USAID | INDIA

FROM THE AMERICAN PEOPLE

USAID-Government of India Clean Energy Partnership

U.S.-India Partnership

In 2012, the United States Agency for International Development (USAID) commemorated 50 years of development assistance to India, totaling over USD 52 billion. This assistance has contributed to India's growth story. Over the past 50 years, USAID/India's development assistance program has evolved from one that directly distributed food and constructed large-scale infrastructure projects at the macro-level, enabling it to achieve national-level dynamic impact, to one that introduced best international practices to improve the delivery of goods and services to targeted beneficiaries at the state and local levels.

U.S. President Barack Obama with Indian Prime Minister Manmohan Singh.

USAID/India's assistance is not the only thing that has evolved over the past five decades; India itself has undergone a transformation, the likes of which are seldom witnessed on the world stage. Over the past two decades, India has emerged as an "indispensable partner" of the United States, South Asia's dominant regional power, and an increasingly important and influential global actor. During this time period, India has experienced accelerated economic growth, becoming a leading BRICS country with the world's fourth largest economy in purchasing power parity terms while making progress towards achieving the Millennium Development Goals (MDGs). With more than 1.2 billion people, India is the world's largest democracy, a major power, and an important U.S. ally.

USAID is working with multiple public and private sector partners in India to develop, test, and deploy innovative technologies that address the global challenges of health, food security, climate change, and education. It is also focusing on developing new mechanisms that will allow it the flexibility to identify, support, and scale-up innovations that fall outside these sectors.

U.S.-India Energy Dialogue

The U.S. and India have been engaged in a strategic dialogue on energy since 2005. The U.S.-India Energy Dialogue, led by the U.S. Department of Energy (USDoE), is co-chaired by the USDoE Secretary Steven Chu and Deputy Chairman of India's Planning Commission Montek Singh Ahluwalia.

The Dialogue comprises of five working groups: *Power and Energy Efficiency; Civil Nuclear Energy; Oil and Gas; Coal; and New Technology and Renewable Energy.*

India's Minister of External Affairs Shri S.M. Krishna and U.S. Secretary of State Hillary Rodham Clinton met in Washington, DC, on June 13, 2012, for the third annual U.S.-India Strategic Dialogue and reaffirmed their countries' strong commitment to work collaboratively in clean energy and low carbon technologies.

U.S. Secretary of State Hillary Rodham Clinton with Indian External Affairs Minister S.M. Krishna.

USAID's History in the Energy Sector

USAID has a fifty-year partnership with the Government of India in the energy and power sector. USAID began providing assistance to the Indian power sector in the 1950s to assist in infrastructure development to fuel economic growth. Over the next three decades it cooperated in the development of 30 power plant projects that energized thousands of enterprises throughout the country and increased the country's then installed electric power generating capacity by 150 percent.

The Sharavathi Hydroelectric Power Project in Mysore, with a capacity of almost 1 million kW, was one of the largest sources of power in the world when installed in the early 1960s and is just one example of these power plants. The era of "brick and mortar" assistance of the 50s and 60s made way for energy programs in the 80s that emphasized science-to-science exchange with scientists from both countries working side-by-side to develop renewable sources of energy and coal conversion technologies.

Recognizing the need to move energy technologies into the market-place, innovative financing approaches were designed and implemented to enable commercialization of market driven products, services and technologies. While USAID's energy programs in the 1990s focused on the global issue of climate change, the focus in the recent past has been on energy sector reforms. The most recent USAID/India energy programs include: Greenhouse Gas Pollution Prevention (GEP), Energy Conservation and Commercialization (ECO), Distribution Reforms, Upgrades & Management (DRUM), Water-Energy Nexus Activity (WENEXA), and Community Development with Solar Energy Illumination. The highlights of the programs are given in the following pages.

Greenhouse Gas Pollution Prevention (GEP) Program

USAID and the Government of India launched the USD 39.2 million Greenhouse Gas Pollution Prevention (GEP) program in 1995 to reduce Greenhouse Gas (GHG) Emissions released per unit of power generated from coal-based power plants, and to encourage the use of biomass fuel from the sugarcane industry. The program, which ended in September 2011, had two key components:

- Efficient Coal Conversion (ECC): Aimed at reducing the amount of carbon dioxide (CO_2) produced per kilowatt hour of electricity generated by coal, which accounts for more than half of India's installed power generation capacity.
- Advanced Biogas Cogeneration (ABC): Aimed at promoting the commercialization of high-efficiency energy production using bagasse, a sugarcane by-product that can be used to generate heat and power.

The GEP program, over 16 years, has helped India avoid 99.1 million tons (MT) of GHG emissions and reduced coal consumption by 78 million tons, worth, a savings of approximately USD 1.5 billion.

It also created an institution Centre of Power Efficiency and Environmental Protection (CenPEEP) at NTPC, which was the Indian counterpart for the program. The Centre is successfully playing an advisory role for the Indian power sector.

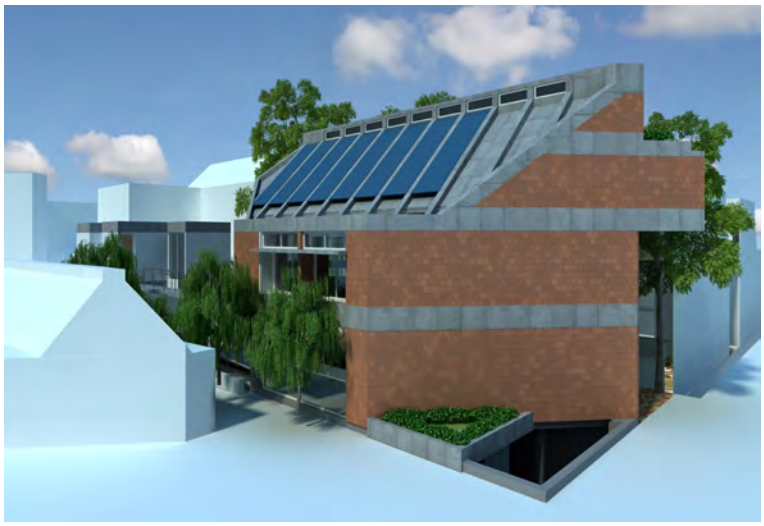
The program has also established a culture of efficiency at NTPC and partner state electricity board plants.

U.S. expert monitoring the combustion process at Control Room, Kolaghat, West Bengal under APP.

Energy Conservation and Commercialization (ECO) Program

The USD 23 million Energy Conservation and Commercialization (ECO) Bilateral Project Agreement was signed between the Government of India and the U.S. in January 2000 with the objective of enhancing commercial viability and performance of the Indian energy sector as well as to promote utilization of clean and energy-efficient technologies in the sector. The program comprised of three phases:

- ECO-I helped India set up the Bureau of Energy Efficiency (BEE) to implement the country's Energy Conservation Act of 2001.
- ECO-II contributed to the establishment of India's first energy efficiency (EE) codes for buildings. It also helped agencies in a few targeted states develop energy conservation strategies and test new approaches through pilot projects.
- ECO-III helped BEE implement the Energy Conservation Building Codes in Gujarat and Punjab, with the focus on improving EE in the building sector. It also developed a roadmap for India which outlines the approach for driving NZEBs to scale in India, and helped established three EE centers and institutions.



Model of Net Zero Energy Building at Centre for Environment Planning and Technology (CEPT), Ahmedabad.

Distribution Reform, Upgrades and Management (DRUM) Program

High Voltage Distribution System (HVDS) work at 11 KV Baroda feeder at pilot site Umreth, Gujarat.

The Distribution Reform, Upgrades and Management (DRUM) program, launched in 2004, was conceptualized jointly by the Indian Ministry of Power and USAID to accelerate power distribution reforms in India. DRUM's key objective was to create "model distribution systems" in certain states. New technologies were tested at three different pilot "Centers of Excellence" - one urban site in Aurangabad, under the Maharashtra State Electricity Distribution Company Ltd. (MSEDCL); and two rural sites under the Bangalore Electricity Supply Company (BESCOM) in Karnataka; and the Madhya Gujarat Vij Company Ltd. (MGVCL) in Gujarat.

DRUM also helped develop the vision for "smart grids" for India's power sector - integrating information technology with transmission and distribution networks for finer control of energy flow and the integration of renewable energy. It also helped seven utilities to develop their roadmap on smart grid and supported the detailed project report on a smart grid pilot in BESCOM.

One key mandate of the DRUM program was to build the capacity of the distribution sector. An institutional network of 20 partners was created and 19 modules covering technical and managerial aspects of power distribution were developed. In the last phase of the DRUM training program, three train-the-trainer modules are being developed on smart grid, improved distribution equipment, and business process re-engineering.

Water Energy Nexus Activity (WENEXA) Program

The Water-Energy Nexus Activity (WENEXA) focused on improving the co-management of energy and water resources in agriculture, urban and industrial sectors through enhanced power distribution and end use efficiency. The project had a positive impact on the quality of life for participating stakeholders, particularly farmers, by helping them to reduce costs and increase income. WENEXA provided technical assistance and training to BESCOM and other stakeholders. It also:

Monitoring of water discharge from energy efficient pump set at the pilot site.

- Designed an innovative public-private partnership for energy conservation in the agricultural sector.
- Launched a pioneering water reuse program in the city of Nagpur to reuse waste water for power generation.
- Developed a policy paper/model on 'converting annual revenue subsidy to capital subsidy by Maharashtra State Electricity Distribution Corporation Limited (MSEDCL) by replacing existing inefficient irrigation pump sets with energy efficient ones' that was also developed to test the hypothesis that agriculture demand side management makes a sound business case for the states as well as the central government.
- 300 pumps replaced so far resulting in an energy saving of 25%.

Community Development with Solar Energy Illumination Program

USAID/India worked with Humana People-to-People India, a Delhi-based organization that is part of the International People-to-People Network, on a community development project designed to address rural lighting needs.

The project provided solar energy-based lighting to households in 100 villages in Uttar Pradesh, and benefitted 35,000 people. In each of the 100 villages, women entrepreneurs were rented solar lanterns each night for a minimal fee.

The project focused on empowering women economically and socially by providing them training in starting up solar station businesses; and also providing quality illumination based on solar energy to rural households. The project led to the establishment of 300 self-help groups and provided training to improve their livelihood. The program also sensitized children and youth through an environmental education program.

Solar charging panel at a women entrepreneur's residence in a U.P. village.

Partnership to Advance Clean Energy (PACE)

Building on its rich experience and carrying forward its partnership, U.S. and India signed a Memorandum of Understanding (MOU) on November 24, 2009, creating the Partnership to Advance Clean Energy (PACE Program) to enhance cooperation on energy security, energy efficiency, clean energy, and climate change.

PACE is a collaborative effort that brings together the skills and resources of many different agencies including USAID, Department of Commerce (DoC), Department of State (DoS), U.S. Department of Energy (DoE), Export Import Bank (Ex-Im Bank), Overseas Private Investment Corporation (OPIC), and the U.S. Trade and Development Agency (USTDA).

PACE has two interlinked components: a Research Component, known as PACE-R, and a Deployment Component, known as PACE-D.

PACE-R

- Focuses on clean energy research and development.
- Led by the U.S. Department of Energy.
- Three components including: building efficiency, solar energy and advanced biofuels.
- USD 125 million effort, including public-private funding, over five years.
- PACE-R awards have been conferred to the following Indo-U.S. consortiums: On solar energy led by The National Renewable Energy Laboratory and The Indian Institute of Science-Bangalore; On 2nd generation biofuels led by the University of Florida and the Indian Institute of Chemical Technology-Hyderabad and on building efficiency led by the Lawrence Berkeley National Laboratory (LBNL) and CEPT University-Ahmedabad Buildings).

PACE-D

- Focuses on clean energy deployment.
- Led by the U.S. Agency for International Development. Other agencies include USTDA, OPIC, Ex-Im Bank, DoC, DoS etc.
- Three components including: energy efficiency, renewable energy, and cleaner fossil technology.
- USAID's PACE-D technical assistance is under bilateral agreement with the Government of India.
- USAID's PACE-D contract is a USD 20 million effort over a period of five years and has been awarded to Nexant, Inc.

PACE-R and PACE-D both focus on supporting, creating and nurturing innovations via public private partnerships, innovative financing mechanisms and cutting edge technology. As part of the overall PACE initiative, the United States has established a Clean Energy Finance Center at the American Center in New Delhi to support the financing of clean technology. Since PACE's inception in 2009, the Overseas Private Investment Corporation (OPIC) has approved or committed USD 741 million to clean energy projects in India.

The U.S. Trade and Development Agency has established the Energy Cooperation Program with India to promote the development of the clean energy market. Since January 2011, the Export Import Bank (Ex-Im Bank) has approved nine solar energy financings with an aggregate value of over USD 300 million, supporting 238 MW of generation. Additionally there is another USD 100 million (600 MW) of solar energy transactions in India under consideration by the Ex-Im Bank.

OPIC and Ex-Im Bank will support large solar projects such as the 5 MW grid connected solar power plant at Khimsar village, Rajasthan.

PACE-D Technical Assistance Contract

The PACE-D Technical Assistance Contract aims to accelerate India's transition to a high performing, low emissions, and energy secure economy. This will contribute to economic growth, create green jobs in both countries and open U.S.-India trade and investment opportunities. This initiative is largely based on the bilateral agreements signed between the two governments, one on energy efficiency technology commercialization and innovation with the Ministry of Power as the line ministry, and the other on renewable energy technology commercialization and innovation with the Ministry of New & Renewable Energy as the line ministry.

The PACE-D Technical Assistance Contract has three key components:

Improved End-use of Energy Efficiency

- Energy Efficiency Technology Deployment - Smart Grids, Net Zero Energy Buildings, Waste Heat Utilization, Heating Ventilation Air Conditioning (HVAC).
- Institutional development and strengthening of policy framework - Provide technical assistance and capacity building support to Bureau of Energy Efficiency (BEE) and support State Development Agencies (SDAs) to develop and implement state EE action plans and improve their regulatory environment.
- Design, develop and implement innovative financing mechanisms to scale up investment in EE projects and initiatives in India.
- Capacity building, education, public outreach programs.

Increase Supply of Renewable Energy

- Institutional development and strengthening of policy frameworks at the state level - Provide support to three Indian states to strengthen the policy and regulatory frameworks for the development of the renewable energy market.
- Provide support for market driven deployment of RE technologies (i.e., RE-based mini/micro grids).
- Design, develop and implement innovative financing mechanisms to scale up investment in RE projects.
- Capacity building, outreach, dissemination of best practices.
- Partnership between U.S. and Indian regulators.
- Microfinance Support Program - Provide technical assistance to micro-finance institutions.

Accelerate Deployment of Cleaner Fossil Technologies

- Provide support to two Indian utilities in improving heat rates in power plant performance.
- Design and develop the concept of Model Power Plant and Service Provider Network.
- Capacity building and outreach program.

The PACE-D technical assistance contract will focus on identifying actors such as technology developers, ESCOs, venture capital firms, financial institutions, industry bodies, policy makers, research institutions, universities, and other government and non-government agencies from both countries to assess the past, existing and potential networks to accelerate clean energy deployment.

PACE-D will help develop and strengthen EE and RE policy and regulatory frameworks, program designs, and financial incentives at the national and state levels. It will also establish linkages between U.S.-Indian institutions including regulators and facilitate exchange of information and best practices.

The PACE-D technical assistance contract seeks to leverage additional resources from the private sector through the establishment of public-private partnerships (PPPs). The program will focus on private sector capacity building and engagement through several focused workshops, conferences and seminars; matchmaking and mentoring for private sector players, linking EE and RE financing mechanisms with private sector players; and a policy dialogue that engages private sector partners with government and public-private partnerships. Similarly, the project will focus on expanding lending for off-grid markets by matching microfinance institutions and banks with technology providers and project developers.

The overall aim of PACE-D is to leave a legacy of a transformed energy economy powered by lower carbon fuels in India.

PACE-D Technical Assistance Contract

Implementation Partners

Nexant, Inc. has been selected by USAID to implement the PACE-D technical assistance contract in India. Nexant is an integrated consulting and clean technology firm that provides intelligent grid software and clean energy solutions. Headquartered in San Francisco, California, the firm has completed more than 3,000 client assignments in over 100 countries since 2000. Nexant's clients include Fortune 500 companies, utilities, transmission and distribution system operators, financial institutions, government agencies, and development banks. Nexant has also implemented four major USAID/India clean energy projects. In November 2011, the firm was named as one of the world's top cleantech companies by Cleantech Group, sponsor of the annual Global Cleantech 100 competition. Further details can be accessed from *www.nexant.com*.

Nexant has put together a consortium of Indian and U.S. companies that represent some of the leading expertise and experience in energy efficiency, renewable energy, energy policy, etc. Nexant's team for the PACE-D technical assistance contract includes:

ABPS Infrastructure Advisory Pvt. Ltd. – will lead the policy tasks for EE and RE; Regulator Training for RE; and provide local support and expertise for the Clean Fossil tasks.

Continuing Education & Training Centre (CETC) – will design and implement training courses, workshops, curricula, and other capacity building efforts across all technical areas.

Dalkia Energy Services Co. Ltd. (DESL) – will lead the Waste Heat Utilization task.

Environmental Design Solutions Ltd. (EDS) – will lead the tasks on Net-Zero Energy Buildings and HVAC.

Emergent Ventures India (EVI) – will lead the RE Deployment and Capacity Building tasks and support RE Finance tasks.

Mercados Energy Markets India – will lead the Smart Grids task.

American Council On Renewable Energy (ACORE) – will work with Indian partners to establish an Apex organization for renewable energy.

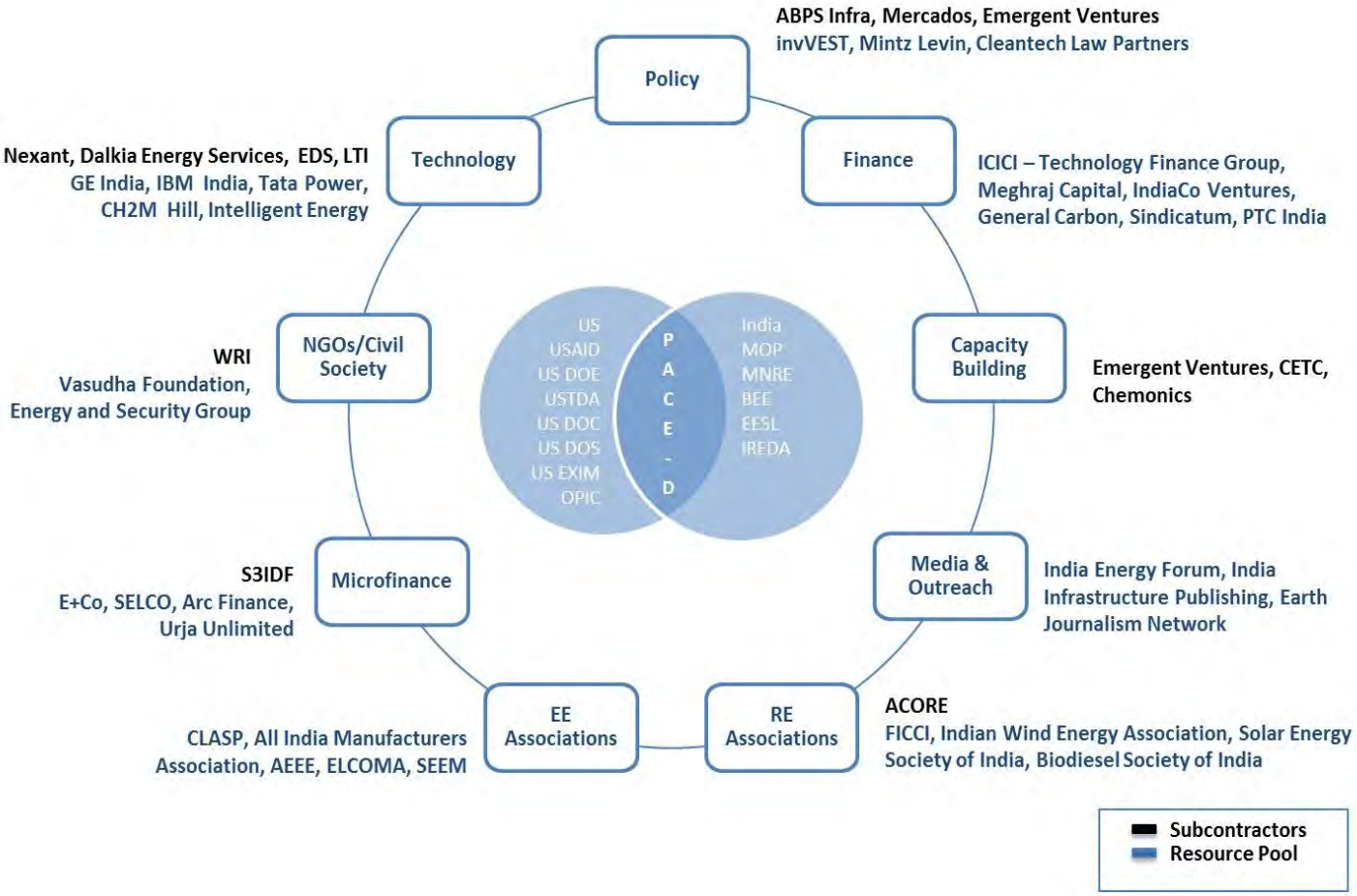
Chemonics International – will provide the Monitoring and Evaluation Key Personnel and organize international conferences.

Leonardo Technologies, Inc. (LTI) – will provide state-of-the art expertise for the Clean Fossil tasks in association with Nexant and ABPS.

Small Scale Sustainable Infrastructure Development Fund (S3IDF) – will lead the Microfinance task.

World Resources Institute (WRI) – will lead the tasks on Strategic Planning and U.S.-Indian linkages tasks.

Nexant has also formed a Resource Pool of organizations to leverage PACE-D resources and provide more program flexibility. This Resource Pool, consisting of various stakeholders such as NGOs; industry bodies; financial institutions; utilities; microfinance institutions and technology companies represents the genesis of the rapidly growing public-private ecosystem truly needed to deploy clean energy on a large scale in India.



Photos courtesy of the U.S. Embassy, USAID/India, Ministry of New and Renewable Energy, and Ministry of Power websites.

Monali Zeya Hazra
Program Management Specialist
USAID/India
Email: mhazra@usaid.gov

Sanjay Dube
Chief of Party
USAID PACE-D Technical Assistance Contract
Email: sdube@pace-d.com

JULY 2012

This publication was produced for review by the United States Agency for International Development.

It was prepared by Nexant, Inc. under Contract No. AID-386-C-12-00001.