities to provide MCD with tailored TA, special training and one-on-one briefings with the Commissioner, Mr. Rakesh Mehta.

> *"A fine mix of presentations, discussions and field visits – it was a great learning experience."* Rakesh Mehta

[1] Developed as part of CLIN 3 component of GEP-CCS.

Results:

- **India's first sanitary landfill project being developed in Bangalore**
- **CO_2 emissions avoided of approx. 187,000 tpa on average (est. at 1,500,000 tons total over the first 8 years of Bangalore project)**
- **A template for calculating MSW project baselines**
- **GHG Guidelines for Landfills**
- **Over 125 officials from 50 urban bodies and relevant institutions trained**
- **Over 400 plus participants in various MSW roundtable and workshops informed**
- **Direct TA for Bangalore, Delhi and Agra on MSWM and Landfill gas solutions**

As an outcome of these activities, MSW management officials are now much better informed and positioned to develop and implement strategies for MSW management that meet MOEF requirements while simultaneously mitigating methane emissions from MSW. In addition, participant input helped LBG identify opportunities for high impact, technical assistance in MSWM and greenhouse gas recovery and re-use in the future.

III. LEVERAGING PARTNERS

A. U.S. Partners

Over the life of the GEP-CCS project, the Louis Berger Group developed a wide range of collaborative partnerships with leading U.S. organizations to further assist in fostering climate change initiatives in India. These partnerships have included national, state and local governments, academic institutions, non profits, multi-lateral funding agencies and the private sector. These partnerships have provided participating Indian counterpart organizations with invaluable access to information and resources in various disciplines including, but not limited to, urban management, solid waste management, transportation planning, and project development and financing. The US organizations were tapped in various capacities depending on the focus of a particular activity; providing training, the organization of roundtable events, various outreach and awareness activities, and hosting or participating in policy exchanges and study tours. US partner organizations included the following:

Technical Project Partnerships

- ? Econergy International Corporation (EIC)
- ? Electric Power Research Institute and Strategic Alliance Partners – Global Energy Partners (GEP)
- ? Global Finance Solutions
- ? International Institute for Energy Conservation (IIEC)
- ? Natsource LLC
- ? Virginia Polytechnic and State University

Collaborative Partnerships

- ? Environmental Defense (ED)
- ? Environmental Resources Trust (ERT)
- ? Ernest Orlando Lawrence Berkeley National Laboratory (LBNL)
- ? SCS Engineers
- ? World Resources Institute (WRI)

Government Twinning

- ? City of Portland Oregon, Office of Transportation
- ? Portland Metropolitan Planning Organization (METRO)
- ? City of Englewood Colorado
- ? San Diego, Department of Environmental Services
- ? City/County of Denver, Colorado
- ? Denver Environmental Protection Division
- ? Denver Regional Council of Governments
- ? Oregon Transportation and Growth Management Office

Resource Partners

- ? Brown, Vence and Associates
- ? California Environmental Protection Agency
- ? California Energy Commission
- ? California Integrated Waste Management Board
- ? International Finance Corporation
- ? Power Project Financing LLC
- ? Sonoma County Waste Management Agency
- ? National Association of State Energy Officials
- ? National Renewable Energy Laboratories
- ? U.S. Environmental Protection Agency
- ? U.S. Export Import Bank

The leveraging of these organizations has been beneficial not only to the GEP-CCS project, but also to the U.S. organizations themselves. The GEP-CCS project benefited from these partnerships by having access to a wide range of experience and expertise, and these organizations were able to further broaden their portfolio by developing lasting relationships with Indian organizations for collaborative activities and business opportunities. Illustrative examples of collaborative partnerships fostered under GEP-CCS are below.

- ? Working collectively with experts from Global Financial Solutions, Natsource, LLC Advisory Services and Ecoenergy International Corporation (EIC) as technical partners, LBG conducted trainings focusing on traditional GCC finance, GCC project development, and GHG emissions trading markets. These training activities provided the FIs with the institutional and technical capabilities to factor the cost/benefits of GHG mitigation into the lending and rating guidelines/criteria in order to complement the energy efficiency savings and sale of GHG emissions reduction in representative projects. They also provided Natsource with a pool of Indian partners for GHG emissions trades, and EIC and LLC with business opportunities.

- ? Through the selection of Electric Power Research Institute and Strategic Alliance Partners – Global Energy Partners as a technical partnership, GEP-CCS was leveraged to develop a comprehensive screening and selection criteria to identify 5 leading municipalities, from a list of 12, to analyze their solid waste management programs. As part of this activity, the GEP-CCS project also developed a comprehensive training plan to train municipal authorities on the tools and techniques to measure their methane emissions and identify appropriate technology options for methane abatement and re-use.

- ? In partnership with the LBG team, the International Institute for Energy Conservation (IIEC) joined the project team to provide inputs on vehicle technology options in development of a transportation demonstration project for the Municipal Corporation of Hyderabad. GEP-CCS worked in conjunction with the Virginia Polytechnic University to strengthen the institutional capacity and technical capabilities of the Climate Change Centers at the Confederation of Indian Industries (CII) and Development Alternatives (DA). The objective of this activity was to assist these organizations to become fully functional centers for their respective constituents; to energize participation in GHG

reduction projects; to facilitate investment linkages; and to facilitate an operational project cycle. This team also identified opportunities to integrate energy development goals with climate change issues in terms of the national, social and economic development in the training programs at the Lal Badadur Shastri National Academy of Administration (LBSNAA).

? LBG and Environmental Defense (ED) formed a technical partnership designed to introduce the theoretical elements of the Environmental Markets University (EMU) curriculum and case study approaches drawn from the experiences of ED's Partnership for Climate Action membership through the involvement in the GEP-CCS Study Tour: *Establishing GHG Emission Baseline Measurements for the Future*. Subsequently, through the ED-CII collaborative partnership initiated by LBG during the study tour, GEP-CCS, CII and ED developed and co-hosted a very successful multi-sector policy level roundtable using the theme of an Environmental Markets University and Partnership for Climate Action in India to tailor an EMU curriculum for the Indian scenario and to showcase applicable international case studies. Through this collaboration, the Partnership for Climate Action partners also prepared special case studies for this workshop to share with Indian industry.

? Leveraging Environmental Resources Trust (ERT) as a collaborative partner, LBG and ERT laid the groundwork for the development of future GHG registry systems in India as a critical building block for GHG emissions inventories and credible trading.

? Working with the Ernest Orlando Lawrence Berkeley National Laboratory (LBNL) as a collaborative partner, LBG assisted LBNL to introduce the *Proform Software* to strategic potential users in India. The software, which was designed to assess renewable energy and energy efficiency projects, was improved by the inputs of India industries and financial institutions through linkages provided by GEP-CCS. Revised versions, containing relevant data and corrected for Indian financial and energy sector policy, were then beta-tested by Indian FIs and industry.

? SCS Engineers was selected as a collaborative partner to assist in the GEP-CCS focus on municipal waste management and landfill gas solutions. SCS Engineers participated in the 2003 Climate Change Technology Bazaar and policy exchange, helping municipalities look at various options for managing and financing the collection and disposal of their solid wastes and LfG solutions. SCS further collaborated during the *Exploring Landfill-to-Gas Project Development, Design and Financing Exposure Trip* providing technical training on municipal solid waste (MSW) management for the high level Indian delegation This training focused on the engineering design, public-private partnerships, and financing associated with solid waste management in general and landfill-gas-to-energy in particular.

? As part of a collaborative partnership with World Resources Institute (WRI), LBG sent a representative from WRI's World Resources Institute-Sustainable Enterprises Program to India under a policy exchange mechanism to provide first hand information on the protocol being developed. This visit was instrumental in assessing the how the protocol can be successful in a practical application with a broad stakeholder community. WRI

also participated in roundtables and hosting visits during India to US exchanges. During the study tour visit *Establishing GHG Emission Baseline Measurements for the Future,* for example, WRI hosted a day-long exchange, presenting its baseline measurement and GHG Protocol for the Global Reporting Initiative (GRI). This partnership was very much a two-way collaboration, with WRI soliciting feedback, data and input from the Indian private sector to make its efforts on the protocol and the GRI globally inclusive and relevant.

Introducing U.S. State and Local governments to prominent representatives in India through the GEP-CCS policy exchange mechanisms has provided Indian representatives and organizations with information on U.S. technologies and practices that have the potential to be replicated throughout India. These interactions also provided senior Indian governmental officials with venues and forums to promote and share environmental initiatives at an international level. In particular, these state and local government agencies in the US included the following:

- City of Portland Oregon, Office of Transportation
- Portland Metropolitan Planning Organization
- City of Englewood Colorado
- San Diego, Department of Environmental Services
- City/County of Denver, Colorado
- Denver Environmental Protection Division
- Denver Regional Council of Governments
- Oregon Transportation and Growth Management Office

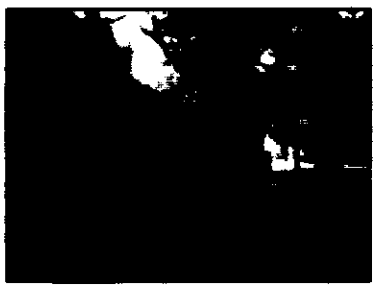
B. Indian Partners

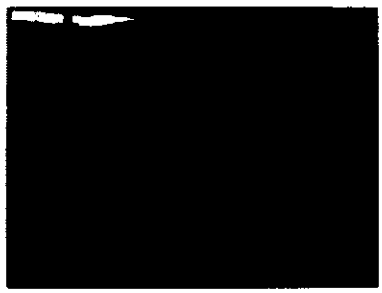
Under the GEP-CCS project, LBG has worked with a wide range of Indian organizations to engage private and non-government stakeholders to participate in international efforts to combat climate change while promoting sustainable development. In this process, the GEP-CCS project has reached out and assisted a large number of organizations to strengthen their institutional capacity. Some of the many organizations with whom LBG has worked closely:

Confederation of Indian Industry (CII)
Federation of India Chambers of Commerce and Industry (FICCI)
Indian Institute of Management (IIM)
Indira Gandhi Institute for Development Research (IGDIR)
(Society of) Development Alternatives (DA)
Society of Indian Automobile Manufacturers (SIAM)
Transportation Engineering Consulting Services of Hyderabad
Credit Rating Information Service of India (CRISIL)
India Leasing and Financial Service (IL&FS)
Indian Renewable Energy Development Agency (IREDA)
Infrastructure Development Corporation of Karnataka Ltd. (IDECK)
Infrastructure Development Finance Company, Ltd. (IDFC)
Investment Credit and Industrial Corporation of India (ICICI)
Administrative Staff College of India (ASCI)

The interaction has been fostered through the development of a number of collaborative partnerships, which were designed to strengthen the institutional capacity and address GHG emissions reductions in India. LBG further built these partnerships by participating in and supporting its collaborative partners' activities (e.g. providing speakers, expertise for training and conferences). Highlights of these collaborations include the following:

? LBG/GEP-CCS and ED, in association with the Confederation of Indian Industry-Environment Management Division (CII-EMD), organized a very successful multi-sector roundtable on September 27-28, 2002 entitled ***Embracing Global Climate Change: Using Market-Based Mechanisms for Global Competitiveness***. The roundtable took the participants beyond GHG mitigation practices to an understanding of how to harness the power of markets to address the challenges of tempering climate change and securing clean and reliable power. The roundtable explored cross-cutting industrial themes and perceived barriers to adopting GHG reduction technologies and/or practices and market access. The interactive market trading exercise that the participants engaged in demonstrated how various factors affect the decision making process. Leader multinational companies, BP and Entergy, who were part of the PCA, shared their experiences, as did Indian "champion" companies (ITC, Tata Steel and Organosys) whose efforts on GHG emission reductions have been fostered and catalyzed by partnership of CII and GEP-CCS.





? LBG worked with the Federation of Indian Chamber of Commerce and Industry (FICCI) to ensure the development and updating of the *Climate Change India* website a source of information for the entire GEP-CCS program and complementing activities. LBG also partnered with FICCI on numerous activities during the GEP-CCS project. One such activity was the organization of the Senior Policy Level Round Table on Industry focusing on GHG emission mitigation held in New Delhi, India on August 3, 2001. LBG also assisted FICCI to identify and mobilize experts for various conferences.

? GEP-CCS and Society of Developmental Alternatives (DA) collaborated on many activities together as part of the project's capacity building thrust for the CCC.

? In the partnership with the Society of Indian Automobile Manufacturers (SIAM), LBG provided technical assistance to build the capacity of SIAM to provide information and services for its stakeholders related to GHG emissions reduction initiatives. SIAM was a valuable partner for the development of the sustainable transportation area and the demonstration project in Hyderabad. Through the GEP-CCS SIAM collaboration other collaborations were instigated, including the very important continuing SIAM–RTA collaboration on improving vehicle and maintenance programs in Hyderabad and the networking of the Pollution Under Control centers.

? GEP-CCS formed a collaborative partnership with Credit Rating Information Service of India (CRISIL) in order to develop curriculum for a training program on Clean Energy Technologies and Climate Change for the Indian Administrative Officers. The module was designed to sensitize the IAS officers to the issues relating to CETCC as well as develop an understanding of their role and the impact of their decisions.

? During the capacity building effort with the Indian FIs, a number of very strong champions emerged who are now leading their country's efforts to raise awareness about the benefits and risks of GHG emissions and the implications for the private sector. These FIs champions include: IDFC, India Leasing and Financial Service (IL&FS), ICICI, the Indian Renewable Energy Development Agency (IREDA), and the Bank of Baroda (BOB).

C. Cross Collaboration with other U.S. Government Agencies

LBG has collaborated with other with other U.S. Government Agencies on numerous activities to leverage the many technical resources available. These organizations have included the Department of Energy (DOE), U.S. Environmental Protection Agency (USEPA), other USAID programs such as FIRE, EWI, and CTI, USAID regional programs such as U.S. Asia Environmental Partnership Program, as well as US state and local government agencies. This cross collaboration helped GEP-CCS to develop strategic interactions between government initiatives, promote leveraging across governments and agencies creating cross government efficiencies and to link agencies of common interests together forming synergistic collaborations. Effective cross collaborations have included the following:

- Working with LBNL, a DOE funded laboratory LBNL in introducing the Proform Software in India.
- Collaborating with the U.S. EPA, Landfill Methane Outreach Program (LMOP) while designing a Municipal Solid Waste Study tour to the U.S. and Thailand.
- Collaboration with "Clean Cities" program, DOE.

IV. OVERALL RESULTS

Looking at the macro impact of the project, GEP-CCS has been successful in building the institutional capacity of DA and CII to become national, and even internationally recognized centers for GHG issues and solutions. DA is consulted at the highest levels nationally, and interacts with governments, academia, and NGOs internationally to help develop a less emissions intensive path for the future.

CII has truly become an Indian "champion" for climate change initiatives and sustainable development. Over the past four years, CII has greatly increased the number of seminars, roundtables, conferences, training activities and services offered on GHGs, clean energy, and the corporate role in sustainable development, that it provides not only to its membership, but also to the community at large. As CII represents the private sector view with policy makers, they have also helped to create awareness with GoI decision makers on the importance of the links between energy efficiency, a reduction in GHG emissions, competitiveness, economic policy, and sustainable development.

As a direct result of LBG's initiatives in linking Indian and US champions, Mr. Nyati was asked to chair an international ISO standard development committee. Several CII companies including Tata Steel and Organosys were asked to beta test the WRI GRI protocols.

The effective institutional strengthening carried out for the financial sector is reflected not only in the way that financial institutions now approach clean energy projects, but in the number, and more importantly the improved quality of such projects. IDFC's work on GHGs and climate change mitigation projects has received international recognition by the UNFCCC. IL&FS EcoSmart has developed a group of services around GHG reduction projects.

The results of the project development and financing concentration are apparent in the numbers:

GHG impact –

- **900,000 tpa CO_2 emissions reductions/avoided:**
- **141 MWs of green/renewable power generated, along with steam and organic compost.**
- **GHG Mitigating Projects funded – Est. investment approx. $170 mil US dollars.**

Policy impact:

- **MSW** MCD proposed "betterment tax", MSW collection Pilots
  Bangalore – BMC and 1st sanitary landfill
  Methodology for MSW project baseline development
- **Transportation**
  AP State (Sustainable Transport Policy Committee)
  Hyderabad – Corridor expanding – road widening, others
  City Strategy Document
  PUC Networking through RTA

Capacity Built: GHG Mitigation Champions

Industry Associations
- CII/FICCI
- SIAM

NGOs
- DA
- ASCI
- CGG

Financial Institutions
- ICICI
- IDFC
- IDeCK
- IL&FS

Collaborative Cities/States
- Delhi
- Agra
- Bangalore
- Hyderabad
- Andra Pradesh

Federal/State Gov't
- MOEF
- MNES
- MCD
- MCH
- BMC
- HUDA
- RTA
- EPTRI
- LBSNAA

•Enabled US/India Collaboration on Climate Change

To further the goal of assisting India participate in the international dialog on climate change and supporting the spirit of the US/India Collaboration on Climate Change, the GEP-CCS project supported activities during CoP-8 events and CII technology bazaars in 2002 and 2003 by: sponsoring booths and events; supporting DA's role as one of two official NGO hosts of CoP-8 and the organizer of the Inter-Regional Conference on Adaptation to Climate Change; enabling a delegation of Indian NGOs from all over India to participate in CoP-8. LBG/GEP-CCS also identified and sponsored speakers to showcase real examples of US/India collaboration during CoP-8 and for USAID Indian partners' events. During COP 8 in 2002, MCH described the work being done on sustainable transportation in Hyderabad to an international audience. During the USG side event at the Climate Change Technology Bazaar and Conference in 2003, the City of San Diego, in India to assist Delhi and Agra on MSW and landfill gas, shared US technology and solutions, as did SCS Engineers. LBNL made presentations at the US/India GEP-CCS booth, during side events, and in individual meetings during CoP-8 in 2002. LBG also supported international conferences and partners, such as FICCI's International Conference on Climate Change & the Financial Sector.

Some results of the LBG/GEP-CCS work on US/India Collaboration on Climate Change:

- ? DA was able to get language on adaptation included in the CoP-8 deliberations and the Delhi declaration, and inserted more prominently into the international dialog on Climate Change.
- ? Increased input from the Indian private sector into the development of international protocols and standards:
- ? Mr. Nyati of CII invited to head a ISO technical advisory group to TC 207 (standardized methodologies for GHG emissions)
- ? Tata Steel worked with WRI on the GHG protocol development.
- ? IDFC, ICICI, CII and other Indian companies reviewed a beta version and contributed input to the final version of the LBNL ProForm GHG assessment software.

Fostering and Building Bilateral Partnerships:

Over 290 Indian participants and 170 of their International counterparts, representing more than 153 institutions from GOI, private and public sectors participated in 8 policy exchanges and 5 study tours on technology options, finding mechanisms, municipal solid waste management, LfG mitigation design, development, and financing, GHG protocols, transportation planning and urban management, GHG emission registry systems, GHG baseline measurements and climate change policy. The timing of these policy exchanges and study tours was designed to coincide with exhibitions and events to maximize exposure, so these figures do not include the many roundtable participants, seminar and conference participants.

Study tours and policy exchanges exposed delegates to various models utilized in the US, provided "hands-on" learning experiences and promoted the development of informational exchange networks with their peers and helped to building international networks

Real Feedback:

• *"This study tour has taught me that regardless of an emissions cap, a regulatory framework, and an emerging emissions market, Indian industry will continue to seek innovative solutions that will protect the environment and ensure sustainable development..... the world of business is interwoven with the elements of environment and only a fine balance of both will ensure long-term viability!"*

Mr. K.P Nyati, Head, Environmental Management Division, CII

• *"The MSW visit organized by the GEP-CCS program will assist my efforts in moving New Delhi into the next generation of MSW."*

Mr. Rakesh Mehta, Municipal Commissioner, Municipal Corporation of New Delhi

• *"I appreciated the hands-on nature of the policy exchange and interacting with my counterparts in Denver, Portland. I foresee a long-term sister city relationship forming here."*

Dr. Mohanty, Municipal Commissioner, Municipal Corporation Hyderabad

International Project Recognition

EBJ BUSINESS ACHIEVEMENT AWARDS RECOGNIZE INDUSTRY'S BEST IN 2003

Environmental Business Journal Volume XVI No.11/12 2003

Special Merit Award given to The Louis Berger Group for implementing the U.S. Agency for International Development's Greenhouse Gas Prevention Program in India, which is designed to provide technical assistance to diverse stakeholders who want to shift to a less emissions-intensive development path

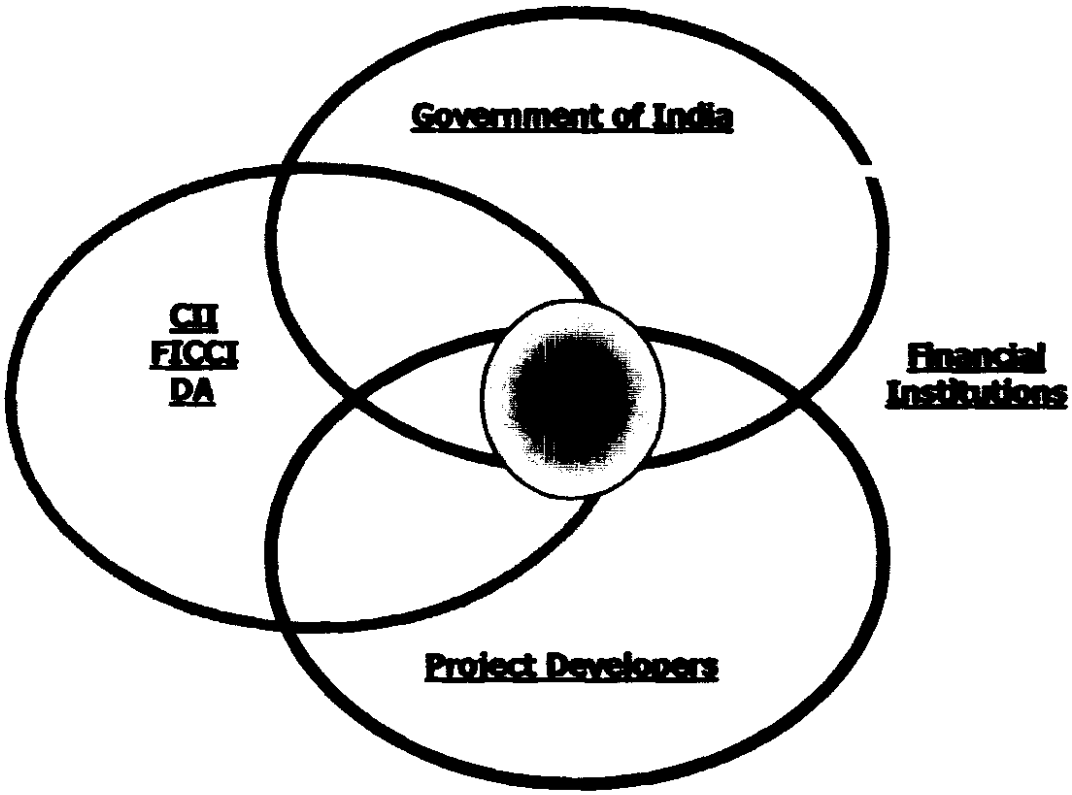
V. LESSONS LEARNED

The GEP-CCS project was well designed to enable multiple capacity building efforts around central themes: project development and financing, sustainable transport, MSW and landfill gas.

- *LBG found that a multi-layered approach applied concurrently, produced the best results.*
-
- One example is the approach used on project development:
-

1. Working with directly Project Developers (direct TA plus tools such as the DPR worksheet and the GHG Assessment)
2. Building capacity with industry through CII, FICCI – using seminars, roundtables, exchanges, tools, case studies
3. Building awareness with FIs on GHG risks and opportunities and building receptivity to CP projects
4. Working with the GoI agencies on local, state and national levels to increase understanding of climate change and the local benefits of supporting/reducing barriers to clean energy project development.

Figure 2: Multilayered Approach



TA to Key Players in Project Development

Government of India
•Awareness of CE project types, structuring, financing
•Technical trainings conducted to build capacity
•Guidance on relevant policies support CE project development
•Thorough analysis and TA to the state of AP on the project development cycle

Industry Associations / NGOs
•Developing pipeline projects
•Pre-feasibility analysis
•Identifying proactive and reactive PD opportunities
•Promoting GHG measurement tools to encourage PD

TA to Key Players in Project Development...contd.
Financial Institutions
•Identify opportunities and risks in existing portfolios
•Designing pre-screening tools for financial mechanisms
•Helped define approval criteria for CEP financing

Project Developers
•Provided direct technical assistance, reviewing project materials and determining financial feasibility
•Utilized tools to determine GHG assessment
•Designed DPR worksheet

-Outlined key financial, technical and risk parameters
-Used to market to FIs

✍ *The best results were obtained by employing a philosophy of:*

- build upon
- reinforce,
- feed into and
- support

Identifying partners who are already inclined to support an initiative, concept or course of action, or projects that are in an advanced stage, and focusing the TA efforts on these partners or projects leverages USG resources more effectively and produces a more sustainable result. LBG believes that leveraging resources through partnering is also the key to success. Buy-in is better ensured when the stakeholders not only feel that they have a stake in the outcome, but commit their own resources to an effort.

✍ *When and where possible, leverage the strength of the private sector.*

Findings demonstrated that in India, as in many other countries, the private sector is usually the quickest to understand the concepts involved: energy efficiency and its impact on the bottomline, the risks of GHG emissions, the potential benefits of GHG emissions reductions and the direct links of GHG to India's economic development. The private sector is generally able to identify where there is a need for GoI policy support to remove disincentive barriers or provide incentives. Working through large business support organizations such as CII and SIAM, Indian MNC champions like Tata Steel, and financial leaders like IDFC is often the most direct conduit to making change happen at local, state and national government levels. Many times the private sector business and financial institutions sit on government advisory committees. Enlisting the help of respected senior level champions in the ICS, and enlightened institutions such as ASCI and CGG who are working on urban governance issues has also proven to be effective. Public and private sector collaborative efforts such as the Bangalore Action Task Force seem to be a model to be emulated.

✍ *Flexibility and creative thinking are key to meeting and surmounting unforeseen challenges.*

As in every project there were the usual challenges and unforeseen factors: the development of a carbon market was not as rapid as anticipated and FIs with a pre-project mindset of conventional banking were reluctant to adopt "GHG mitigation" in their portfolio due to non development of a specific formal international carbon market. There was also stakeholder lack of information about other emission trading mechanisms/markets and a lack of Government commitment and incentives to encourage Indian industries to initiate/support GHG emission reduction activities.

Findings also revealed that the open dumping "business-as-usual" conditions of MSW operations in India were not immediately suitable for conversion to LfG recovery and re-use

systems. The initial ground-truthing also unearthed great uncertainties and a lack of municipal "know-how" and resources for complying with the MOEF 2001 Guidelines for MSW collection, treatment and disposal. The findings combined to indicate that TA for the development of sanitary landfills with methane mitigation would be the most effective immediate project assistance with LfG to energy systems as a longer term goal.

VI. RECOMMENDATIONS FOR FOLLOW-ON ACTIVITIES TO USAID/INDIA MISSION

Continuing the Momentum

? Greenhouse Gas Mitigation Project Development/Clean Energy Projects
? GHG Emissions Registry/Inventory
? MSW and LfG
? Clean Transportation
? Reinforcing Champions

Future Areas

Momentum for developing GHG mitigation projects has been created by capacity building under the GEP-CCS project and has been further supported by the success stories. Leading FIs are now considering GHG mitigation as part of the risk management assessment for their portfolios, and for opportunities for enhancing financial viability. This increased receptivity to CE projects offers more opportunity for technology transfer and economic development. It will be important to maintain the tempo which will be critical to keeping the Indian stakeholders actively engaged. To maximize the impact and continue the significant momentum created in the last four years, one of the most logical areas for follow-on activities would be to continue the work to get more greenhouse gas mitigation/clean energy projects on the ground.

The greenhouse gas mitigation project development was an area that was initially slow to build as it required intensive capacity building with multiple stakeholders: the financial institutions, the project developers, the industry associations and federations, and GoI officials. Now that there has been quantifiable success in that area, with more qualified, better-structured clean energy projects being funded and considered for funding, it has been observed that the "culture' for the receptivity of FIs to clean energy projects has changed. The project developers and companies are being to understand the concepts of CE projects, the benefits, both tangible and intangible, and the way to structure these projects better. GoI policies are becoming more conducive to encouraging these types of projects. Employing one mantra for sustainable efforts, these efforts should be built upon and reinforced to use the momentum created for a larger result.

The stage has been set to build upon the framework established under the GEP-CCS program to create a larger and stronger foundation of Indian stakeholders in industry, FI, Government and NGO sectors to work on GHG emissions reductions. There is also an opportunity to further enhance and tailor internationally accepted GHG mitigation tools and best practices for the Indian scenario.

GHG Emissions Registry/Inventory: a necessary building block

The early outreach activities undertaken as part of the GEP-CCS program revealed a critical gap, a building block for employing GHG market based mechanisms which was not being addressed, the need for development of a GHG registry. As a crucial mechanism for tracking and trading credible emission reductions in India and elsewhere, the ability to register emissions reductions in a recognized platform is a necessary element to ensure confidence in the process. LBG was able to begin to address that gap in the second half of the project, working with the principal stakeholders, the FIs and the business support organizations like CII and FICCI who were quick to recognize the need for such a platform. CII and IDFC see themselves as the logical private sector hosts: CII as the lead business support organization in India, and IDFC to give the platform a financial sector accountability framework and credibility. Both CII and IDFC were keen to get started as they rightly forecast that Indian companies will not be able to benefit from the new markets emerging in emissions trading, particularly the EU cap and trade market, without a credible registry. FICCI envisioned a support role for such a platform and would augment their existing services and create new services to help their members prepare for registering their GHG emissions reductions.

Under the component linking climate change and urban expansion, there are two additional areas where substantial gains have been made and where momentum has been created that could/should be capitalized on: the work with municipalities on municipal waste management and methane emissions from collection through disposal, and the work with local and state governments on sustainable transportation guidelines and urban planning.

VII. ADMINISTRATIVE OVERVIEW

A. Field Office

The GEP-CCS Field office was co-located in the regional office of the Louis Berger Group's Global Environment Team in Delhi, India. The field office was responsible for the overall technical design and implementation of the project, which included collaboration with NGOs and academic institutions, technical assistance, training, and outreach to the private and financial sector, and government policy makers to combat the growth rate of GHG emissions in India.

In particular the field office:

? Developed action plans and strategic direction with USAID for the implementation of activities.

? Interfaced with USAID on a regular basis on various activities and events.

? Collaborated with U.S. and India partners.

? Managed project related field activities.

? Provided local administration and management of subcontractors.

The field office was comprised of a Chief of Party (COP) as well as a staff of professionals who provided specialized technical expertise as well as logistical and administrative support for the project. The local staff positions included a Project Development/ Finance Specialist, a Program Management Specialist, an Administrative Assistant, and an Office Manager. Additional support was provided by office clerical staff, which included a receptionist and office assistant.

Figure 3 illustrates the organizational structure of the GEP-CCS field and U.S. home office.

Since May 2002, Ms. Young has been acting as the COP where she has provided overall direction and coordination for the project. Ms. Young was also responsible for coordinating with the USAID GEP-CCS Project Officer as well as coordinating all activities with Indian partners and U.S. collaborators to assure the accomplishment of contract objectives.

Mr. Michael Gaffen originally held the GEP-CCS Chief of Party position, but due to an unforeseen medical emergency he could no longer perform the necessary duties of COP and was replaced by Mr. Ron Sissem. Mr. Sissem held the COP position before leaving India in May 2002 for personal reasons. Following Mr. Sissem's departure from the project, Ms. Suzanne Young was recruited as COP for the remainder of the project.

Local Staff

As Project Development and Finance Specialist for GEP-CCS, Mr. Vinay Deodar was primarily responsible for identifying clean energy projects in power, industrial, and municipal utility sectors, interacting with domestic/international funding agencies and assisting the project promoters in developing and financial structuring the project concepts into bankable projects.

As Program Management Specialist for GEP-CCS, Mrs. Vandana Bhatnagar provided development banking expertise, technical assistance for the urban activities in MSW and sustainable transport, environmental research, communications, and assisted in writing and preparing reports for the project.

As Administrative Assistant and Office Manager for GEP-CCS, Mrs. Suja Arora and Mrs. Anju Verma provided day-to-day logistical and administrative support including bookkeeping and overall office management.

Over the life of the contract, LBG also brought in additional key experts to address the various technical obligations of the project.

B. Home Office

The GEP-CCS home office, located at the Louis Berger Group headquarters in Washington, D.C., provided corporate guidance to the GEP-CCS field office.

The role of the home office was to handle all contractual matters as well as to provide vision and guidance to the LBG field office implementing GEP-CCS, assuring USAID that the project was meeting the targeted strategic objectives, the proposed indicators, and milestones – on time and within target. Other responsibilities of the home office included working with U.S. based technical subcontractors on the design and development of industry and urban related programs working towards reducing GHG emissions. These programs included the design of roundtable discussions, research forums, the design and development of international study tours and policy exchanges, and serving as the liaison to other US Government agencies, private sector organizations, and research/think-tank institutions.

The GEP-CCS home office staff was comprised of the following:

As U.S. Program Manger, Mr. Erik Brejla was responsible for managing the development of all institutional linkages and partnerships with U.S. firms and identifying short-term technical experts. Mr. Brejla was also responsible for acting as the liaison between the field office and corporate officers.

As U.S. Program Associate, Mr. Howard Kronthal was responsible for the providing backstop and technical support for the project, which included daily communications with the field office and designing international policy exchanges and study tours.

In addition, the home office staff tapped additional LBG professionals for specialized technical expertise throughout the project, which included:

? Rod Carvajal - Trade Finance Specialist
? Ted Yoder – Trade Finance Specialist
? Donna Boysen - Clean Energy Specialist
? David Jarrett – City Planner and Sustainable Transportation Expert

C. Subcontractors

In order to further assist in the implementation of GEP-CCS, LBG entered into subcontract agreements with leading U.S. and Indian organizations to further promote climate change initiatives in India on an as-needed basis. These organizations provided short-term technical expertise to GEP-CCS.

These organizations included the following:

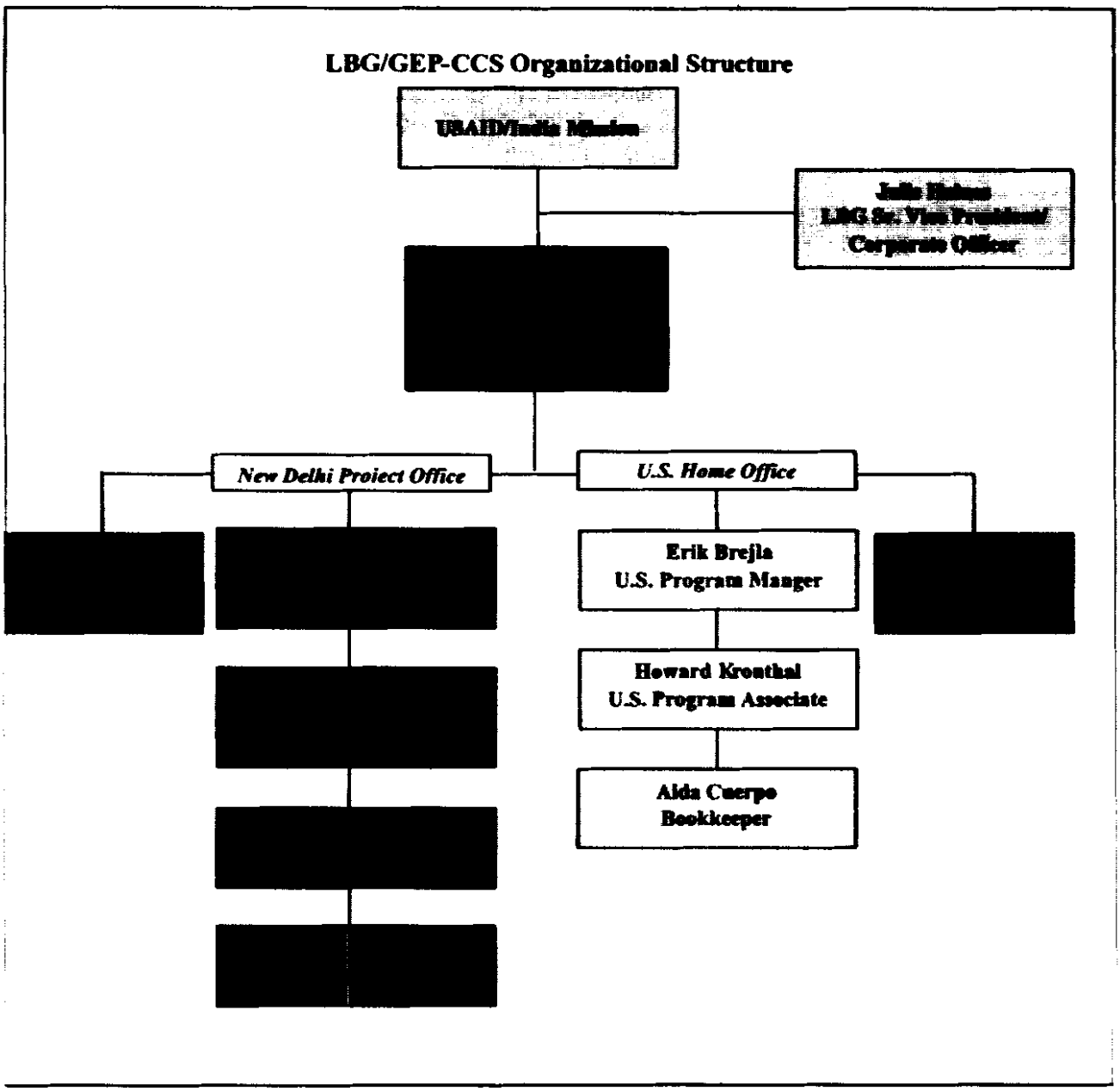
United States:

Econergy International Corporation (EIC)
Electric Power Research Institute and Strategic Alliance Partners – Global Energy Partners
Environmental Defense (ED)
Environmental Resources Trust (ERT)
Global Finance Solutions
International Institute for Energy Conservation/Civil Engineers Research Foundation (IIEC/CERF)
Natsource LLC
SCS Engineers
Virginia Polytechnic and State University
World Resources Institute (WRI)

Indian:

Confederation of Indian Industry (CII)
Society of Development Alternatives (DA)
Credit Rating Information Service of India, Ltd. (CRISIL)
Energy and Environment Analytics
Federation of India Chamber of Commerce and Industry (FICCI)
Indian Institute of Bombay
Indira Gandhi Institute for Development Research (IGDIR)
Society of Indian Automobile Manufacturers (SIAM)
Transportation Engineering Consulting Services of Hyderabad

Figure 3: LBG/GEP-CCS Organizational Structure

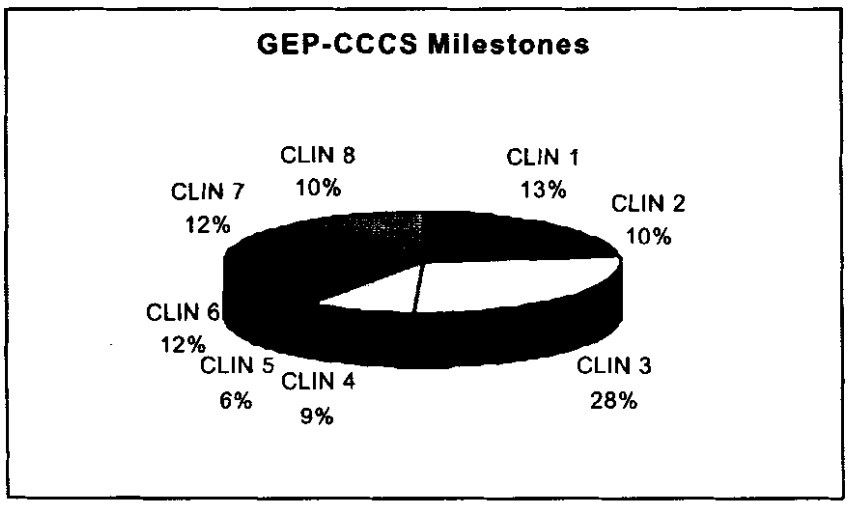


IV. FINANCIAL SUMMARY

The overall budget for the *Greenhouse Gas Pollution Prevention Project - Climate Change Supplement (GEP-CCS)* totaled US $5,199,392.62. The GEP-CCS project was designed as a Firm Fixed Price Contract over a 4-year duration including all labor, training and travel related costs, and direct costs. The Louis Berger Group, Inc. successfully completed the technical implementation of the project on time and within all designated cost parameters. As of April 1, 2004, LBG has billed 100% of the negotiated budget.

The following illustrates the distribution of the overall project budget to each respective CLIN component of the project.

Figure 4: Percentage of Budget by CLIN



The detailed budget overview, including Technical Milestones and accompanying deliverable dates and deliverable amounts are included below in Table 2.

Table 3: GEP- CCS Milestones and Costs by CLIN

CLIN 1	*Fostering Climate Change Initiatives for Sustainable Development*		
1A	GOI Training Needs Assessment Completed.	11/30/00	$ 67,452.36
1B	CCC Training Needs Assessment Completed; Report Submitted.	11/30/00	$ 257,614.15
1C	Computational Tool Kit Completed for both Centers; Training Manuals Completed.	5/31/01	$ 159,376.64
1D	Train the Trainer Program: Core Center Staff trained/certified as training providers.	3/31/02	$ 124,999.59
1E	Sustainable Centers Established (Tools in Place with Sustainability Plan).	1/31/03	$ 65,080.58
	TOTAL CLIN 1		**$ 674,523.32**
CLIN 2	*Institutional Strengthening of the Financial Sector*		
2A	Training Materials & Partners Established; Training Schedule Report Submitted	11/30/00	$ 85,206.99
2B	Completed TA for 2 Banks and their existing portfolios (Opportunity Cost Analysis of their existing portfolio completed)	8/15/01	$ 130,915.00
2C	Completed Training for Additional 60 Banking Professionals, Certificates Given	5/31/01	$ 122,619.32
2D	Finish Providing TA for the remaining three selected bank portfolios, provided final report	8/15/02	$ 151,769.68
2E	Final 60 Bank Officers Trained	3/31/02	$ 54,501.22
	TOTAL CLIN 2		**$ 545,012.21**
CLIN 3	*Project Development and Financing*		
3A	Project Tracking Format Completed and Documented.	2/28/01	$ 264,439.89
3B	TA for Demonstration for GHG reduction in one State: pilot project work completed	10/31/02	$ 353,010.33
3C	10 Projects identified and guidance given to Fund Managers: detail project report prepared and submitted	10/31/02	$ 269,487.80
3D	Five additional proposals in pipeline, with at least 8 with commitment of funds	12/31/03	$ 380,033.69
3E	At least 8 projects receive secured funding	2/15/04	$ 140,774.63
	TOTAL CLIN 3		**$ 1,407,746.34**

CLIN 4	***Communications and Information Outreach***		
4A	**Short List Completed of US and Indian Organizations to co-host forum.**	7/31/00	$ 90,414.68
4B	**Completion of first Indian meeting of forum and draft research paper topics proposed & web dialogue**	2/15/01	$ 110,355.88
4C	**Complete US Forum Meeting; paper topics finalized.**	5/30/01	$ 114,738.09
4D	**Draft research papers (5) submitted for comment and review.**	9/30/01	$ 108,561.25
4E	**Papers Published in Compendium.**	6/1/02	$ 47,118.88
	TOTAL CLIN 4		**$ 471,188.78**
CLIN 5	**Senior Policy Level Round-Tables**		
5A	**Champions identified, action plan established and report submitted.**	11/30/00	$49,940.75
5B	**First Drafters Meeting Completed in selected Utility Sector; regional bodies introduced.**	6/1/01	$101,457.43
5C	**Completion of first multi-sector round table event**	2/1/03	$69,962.88
5D	**Completion of at least three sector-specific roundtables**	12/31/01	$109,793.23
	TOTAL CLIN 5		**$ 331,154.28**
CLIN 6	***Policy Level Exchange Visits between U.S. & Indian Counter-Parts***		
6A	**Completion of study tour and exchanges for Milestone A - for all CLINS + 2 policy exchanges**	03/31/01	$ 69,143.22
6B	**Completion of study tour and exchanges for Milestone B - for all CLINS + 1 policy exchange**	09/30/01	$ 148,285.09
6C	**Completion of study tour and exchanges for Milestone C - for all CLINS + 1 policy exchange**	05/15/02	$ 153,014.51
6D	**Completion of study tour and exchanges for Milestone D - for all CLINS + 2 policy exchanges**	03/31/03	$ 199,594.22
6E	**Completion of study tour and exchanges for Milestone E - for all CLINS + 2 policy exchanges**	03/31/04	$ 63,337.45
	TOTAL CLIN 6		**$ 633,374.49**

CLIN 7	*Reduced Rate of Growth of GHG Emissions from Vehicles*		
7A	**Completion of Detailed Assessments: "Vehicles Technology Assessment"**	06/30/01	$ 194,766.49
7B	**Completion of project site selection: Demonstration Project Design.**	03/31/02	$ 128,558.05
7C	**Demo Project Documentation Submitted for Financing.**	02/14/03	$ 151,368.17
7D	**Development and submission of draft guidelines for transport master plan for replication.**	02/14/03	$ 84,311.13
7E	**Outreach and Dissemination of Transport Project Guidance.**	12/31/03	$ 62,111.54
	TOTAL for CLIN 7		**$ 621,115.37**
CLIN 8	*Methane Emissions and Re-Use Potential in Cities*		
8A	**Training plan developed and submitted.**	05/31/01	$ 75,242.55
8B	**Training of municipal authorities from 2 cities completed.**	03/31/02	$ 142,536.86
8C	**Training of municipal authorities for 3 additional cities completed.**	06/15/02	$ 125,807.74
8D	**Project Site Selected and Project Design Submitted to CTO.**	03/31/03	$ 120,162.89
8E	**Funding Identified and Documentation for Funding Submitted.**	12/31/03	$ 51,527.78
	TOTAL for CLIN 8		**$ 515,277.82**
	TOTAL COST FOR ALL CLINS		**$5,199,392.62**