

# US-AEP India

## FY 2004 Work Plan

### Country Strategy

#### Background

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India is the world's largest democracy, with a population exceeding one billion. While India's highest priority remains combating poverty, it is currently addressing a range of environmental challenges including: meeting water supply and wastewater treatment needs, ensuring water quality, handling solid and hazardous wastes, combating air pollution, working to improve energy efficiency, and responding to global climate change. In the recent past, increased pressure to improve the environment has come from civil society. Numerous NGOs are active in the environment sector and there is a growing consciousness among Indians of the importance of environmental protection. While the courts are increasingly reaching favorable environmental decisions, overall compliance and enforcement is weak.

India's economy has moved forward as a result of economic reforms that began in 1991 and the need to meet WTO standards. The fourth largest in the world in purchasing power parity, India's economy is viewed as a significant emerging market with large potential for U.S. exports. The environmental market in India was estimated at about \$3.0 billion in 2001, with an annual growth rate of approximately 12 percent. Financing for environmental improvements is estimated at \$400 million per year from the government of India, \$800 million per year from international lending and donor organizations (primarily the World Bank and the Asian Development Bank), and from the private sector.

#### Mission Statement

Promote sustainable economic growth and an improved quality of life in India by working to make Indian cities cleaner and more efficient, its industries less polluting and more competitive, and its laws and regulations better able to protect the environment. In doing so, US - AEP will transfer to India environmentally beneficial knowledge, services, and technologies from the United States and Asia through innovative, sustainable partnerships that leverage expertise and resources from U.S., Indian, and Asian public and private sector entities.

#### Overall Objectives

In support of US - AEP's objective of "cleaner cities and industry in Asia" and the USAID India Mission objectives of "increased transparency and efficiency in the allocation and mobilization of resources in selected states (SO 13)" and "improved access to clean energy and water in selected states (SO 16)", US - AEP/India will seek to improve access to and the quality of water, introduce strategies for urban air quality management, improve solid waste management practices, increase energy efficiency and the use of clean energy, introduce environmentally friendly residential building practices, and improve environmental governance. When possible and resources permitting, US - AEP/India will seek to share relevant environmental best practices throughout the region, especially with Bangladesh and Nepal.

#### India Country Strategy

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In contribution to US - AEP's strategic objective and USAID/India's SO 13 and SO 16, US - AEP/India will work in partnership with U.S and Indian governments, NGOs, and businesses. Harnessing creative energies and leveraging financial resources from new and existing partners, US - AEP/India will act as a catalyst to effect environmental change and improvements. US - AEP/India will capitalize on both its regional presence, in India and across Asia to support its own and the USAID Mission's strategy. US - AEP's ability to use technology as a development tool when appropriate will serve as an asset to US - AEP/India's and the USAID Mission's strategy. Flexibility and the ability to respond

quickly to changing circumstances are hallmarks of the US - AEP program and will continue to be a part of US - AEP India's strategic approach. US - AEP/India, a program that supports cross-cutting themes, will significantly contribute to the India Mission's goals regarding the cross-cutting themes of governance, urban issues, partnerships, and cutting technologies.

## **Relationship to USAID and other Donor Programs**

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US - AEP/India has and will continue to actively to collaborate with USAID/India Mission activities that contribute to SO 13 and SO 16. To meet millennium development goals and to contribute to USAID objectives in water resource management, US - AEP will actively collaborate with Mission programs such as FIRE-D and WENEXA. US - AEP will seek to identify outside resources and private sector partners for projects to improve urban water and sanitation. US - AEP's ability to identify resources for the feasibility of such projects complements the municipal finance objectives of programs such as FIRE-D. To improve water resource management in India, US - AEP has and will continue to actively collaborate with a wide range of donors such as WHO, UNICEF, UNDP, World Bank, ADB, Swedish IDA, JAICA, and others.

US - AEP has collaborated with the Mission's CTI program in its efforts to improve urban air quality in Indian Mega cities over the years. US - AEP's efforts to improve urban air quality also support the Mission strategy on reducing green house gas emissions (CO<sub>2</sub> avoided). In January 2002, US - AEP brokered the MOU between the Ministry of Environment and Forests and USEPA and a large part of the work under this umbrella is targeted at urban air quality improvements. US - AEP is coordinating these efforts with the efforts for the same that are funded under US - AEP's agreement with USEPA. This effort is also coordinated with the World Bank's and the India oil industry's efforts in air quality improvement. Over the years the Department of Energy's Clean Cities Program has also been a strategic partner for US - AEP in supporting the development of clean and safe alternate fuels. Such activities will now also be supported under the Mission's Greenhouse Gas Emissions Project PASA with DOE and US - AEP will actively collaborate with these to improve air quality.

Over the years US - AEP has worked closely with the USAID Mission FIRE-D program on promoting best practices and private sector participation in municipal solid waste management. These efforts contribute both to SO 13 IR3 (increased capacity of urban local governments to raise and allocate resources) and SO 16 IR3 (improved urban water availability and sanitation). US - AEP/India's interventions in this sector have also enabled local bodies and other institutions to secure project funding from organizations such as the World Bank, The Asian Development Bank, Housing & Urban Development Corporation, Infrastructure Development Finance Corporation, the US Trade and Development Agency, and the World Health Organization.

US - AEP/India's efforts in energy and water resource efficiency and the promotion of renewable energy efficiency fit under the Mission's SO 16 (improved access to clean energy and water) and contribute to indicator 3 (number of tons of CO<sub>2</sub> avoided) as well as to IR2.1 (adoption of energy efficient pumps). US - AEP has collaborated with USAID Mission activities such as the ECO project in the past and currently has plans to work with ECO-2 on energy efficiency in the state of Maharashtra. US - AEP will also collaborate with other Mission activities (i.e. WENEXA and ICLEI) that support improved co-management of energy and water, including municipal water and energy efficiency. US - AEP efforts in renewable and clean energy have been coordinated with either Mission activities such as CTI or the SARI/E program. Under this project, US - AEP has also fruitfully collaborated with other donors such as the ADB and the World Bank and will continue to do so.

In the past US - AEP has supported the USAID Green Business Center to promote green building in India contributing to the Mission's SO 16. The US - AEP eco-housing project which aims to promote environmentally sound residential building practices in urban areas will contribute to the co-management of energy and water under SO 16 and to increased capacity of urban local government to raise and allocate resources under SO 13. US - AEP is actively collaborating with other donor programs in this area such as European Union funded activities and activities funded by the Department of State's Public Affairs Office. US - AEP will also seek to bring in USEPA expertise to support this project.

The activities US - AEP supports under improving environmental governance and capacity building most directly contributes to SO 13 (increased capacity of urban local governments to raise and

allocate resources). Over the last four years, US - AEP has collaborated with FIRE-D on developing city managers' associations in India and developing the ability of city managers to deal with urban environmental issues and plans to continue this cooperation. Through this activity and the civil society partnership program, US-AEP contributes to the mission cross-cutting themes of partnership, governance, and urban.

## **Strategy Development Process**

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Under this strategy US - AEP seeks to support both US - AEP's strategic objective and the USAID Mission's approved Strategy for India. USAID Mission staff members have participated in the work plan development workshop in July and in the work plan review process. This strategy is also consistent with objectives for U.S. and India bi-lateral cooperation under the Global Issues Forum (access to clean water is India's number one objective) and with efforts for climate change cooperation. Finally, it supports the developing I.P.H.E. (International Partnership for Hydrogen Economy). The development of this strategy reflects inputs of strategic partnerships with organizations such as USEPA and the Ministry of Environment and Forests and relationships with donor organizations such as ADB and the World Bank. Finally, this strategy builds on US - AEP/India's past successes and reflects US - AEP's intentions to work in partnership with institutions committed to similar goals and objectives.

## List of Projects

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1. **Water Resource Management** — Increase the availability and improve the quality of water through development of innovative partnerships at the municipal level.
2. **Urban Air Quality Management** — Improve and maintain the air quality in India to reduce pollution and related health effects
3. **Solid Waste Management** — Improve the solid, industrial and hazardous waste compliance through private sector participation and capacity building in partnership with working with state and local governments, industries, regulators and citizens.
4. **Energy and Water Resource Efficiency** — Promote energy efficiency and conservation as well as improved co-management of energy and water resources.
5. **Eco Housing** — Through this project US - AEP aims to assist in the implementation of environment friendly measures in urban housing for citizens at all income levels and to promote community models of self governance to improve the urban housing scenario over the next five years.
6. **Environmental Governance** — Support improved urban and industrial environmental governance through working with government, industry, and civil society.

## Activities

### 1. Water Resource Management

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**Purpose:** Increase the availability and improve the quality of water through development of innovative partnerships at the municipal level.

**Primary Program Area:**

IR2: Improved urban environmental management, technologies and resource efficiency

IR3: Improved industrial environmental management, technologies and resource efficiency

**In-Country Partners:** Arsenic Task Force, Government of West Bengal, Biochemistry Department, University of Calcutta, Loktak Lake Development Authority (LDA), Chilika Development Authority, Siliguri Jalpaiguri Development Authority, Government of Manipur, Ramky Enviro Engineers, Hyderabad Development Authority, TSSC, TAF, Jal Bhagirathi Foundation (JBF), United States-Environmental Resource Center (US-ERC), the Municipal Corporation of Greater Mumbai, Institute of Wetland Management & Ecological Design, Calcutta, Tamil Nadu Urban Infra Financial Services Ltd, Chennai Metropolitan Water Supply and Sewerage Board, Infrastructure Development Finance Corporation (IDFC), VUDA, Indian Water and Sewerage Boards and Municipal Corporations

**International Partners:** Enviro Associates International, NY, CSG-IRG, IIE/EPSCG, US-TDA TSSC, Camp Dresser and MacKee (CDM), the Asia Foundation (TAF), Zenon Corporation, WEF, and USEPA

**Description:** There are many issues regarding water and its management facing India in the 21st century. While India receives about 4000 billion cubic meter of precipitation each year, water shortage continues to be a problem and city demands exceed the availability of water often by 30%. Water quality is adversely affected by municipalities and industries that continue to dump untreated or partially treated waste surface into water and water bodies. Because of the overall lack of adequate sanitation in India, water-borne diseases (including diarrhea) are also a major issue in the country. India has over 100 million cases of diarrhea per year with approximately 500,000 children dying of the disease yearly and approximately 77% of the population lacks adequate sanitation.

While it is clear that issues of availability and quality of water are paramount in India, the inability of most utilities to cover costs and skewed tariff structures hinder proper maintenance and upgrading. Traditionally there has been very little private participation in the sector. Because of over-reliance on ground water, federal and state governments have implemented measures such as sinking or adding new bore wells to meet water requirements which has created additional problems. Ground water is pumped at nearly twice the rate of recharge, leading to falling ground water levels (depths in excess of 1,000 ft and below) and saline water intrusion in some areas. Other expensive stop-gap attempts include bringing in water by road and rail and new water projects that pipe water from distances of 200 kilometers or more.

To address these issues over the next five years, US - AEP will work with the donor community, the private sector, and NGO's with the objective of improving water availability and quality. US - AEP through this project will not only seek to develop innovative public private partnerships and leverage financial and in-kind resources, but will also introduce new water, wastewater, and industrial effluent treatment technologies while promoting best practices for water conservation and improved quality monitoring and surveillance of urban water supply. To support the mission's WENEXA objectives US-AEP will promote rain water harvesting in India and continue its efforts in introducing new decentralized technologies for wastewater recycle and reuse. US-AEP will also work in collaboration with FIRE-D and FIRE-D partners on the structuring of concession agreements with municipalities. Across all activities in this project US-AEP will work with local and international partners to leverage outside resources to address the key issues India faces regarding water resource management.

## **Expected Results:**

### Short to medium term results

- Wastewater recycle-reuse feasibility study completed by Winter 2004.
- New arsenic removal in-situ treatment with Arsenic task force introduced by 2004.
- Rainwater harvesting awareness and capacity increased through model projects in 3 states by 2005 – (potential states: Tamil Nadu, Maharashtra, Andhra Pradesh, West Bengal, and Rajasthan).
- Demonstrated decentralized wastewater treatment in 2 states by end 2004 (potential states: Karnataka, AP, Delhi, TN, or Gujarat).
- River quality monitoring technology with biological sensors demonstrated by end 2004.
- At least three appropriate effluent treatment technologies demonstrated for industries with high salt concentration such as the pulp and paper, sugar/distillery, starch and sago, and high salt bearing wastewater demonstrated by Fall 2004.
- Recycle and reuse model demonstrated in three states by 2005

### Longer term results

- Enhanced awareness of water quality and surveillance issues in selected states by 2006.
- Increased number of water body lake clean-ups initiated by 2006 (targeted: West Bengal, Andhra Pradesh, Manipur, Karnataka, and Tamil Nadu).
- Increased adoption of water conservation methods such as rain water harvesting and recycle reuse in selected states by 2006.
- Increased use of decentralized wastewater treatment technologies by 2007
- Increased private sector participation in water resource management by 2008.

## **Implementation Activities:**

### Promotion of Safe Drinking Water Treatment Technologies

- Safe drinking water/arsenic removal for West Bengal/Bangladesh: pilot on removing arsenic from aquifers.

### Water Body Restoration

- Improved river/lake water quality monitoring with biological sensors: technology demonstration for monitoring river and lake water quality.
- Technical support for remediation of Loktak Lake: With U.S. experts and Loktak Development Authority (LDA).
- 1.5 MLD low pressure membrane bio-reactor system: for sewage flow to lake in Hyderabad. Associated Environmental Engineers to submit proposal to HUDA

### Rain Water Harvesting

- Promote rain water harvesting and develop model sites: in the states of Maharashtra (Mumbai), Rajasthan (Jalore), and West Bengal (Calcutta). This effort to be coordinated with Project 5 in Maharashtra.
- Grant to Institute of Wetland Management & Ecological Design (West Bengal) to promote model rain water harvesting project (funding from Public Affairs-US-AEP to monitor grant)

### Decentralized Waste Water Treatment and Waste Water Recycle and Reuse

- Feasibility study for low pressure membrane for wastewater recycle and reuse in seven locations in the state of Tamil Nadu:
- Feasibility studies and project implementation for waste water recycle and reuse and decentralized waste water treatment
- Orientation visit funded by USTDA to US: on waste water treatment technologies.
- Technology exchange to US for water and wastewater treatment:
- Feasibility study for decentralized wastewater treatment and recycle reuse: for Andhra Pradesh and Karnataka [KUIDFC (coastal towns). Proposal submitted to PPIAF].
- Pilot plant for a low pressure membrane bioreactor: at a park in Vishakapatnam to reuse the water for non potable applications.
- Demonstration of low cost waste water treatment systems in Andhra Pradesh: (S&M Engineering, Crofton, Maryland)
- India/EPA State Level Partnership on Urban Water Quality Surveillance and Monitoring

Technology Exchange to WEFTEC

- US-AEP will recruit a delegation to participate at WEFTEC

Industrial Effluent Treatment Technologies and Best Practices

- Paperex 2003: Support for 2 US experts to participate in conference on effluent treatment for the pulp and paper industry.
- Black liquor treatment and chemical recovery from small pulp and paper mills: (Sun Paper Mills Limited in Chennai and Bountiful Applied Research Corporation , Utah)
- Variable Separation Membrane (VSEP)Technologies: for treating high organic load effluent (GEA Systems, Chennai and New Logic Research, CA)

## 2. Urban Air Quality Management

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**Purpose:** In the five year project period US - AEP/India will strive to achieve the following:

- Adequate capacity enhancement on air quality management and adoption of sound air pollution control strategies by the Federal, state and local governments
- Enhanced in-use vehicles Inspection and maintenance programs established
- Reduction in adulteration of conventional fuels such as gasoline and diesel.
- Portfolio of cleaner alternate fuels developed and available for decision makers and regulators to chose and apply in a given scenario.
- Transition of at least two states in India to a cleaner automotive fuel regime.

**Primary Program Area:** US - AEP IR2: Improved urban environmental management, technologies and resource efficiency; US-AEP IR3: Improved industrial environmental management, technologies and resource efficiency

**In-Country Partners:** Ministry of Environment and Forest (MoEF), Central and State Pollution Control Boards, Indian Oil Industry, Ministry of Petroleum and Natural Gas, Society of Indian Automobile Manufacturers, National Environmental Engineering Research Institute, Indian Institute of Technology/Bombay, Automotive Research Association of India, Tata Energy Research Institute, Pune Municipal Corporation, NGOs, Mahindra & Mahindra, Indian Oil Corporation, CONCERT, Tamil Nadu Pollution Control Board, Dept of Science and Technology, Govt. of Tamil Nadu

**International Partners:** University of California-Riverside, Desert Research Institute, California Air Resources Board, Univ. of Illinois, EPA Air Pollution Training and Research Institute, World Bank, Asian Development Bank CSG-IRG, IIE/EPSC, USEPA, Energy Conversion Devices, Inc, CARB, Air and Waste Management Association, Department of Energy.

**Description:** Transport, power, manufacturing, commercial and residential energy use all contribute to problems of air quality and escalating demand for such services has significantly impacted the quality of air especially in urban areas. Incidence of respiratory disorders in urban areas have therefore increased manifold in the last decade. Appropriate strategies and policy actions, stricter enforcement of environmental regulations, adoption of cleaner fuels and improved combustion technologies, higher standards of fuel quality are all required in tandem to reduce the adverse impacts of air pollution and thereby associated socio-economic and health costs. However, the lack of adequate reliable data, weak technical capacity and capabilities of enforcement agencies and regulatory bodies to develop and implement air quality management strategies and, the absence of a cohesive approach amongst various stakeholders have all impeded efforts to improve air quality.

The failure of the executive to curb the rising menace of air pollution due to rapid urbanization and proliferation of motor vehicles led to a number of Public Interest litigations swinging the judiciary into action. The Supreme Court of India in its landmark judgment in 1998 ordered all public transit vehicles in Delhi to be converted to Compressed Natural Gas (CNG). As a result almost 70,000 public transit vehicles in Delhi are today running on a single fuel. Many other states are also considering similar actions. However, there are now arguments that such Suo Moto decisions put technical, economical, and social burdens on cities and comprehensive strategies are required to address air pollution mitigation issues. Both CNG and LPG are now approved fuels but much needs to be done with regard

to safety standards and codes for gaseous fuels. Though lead has been completely phased of gasoline and trials with other alternatives such as ethanol in gasoline and biodiesel in diesel are being conducted, problems of fuel adulteration remain.

This project focuses on improving urban air quality through addressing mobile sources of emission. US-AEP's efforts will complement the Mission's objective of improving emissions in the power sector. This project will assist Indian municipalities in combating vehicular air pollution through support for establishing inspection and maintenance programs and the safe use of alternate fuels. The project will also demonstrate urban air quality management strategies in partnership with EPA with the goal of improving the capacity of stakeholders and regulators. US-AEP will also address the continuing widespread problem of fuel adulteration through this project. Finally, under this project US-AEP will continue to support regional information exchange through forums such as CAI-Asia and others.

### **Expected Results:**

Short to medium term results:

- Pune to become a city member of CAI Asia by December 2003
- Successful demonstration of remote sensing as a tool for gross polluter identification in Delhi by March 2004.
- Establishment of an Auto LPG Coalition consisting of multiple stakeholders by Summer 2004.
- Development of roadmap for introduction of revised inspection & certification procedures for Delhi by December 2004.
- Safety standards and codes in place for gaseous fuels fall December 2004.
- Successful completion of urban air pollution control strategy development for the city of Pune by April 2005.
- Demonstration Fuel Adulteration testing facility established in Chennai by spring 2005.

Longer term results:

- Demonstration of Hydrogen based three-wheeler transportation as a viable option by FY 2006.
- At least six of the eleven critically air polluted cities to have comprehensive air pollution control strategies ready for implementation by FY 2008.
- Inspection, Maintenance and Certification of in-use vehicles institutionalized and operational in at least two of the critically polluted metros in India by FY 2008.

### **Implementation Activities:**

Introduce Air Quality Control Strategies

- Work with EPA, MOEF, CPCB and World Bank to collaborate on a demonstration project to develop an emission inventory and perform air pollution dispersion modeling for the city of Pune, India over a 2-3 year period.
- Air pollution source apportionment: use of source apportionment techniques to assist in determining the origins and source of air pollution problems in key India cities.
- Clean Fuels and Vehicle programs
- EPA air pollution exchange: an exchange for representatives from Indian organizations
- Inspection and maintenance pilot with Delhi Government (Environmental Systems Products): demonstrate remote sensing equipment in Delhi

Promotion of Clean Fuels

- Develop LPG coalition with active participation of private and public sector partners in India for the safe use of LPG as an alternate fuel to improve air quality:
- Alternate fuels conference: Support for SIAM's alternate fuels conference
- Alliance Project on Clean Hydrogen technologies for 3 wheeler transportation to improve air quality: program to develop, demonstrate and generate business opportunities for the commercialization of non-polluting hydrogen-fuel
- Fuel Adulteration Testing Facility: Establish independent fuel testing facility for detection and prevention of fuel adulteration.

- Support for Indian Participation in Regional and International Forums on Air Quality Improvement
- Better Air Quality Conference 2003: exchange of Indian representatives to attend the conference
  - Air and Waste Management Conference 2004: exchange of Indian representatives to attend the conference
  - Clean Cities Conference: exchange of Indian representatives to attend the conference
  - Support for Indian Participation for Clean Indoor Air-Seattle Cookstove Design Workshop

### 3. Solid Waste Management

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**Purpose:** Improve the solid, industrial and hazardous waste compliance through private sector participation and capacity building in partnership with state and local governments, industries, regulators and citizens.

**Primary Program Area:**

IR2: Improved urban environmental management, technologies and resource efficiency;

IR3: Improved industrial environmental management, technologies and resource efficiency

In-Country Partners: Urban Development Departments of concerned State Governments, State Municipal Corporations, All India Institute of Local Self Government, Department of VJTI, Central Building Research Institute, Roorkee and, Maharashtra Engineering Research Institute, Nashik, MITCON, South India Salesian Society, Enterprise Development Society, Ahmedabad, Exnora International, Eco Science Research Foundation, Toxics Link, Haldia Development Authority, West Bengal Pollution Control Board, Orissa Industrial Infrastructure Development Corporation, Orissa Department of Environment, Orissa Pollution Control Board, Asansol Durgapur Development Authority, Patna Municipal Corporation, Kolkata Municipal Corporation, Ramkay Group, Ministry of Environment and Forest, selected State Pollution Control Boards, relevant research/academic organizations (e.g. ITRI, IIT), and industry groups (e.g. FICCI), NGOs (e.g. CSE)

**International Partners:** CSG-IRG, IIE/EPSP, USEPA, US-AEP Urban Representative, USAID FIRE-D Project Office, Blacksmith Institute, EPA w/ State partners (e.g. Great Lakes region for chloralkali), U.S. industry

**Description:** The management of solid waste in India has been historically neglected by both urban local bodies and industry resulting in the disposal of municipal solid waste (MSW) on the streets and the unauthorized disposal of hazardous, bio-medical and toxic waste. In India MSW is collected irregularly by sanitation workers and deposited at open waste storage depots resulting in unsanitary conditions. Further transportation, dumping and disposal takes place in an unhygienic and unscientific manner and causes land, water and air pollution. The Central Pollution Control Board has observed that the 4,378 urban areas in the country generate more 100,000 tons of waste per day out of which 20% to 50% of waste is not collected at all by the cities. Not much was done to improve MSW management until 1996 when a public interest litigation in the Supreme Court of India (Writ Petition No. 888) drew attention to the issue. After the intervention of the Supreme Court, the situation has begun to gradually improve. The Ministry of Environment and Forests framed the Municipal Solid Waste Management and Handling Rules 2000 under the Environment Protection Act 1986.

The management situation of other solid wastes remains critical. In the absence of sufficient common disposal facilities, indiscriminate dumping of hazardous waste occurs and the proper treatment and disposal of biomedical wastes remains a problem for many urban areas. Senior officials of the urban local bodies and state pollution control boards have become somewhat more effective in ensuring compliance with the rules, but deadlines prescribed have not been met and will not be met in the near future. Strategic interventions and technical support are, therefore, necessary to improve compliance and enforcement and to work with states and municipalities on establishing treatment disposal facilities with private sector involvement.

This project will address the management of solid waste through providing training and capacity building to municipal corporations on MSW (Management & Handling) Rules 2000, introducing model best practices for treatment and disposal of MSW, hazardous waste, and bio-medical waste increasing private sector participation in SWM management, and lastly promoting awareness

amongst citizens, local government, regulators and industry. US-AEP will work in close partnership with USAID programs such as FIRE-D and GEP along with local governments and industry to develop sustainable waste management projects. This project will be coordinated with the compliance and enforcement activity (Project 6) that US-AEP is implementing in partnership with USEPA.

#### **Expected Results:**

Short to medium term results

- Barriers to effective compliance and enforcement of industrial waste management rules identified through compliance and enforcement assessment by summer 2004
- Awareness created and adequate training provided to almost all class-1 cities with populations exceeding 100,000 by 2005
- Level of compliance with MSW (Management & Handling) Rules 2000 and Biomedical Waste (Management & Handling) Rules 1998/2000 by 35 cities with a million plus population increased by 2005

Longer term results

- Increased MSW compliance by half a million plus cities in the abovementioned Rules by 2006.
- Increased compliance by 358 Class-I cities and towns with population of more than 100,000 with MSW Rules by 2007
- Increased number of operational and registered hazardous waste management facilities by 2007
- Increased hazardous waste compliance in states with common treatment facilities by 2007.
- Improved inventorization and management of toxics by 2007
- Increased MSW partial compliance by 3000 small cities and towns in the country by 2008
- Sanitary landfills established in ten cities with population greater than one million by 2008

#### **Implementation Activities:**

Municipal Solid Waste Management in India

- Expand solid waste management technical support program to three new municipalities in North East Indian states:
- State and city level workshops on solid waste management: UEIR to provide training through workshops and technical assistance at the state and city level to help in designing appropriate systems of waste management
- Technology/Best practices exchange for solid waste treatment and disposal: exchange of decision-makers from India to the US to see treatment and disposal technologies
- Model Sanitary Landfill: develop model with partners (All India Institute of Local Self Government and National Productivity Council)

Hazardous, Bio-medical, and Toxic Waste Management in India

- Toxics links/Blacksmith Inst. polluted places remediation activity: work with Blacksmith Institute and Toxics Link to develop remediation plan and eventual clean up of polluted site
- Support for hazardous waste treatment: technical support for development of hazardous waste treatment facility in Haldia.
- Support for hazardous waste/ bio-medical project implementation:
- Monitoring, inventory and sector control strategies for Mercury Emissions: cooperative work under their Memorandum of Understanding addressing Management of Toxic Chemicals and Hazardous Waste

## **4. Energy and Water Resource Efficiency**

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**Purpose:** Promote energy efficiency and conservation as well as improved co-management of energy and water resources.

#### **Primary Program Area:**

IR1: Improved environmental governance;

IR2: Improved urban environmental management, technologies and resource efficiency;

IR3: Improved industrial environmental management, technologies and resource efficiency

**In-Country Partners:** Infrastructure Development Finance Corporation (IDFC), Department of Environment/Science & Technology, Government of Arunachal Pradesh; State Renewable Energy Development Authorities in Eastern India, International Institute of Energy Conservation, Maharashtra Energy Development Agency, Office of the Collector, Vizianagaram, Vishakapatnam Urban Development Authority, Non Conventional Energy Development Corporation of Andhra Pradesh, Ministry of Non Conventional Energy Sources, Govt. of India, Industrial and Technical Consultancy Organization of TamilNadu, Aurore Projects and Services & Solar Agni International, Ankur Technologies, Tata BP Solar, Maharashtra Energy Development Agency

**International Partners:** EWI, ASE, CSG-IRG, IIE/EPSC, USEPA, US-AEP Urban Representative, USAID FIRE-D Project Office, U.S. renewable energy companies, National Renewable Energy Laboratory, Capstone, Ingersoll-Rand, BP

**Description:** Fueled by rapid industrial growth and an increasing population, India's demand for energy is among the fastest growing in the world. Investments in power generation, transmission, and distribution have not kept up with this demand. With demand for energy projected to grow at 8-10 percent annually over the next 15 years, the Government's goals include generating more electricity, using it more judiciously and promoting use of renewable energy. On August 18, 2001, the Indian Parliament enacted the Energy Conservation Act which has set the stage for establishing institutional and legal structures and mobilizing market forces to implement energy-efficiency programs in India. A direct result has been the establishment of the Bureau of Energy Efficiency (BEE) and the requirement for states to develop plans to implement the Energy Conservation Act.

While industry is seeking to be more competitive through implementing energy efficiency and energy recovery programs, widespread energy efficiency measures have not been implemented. At the same time, municipalities are grappling with the co-management of energy and water resources. Urban local bodies (ULBs) face problems with high rates of unaccounted water losses, inadequate and intermittent water service coverage and provision for local populations, and disproportionately high energy costs associated with pumping. A major barrier in implementing both municipal and industrial efficiency projects is the absence of proven financial models. Though energy efficient equipment and service providers are numerous there are only a few ESCOs that can guarantee attractive rates of return for such projects. Financial institutions and banks are also reluctant to finance these projects due to the poor balance sheets of the implementers.

US – AEP through this project will work towards enhancing the adoption of voluntary energy efficiency practices while making a concentrated effort to improve energy conservation at the State level. The project will seek to improve the co-management of energy and water resource efficiency through municipal energy/water audits and encouraging low-cost system improvements. When and where possible this project will also promote the use of renewable energy and waste heat recovery. Finally, in both the municipal and industrial sectors this project will seek to identify financing models for energy efficiency. This will be achieved by working in close partnership with USAID and its implementing partners, other donors, industry, and selected states and municipalities.

#### **Expected Results:**

Short to medium term results

- Enhanced efficiency management capacity of ULBs in Karnataka, AP, Tamil Nadu and Maharashtra through creation and support of state Energy Management Cells (EMCs) by June 2004
- Efficiency measures within 15 - 20 municipalities based upon work of state EMCs in Karnataka, AP and Tamil Nadu adopted and documented by August 2004
- Three energy audits with the assistance of US - AEP in industrial cluster completed by Summer 2004
- Preparation of a roadmap for implementing Energy Conservation Act 2001 in Maharashtra by Fall 2004.
- Flagship energy efficiency assessment for the pulp and paper industry completed by Fall 2004.
- Protocols standardized and tools for energy audits, data collection, and baseline development for an industrial cluster established by Fall 2004.
- Two model municipal energy efficiency projects in partnership with State of Karnataka (KUIDFC) implemented by December 2004

#### Longer Term Results:

- Model Municipal water and energy efficiency policies developed at state level (to include of a model performance based contract document) by March 2005 for Karnataka.
- Model waste heat recovery project in metallurgy industry implemented with US - AEP and GEP assistance by Spring 2005.
- National dialogue through network promoting municipal water and energy efficiency concepts initiated by Summer 2005.
- Increased voluntary sharing of corporate energy efficiency best practices by the pulp and paper and hotel sector by Summer 2005.
- Implementation of the Energy Conservation Act 2001 road map in Maharashtra by Fall 2005.
- Voluntary sharing of corporate energy efficiency best practices by the assembly, manufacturing and job shop industries increased by Winter 2005.
- One model renewable energy project implemented by 2005.
- Energy Conservation Act 2001 implementation roadmaps for Gujarat and Chhattisgarh developed by 2006.
- Enhanced abilities by states to develop and implement energy efficiency roadmaps by 2007
- Significant increase in the adoption of voluntary energy efficiency practices by industry by 2008

#### Implementation Activities:

##### Municipal Energy and Water Efficiency

- Alliance to Save Energy /Watergy Project (Karnataka, AP, TN):
- Watergy Concept Demonstration: with the All India Institute of Local Self Government and the Alliance to Save Energy in one ULB in Maharashtra

##### Implementation of Energy Conservation Act 2001 for Maharashtra

- Develop action plan for implementing the conservation act with Maharashtra Energy Development Agency and USAID funded ECO/2:

##### Renewable and Distributed Energy Promotion

- Solar wind hybrid system: develop feasibility/case study for a solar-wind hybrid electricity generation system in coastal region
- Introduction of new generation renewable energy technologies in Arunachal Pradesh: using low capacity micro turbine technology with biogas as feed
- Technology and Commerce Agency) for grant and logistical/program support during technical assistance phase.
- Distributed energy generation (using renewable energy for Vizianagram):

##### Energy Wise India

- Voluntary sharing of energy efficiency best practices in India

## 5. Eco-Housing

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**Purpose:** Through this project US - AEP aims to assist in the implementation of environment friendly measures in urban housing for citizens at all income levels and to promote community models of self governance to improve the urban housing scenario over the next five years.

#### Primary Program Area:

IR 1: Improved environmental governance;

IR2: Improved urban environmental management, technologies and resource efficiency

**In-Country Partners:** Indian Institute of Architects, Builders Association of India, Indian Environmental Association, Green Business Center, CII, TERI, Municipal Corporations and private firms such as Hiranandani.

**International Partners:** International Institute of Energy Conservation, IIE/EPSC, UEIR, ECO/2, FIRE-D

**Description:** Rapid population growth, increased urbanization, relatively low investment in housing, and widespread poverty have created a serious shelter problem in India, contributing to the proliferation of slums and increased demands for urban infrastructure and services. The housing shortage in India is estimated to be approximately 40 million units and there is a demand for 15 million homes in urban centers alone. With economic liberation and expected higher economic growth, the rate of urbanization in India in coming decades is likely to increase. Today approximately 30% of population is urban and has grown from 22 million in 1901 to over 300 million now. The use of water and energy in this sector is highly inefficient. It is estimated that a potential of up to 30% energy savings exists in the housing sector alone. In most cases a large portion of the electricity is used for pumping water in high rise apartment's buildings.

Urban housing guidelines are framed by ULBs based on local conditions. For example, in some cases legislation for rain water harvesting in new buildings has been passed. In other cases, it is required for both new and existing buildings. Similarly, some municipalities are promoting "zero garbage" through property tax incentives. There is a need to work with municipalities to increase these types of local incentives to promote eco-housing and to build citizen awareness of its benefits through successful demonstrations.

Through this project US – AEP, in partnership with builders, developers, and architects, seeks to develop principles at the municipal level for eco housing in India. Through work with project stakeholders (municipalities, builders, architects and financial institutions) US-AEP will examine the use of utility consumption in the housing sector with the idea of achieving appropriate benchmarks for Indian cities. US-AEP will work with stakeholders to develop and disseminate information on opportunities for reduction in energy and water use in the sector and for community participation in waste management and other environmental improvement programs. Working in targeted ULB's the project will seek to improve environmental regulations and buildings codes for urban housing and disseminate information on best practices in the sector. In collaboration with other interested parties such as Confederation of Indian Industry's Green Business Center (CII-GBC), Bureau of Energy Efficiency, the Bureau of Indian Standards, and The Energy Resources Institute (TERI); US - AEP will seek to promote the development of an indigenous rating system for green buildings in urban housing. Finally, US - AEP will work with project stakeholders to develop an eco-housing demonstration project. This project will be closely coordinated with the Energy Efficiency activities under Project 4 and the Rain Water activities under Project 1.

#### **Expected results:**

##### Short to medium term results

- Data collection for benchmarking activity completed by November 2004
- Technical inputs to TERI on eco-housing materials and services for green building website and database provided by end 2004
- Model rain water harvesting project with Mumbai stakeholders developed by December 2004
- Increased awareness of rainwater harvesting rules by 2005
- Base line principles of eco-housing developed and disseminated by end 2005.
- Guidelines to ULBs on necessary reforms to implement baseline principals provided by end 2005

##### Longer term results

- Increased awareness of builders and architects on energy conservation, recycle and reuse, use of renewable energy, use of environment materials and incorporation of green architecture by 2006
- Awareness on eco-materials and services increased by 2006
- Partnership for a new eco-housing complex demonstration project developed by Summer 2006
- Number of Advances Locality Management groups (community groups) increased by 100 by 2007
- Best practices on various issues such as rain water harvesting, wastewater recycle and solar water heating projects in existing housing complexes demonstrated by end 2007
- Increased number of architects implementing baseline principles in the design, planning and construction of urban housing complexes by 2008

#### **Implementation Activities:**

- Data collection for utilization of water, energy, and generation of solid waste in urban houses
- Developing baseline principles and benchmarking

- Coalition of eco friendly builders and training/awareness for builders
- Facilitate establishment of a "demo" eco house project
- Increasing Advanced Locality Management in Mumbai

## 6. Environmental Governance

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**Purpose:** Support improved urban and industrial environmental governance through working with government, industry, and civil society.

### Primary Program Area:

IR 1: Improved environmental governance

**In-Country Partners:** City managers' associations in the states of Gujarat, Maharashtra, Rajasthan, Karnataka, Andhra Pradesh, Orissa, Madhya Pradesh, Bihar, Tamil Nadu, and Uttaranchal. Four new states that may come forward in India, All cities and towns of Gujarat, Government of Gujarat, The City Alliance, World Bank, Ministry of Environment and Forest, selected State Pollution Control Boards, Confederation of India Industry, Federation of India Chambers of Commerce and Industry, Delhi Metro Rail Cooperation, FOSEP (Federation of NGOs in Darjeeling); Darjeeling Municipality; ECOSS, International Center of Ecological Design, University of Kalyani, Loyola College, SUSTAIN, Exnora, Jeevan Rekha Parishad. Sankat Mochan Foundation (SMF), Eco Friends, Kanpur.

**International Partners:** TAF, TSSC, IIE/EPSP, US-AEP Urban Representative, USAID FIRE-D Project Office, ICMA, USEPA, UM Environmental Systems, LLC – pilot wastewater treatment system, (U.S.) Asia Foundation; OK International, Camp, Dresser and McKee International

**Description:** Ever since India framed the first environmental law, the Water Act in 1974, over 200 regulations covering a wide range of issues have been framed. In the last three years only, five new laws have been created. Simultaneously, starting with the formation of the Central Pollution Control Board in 1974 and the Ministry of Environment & Forests in 1985, a large institutional network is in place to enforce compliance. Despite these developments compliance remains low and many industries continue to dump untreated/partially treated effluents in to water bodies, municipalities fail to treat sewage, and solid waste is dumped in many cities.

External drivers are largely responsible for the evolution of Indian environmental legislation. It took a Bhopal tragedy to legislate the 1986 Environmental Protection Act; it took the Supreme Court to clean up the air in Delhi. Because poverty alleviation is a higher priority for the government, environmental compliance and enforcement issues have been neglected. Most polluters, urban and industrial, are aware of the legal requirements. However, both industry and municipalities regularly point to the cost of treatment and safe disposal as an impediment to compliance. Price levels for products and services most often do not include the cost of environmental management. Regulators hesitate to take drastic steps since economic livelihoods for large numbers of people are at stake. Furthermore, the executive is unable to use certain punitive measures that are available in other countries.

This project aims to promote best practices in environmental governance through promoting the adoption of voluntary environmental management systems by industry. At the same time US-AEP, with EPA, will work to improve overall compliance and enforcement and the capacity of Pollution Control Boards to implement pollution control measures. Under this project US-AEP will continue to support Indian City Managers Associations and their ability to successfully manage urban environmental issues. Finally, this project also aims to demonstrate successful models of citizen involvement in environmental decision making processes through the Civil Society Partnership Program.

### Expected Results:

Short to medium term results

- Assessment of compliance and enforcement system completed by Spring 2004
- Initial design of intervention in compliance and enforcement activity completed by Summer 2004
- Delhi Metro Stations on first line certified to Environment Health and Safety Systems by Fall 2004

- Alternate strategies for improved industrial waste management rules compliance and enforcement identified by spring 2005
- 4-5 new City Managers' Association formed by Fall 2005

#### Longer term results

- Increased involvement of civil society in environmental decision making by 2006
- Adoption of GRI Guidelines by Indian firms increased by 2006
- Increased adoption of voluntary environmental standards by December 2006.
- Capacity of regulators in environment compliance and enforcement enhanced by December 2007
- Apex body of the Indian City Managers' Association to interact with the international agencies on urban governance best practices formed by 2008

#### **Implementation Activities:**

ICMA-strengthening existing 10 city managers associations and formation of 4 new city managers association in India

Environmental compliance and enforcement capacity building

Promotion of Voluntary Environmental Management Strategies

- Support to Delhi Metro Rail Corporation to achieve OHSAS 180001 and ISO 140001 certification:

Civil Society Participation in Environmental Decision Making

- Community based eco-watch group for better environmental governance in cities of Darjeeling and Gangtok:
- Environmental Audit and Certification Program for Indian Battery Manufacturing Units:
- Introduction of Water Tariff in Kolkota:
- Minimizing environmental health hazards for women and child workers in stone crushing industries:
- Clean Ganga Extension: Sankat Mochan Foundation (SMF) extension for Clean Ganga Public Awareness Program
- De-pollution of the river Ganga project: to support pollution control in the Ganga through civil society awareness programs.

Formulation of State policy on Slums