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Government of India
Ministry of New and Renewable Energy
Renewable Energy is Green, Clean & Sustainable

PACE-D Technical Assistance Program

PROGRESS REPORT

March 2014

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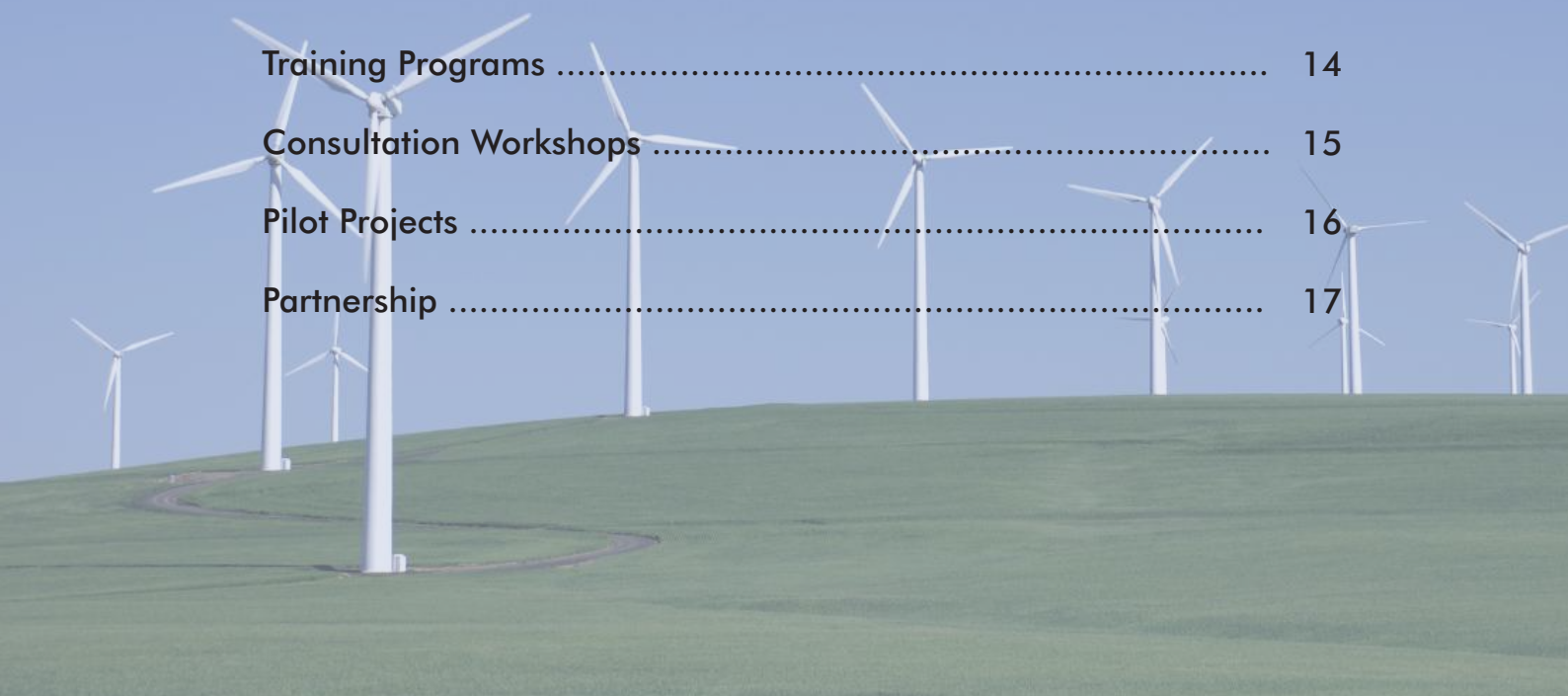

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FOREWORD

The Partnership to Advance Clean Energy (PACE) is the flagship program under the U.S.-India Energy Dialogue. PACE focuses on spurring low carbon inclusive development by supporting research and deployment of clean energy technologies.

USAID's Partnership to Advance Clean Energy - Deployment (PACE-D) Technical Assistance Program is one the initiatives under the broader PACE program and was formally launched on July 31, 2012. Since its launch, the program has made significant progress and achieved key milestones: six consultation workshops, two international conferences, twelve training programs, five technical reports, two exchange programs, three pilot projects and 7,600 person-hours of training.

The program has established itself as a platform for knowledge transfer, technology demonstration, and information dissemination. It is playing the role of a catalyst to accelerate the deployment of clean energy through institutional strengthening, capacity building of stakeholders, innovative financing mechanisms, and increasing the awareness regarding energy efficiency and renewable energy technologies.

This report highlights key activities and achievements since the launch of the program in July 2012. None of this would have been possible without the guidance of the Ministry of Power and Ministry of New and Renewable Energy as well as the support of other partners including Bureau of Energy Efficiency, India Smart Grid Task Force, NTPC Ltd. and the state governments of Rajasthan, Haryana, Madhya Pradesh and Karnataka.

USAID/India is pleased to be on this journey with you. Thank you for your support.

Jeremy Gustafson
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Progress Snapshot

as of February 2014

4 States (Identified for Institutional Strengthening)

12 Training Programs

2 Study Trips

3 Pilot Projects

1 Partnership

6 Consultation Workshops

5 Technical Reports

2 International Conferences

7,600 Person-hours of Training

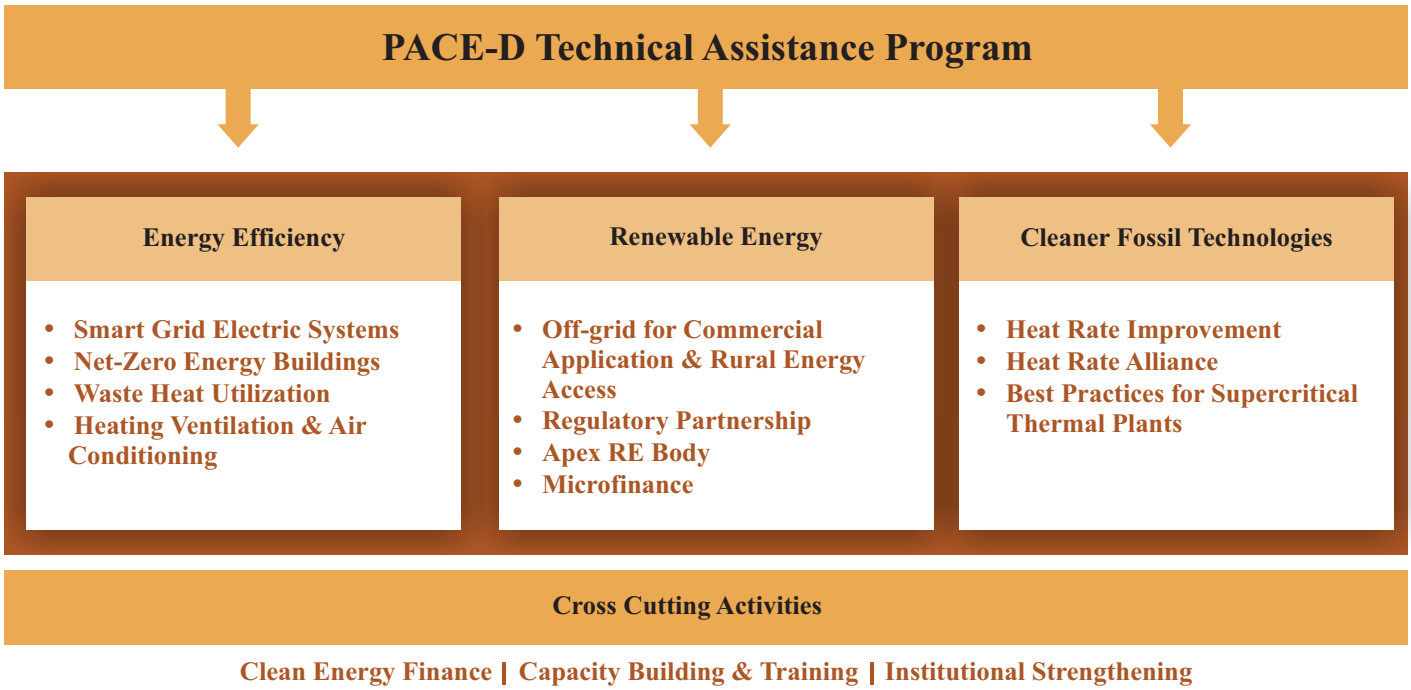
Program Overview

USAID's five-year PACE-D Technical Assistance Program is a USD 20 million program in partnership with India's Ministry of Power and Ministry of New and Renewable Energy.

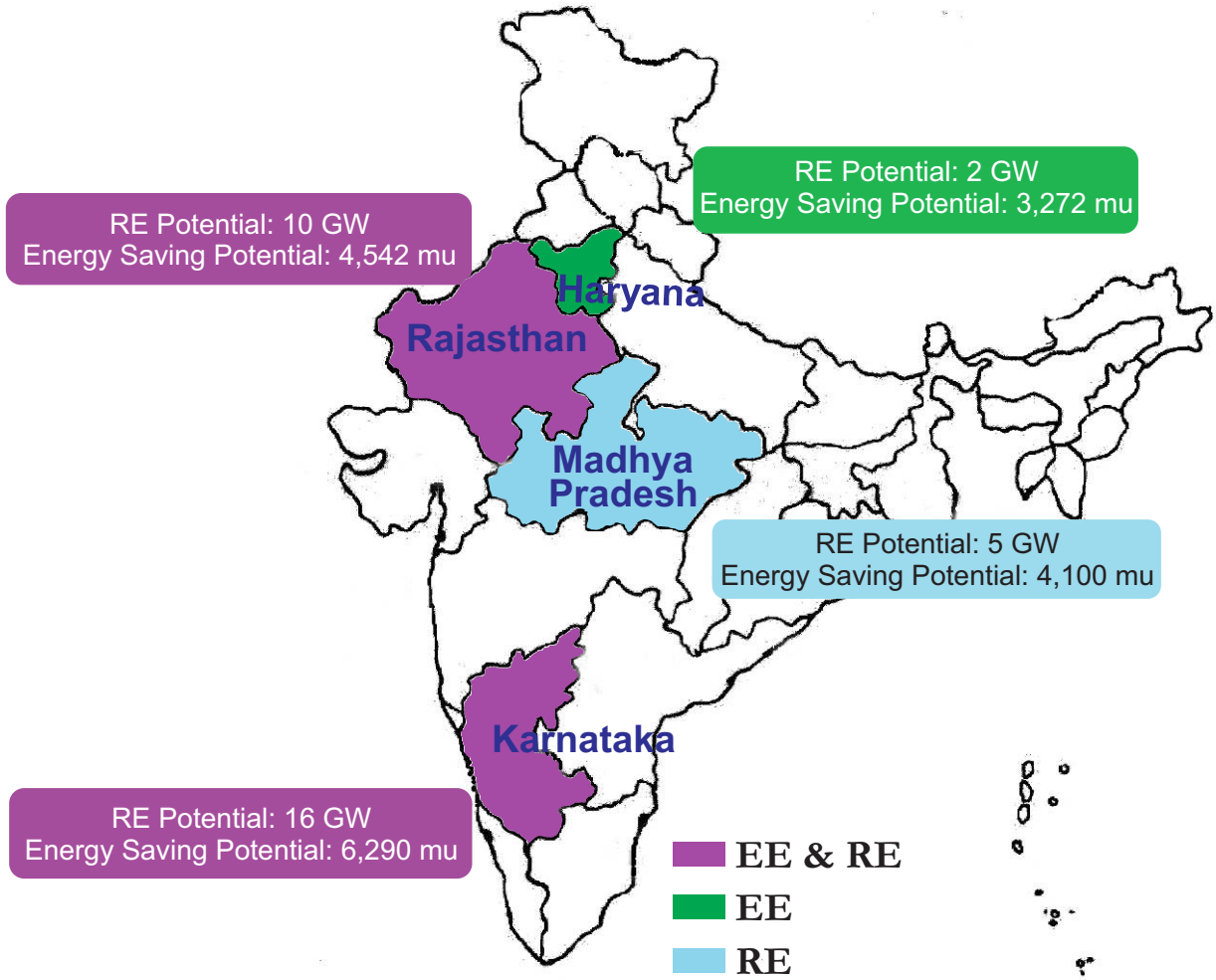
The program focuses on accelerating the deployment of clean energy in India through:

- **Policy Support**: create an enabling environment by providing technical assistance to policymakers and regulators to design and implement supportive policies and regulations;
- **Institutional Strengthening**: strengthen state agencies to effectively develop and implement enabling policies and programs for clean energy deployment;
- **Capacity Building**: build the capacity of technical and non-technical stakeholders via technical reports, hands-on trainings, workshops and site visits;
- **Pilots**: support pilot projects to demonstrate the feasibility of innovative technologies and applications;
- **Finance**: create innovative financial mechanisms and facilitate the investments in clean energy projects;
- **Partnerships**: facilitate partnerships between U.S. and Indian firms, and public and private firms, for knowledge transfer and sharing of best practices; and
- **Outreach**: increase the awareness of clean energy technologies using different media including marketing collateral, social media and events.

The PACE-D TA Program has three key components: Energy Efficiency (EE), Renewable Energy (RE) and Cleaner Fossil Technologies, with cross cutting activities of clean energy finance, institutional strengthening, and capacity building and training.



Institutional Strengthening: Focal States



(mu = Million Units)

One of the key objectives of the PACE-D TA Program is to support institutional strengthening at the state level to create an enabling environment for the effective development and implementation of policies and programs for clean energy deployment.

Four states were selected for support under the program – Haryana, Madhya Pradesh, Rajasthan and Karnataka. A rigorous analytical process was used along with consultations with the Ministry of Power and Ministry of New and Renewable Energy to select these states.

The program initiated consultations with the State Nodal Agencies (SNAs)/State Designated Agencies (SDAs) in the focal states and few State Electricity Regulatory Commissions (SERCs). The program undertook a detailed analysis of existing clean energy policies and programs, capacity of the SDAs/SNAs and identified the key interventions for each state. These are being compiled in the state action plans that include the development challenges, program implementation and institutional gaps, clean energy intervention opportunities and potential activities to be taken up.

Few activities undertaken in the states include:

- Completed a detailed project report for development of centralized monitoring center for effective monitoring of off-grid RE projects in Madhya Pradesh.
- Currently preparing a background paper for the development of an off-grid RE policy in Madhya Pradesh.
- Prepared a draft white paper on designing the net metering regulatory framework in Rajasthan.
- Providing support to the Government of Karnataka for the amendment and update of the state solar policy with increased capacity addition target and increased focus on off-grid installations.
- Currently engaged in discussions with Haryana Electricity Regulatory Commission to identify activities leading towards a signing of MOU between the two agencies.

Workshop on Sharing of Best Practices in Clean Energy Policies and Regulations

The PACE-D TA Program organized a three day workshop in Puducherry in February 2014, which brought representatives from the focal states together to deliberate on clean energy policies and regulations. The three day event included sessions on various RE and EE policy, regulatory and programmatic issues and field visits for live demonstrations of technologies.

The discussions focused on the following themes:

- Building EE focusing on Energy Conservation Building Code (ECBC) and Net Zero Energy Building (NZEB)
- Brainstorming on developing comprehensive EE and off-grid RE policies
- Operationalizing solar rooftop photo-voltaic (PV) and net metering framework
- National level initiatives for promoting RE/EE and sharing of best practices.

Participant at the Workshop on Sharing of Best Practices in Clean Energy Policies and Regulations held in Puducherry in February 2014

Clean Energy Finance

India requires capital investment to meet its RE deployment and EE savings target. While Government of India (GOI) interventions in the form of fiscal and financial incentive schemes have helped the sector grow, innovative approaches and global best practices are required to make the sector more attractive to investors and accelerate clean energy financing in the country.

The PACE-D TA Program is focusing on transforming the clean energy finance market in India by identifying innovative global financing mechanisms and assisting in developing sustainable financing policies to accelerate clean energy deployment and financing in India.

Study of Existing Landscape: The program initiated its clean energy finance activities by reviewing the existing financing mechanisms in India. It analyzed global best practices and explored their potential to be deployed in India keeping the market requirement and the policy and regulatory framework in mind. The program had several one-to-one meetings and organized two roundtables to seek inputs from key stakeholders including entrepreneurs, project developers, policy makers and financial institutions.

Advisory Teams: The program formed two advisory teams for EE and RE finance including senior bankers, technology experts and investors. The advisory teams are expected to meet every quarter and provide strategic inputs and guidance to the program. In addition to senior representatives from BEE and Indian Renewable Energy Development Agency (IREDA), the finance advisory team for EE includes Rajiv Kumar, SIDBI; Jaisingh Dhummal, ICICI Bank; Ashish Khanna, World Bank; and G C Dutta Roy, Dalkia Energy Services Ltd. Similarly the members of the RE finance advisory team include: Pankaj Sindwani, Tata Cleantech Capital; Jayesh Modi, HSBC; Satish Mandana, IDFC Private Equity; VInayak Mavinkurve, IDFC; Shallabh Tandon, IFC; and Vivek Mehra, Aloe Private Equity Group.

EE Finance Advisory Team Meeting held in January 2014

Reports on Clean Energy Finance: The collective findings of research and stakeholder feedback have been documented in two reports on EE and RE financing. These reports review the current status of clean energy financing in India and provide details on the proposed innovative mechanisms. The reports can be accessed from the program website.

Launch of the Finance Reports by Joint Secretary Srivastava, MNRE; Secretary Wattal, MNRE; Joint Secretary Arora, MOP and S. Padmanabhan, USAID/India

Innovative Financing Mechanisms: The program has identified innovative financial mechanisms for EE and RE to spur investments by catalyzing new sources of financing such as pension funds, sovereign wealth funds and insurance companies. It is in discussions with potential organizations to host some of the high priority mechanisms and is in advanced stages of finalizing MOU with potential hosts such as Tata Cleantech Capital for the Corporate Energy Audit Program (CEAP). Detailed concept notes are also being developed on the mechanisms, which will be presented to key stakeholders in consultation workshops.

Innovative Financing Mechanisms

Energy Efficiency	Renewable Energy
• **Establishment of State-Level Clean Energy Funds using the Public Benefit Charge (PBC) Concept:** The PBC-based funds at the state level can help overcome many barriers to the implementation of EE and off-grid RE projects.	• **Off-Grid RE Fund:** An off-grid fund financed by high-net-worth individuals and corporate social responsibility sources will be used to support off-grid renewable energy projects.
• **Mainstreaming EE in Corporate Loans:** The European Bank of Reconstruction and Development's Corporate Energy Audit Program essentially mainstreams EE loans within the Bank's corporate lending business.	• **Green Bonds:** Green bonds, or climate bonds, are asset-backed bonds that allow refinancing of RE projects and thus increase liquidity.
• **Energy Savings Insurance (ESI) Facility:** An ESI scheme in India can enhance the ability of ESCOs to obtain bank financing by backing up the ESCO's performance guarantee.	• **Risk Insurance:** Insurance instruments can be designed to cover the various risks faced by RE projects, such as resource, technology, off-taker, power purchase agreement, and project development risks.
• **Standard Offer Program (SOP):** The SOP is a mechanism under which a utility (or a government agency) purchases energy savings and/or demand reductions from energy users using a predetermined and pre-published rate based on verified delivered savings.	• **Infrastructure Debt Fund (IDF):** IDFs allow tapping of long-term, low-cost debt from insurance and pension funds (both domestic and foreign) to refinance bank debt of infrastructure projects.
• **Energy Efficiency Obligations (EEOs):** In India, EEOs mandated by state electricity regulatory commissions can mobilize utility financing for EE projects and programs.	• **Renewable Energy Certificates (REC) Market Maker:** The establishment of an "REC Market Maker" would address the existing lack of "bankability" of RECs.
• **Establishment of a Clean Energy Financing Facility:** Such a fund or facility will help increase the availability of funds for EE projects in India by providing innovative financial products.	• **Tax Efficient Trusts:** Tax efficient trusts provide pass-through tax benefits for investors in RE projects, and can be traded publicly.
• **Priority Lending Sector (PSL):** The designation of EE as a sector under the PSL program would substantially increase commercial lending for EE projects in India.	• **Tradable AD Tax Credits:** Tradable tax-saving certificates can be used by RE Projects to avail the benefit of accelerated depreciation.

Off-grid Renewable Energy

Energy Access

The PACE-D TA Program is working on a programmatic approach for off-grid rural electrification. This approach will address the existing constraints around demand, financing, systems sizing and threat from the grid. In particular, it will enable consolidation of demand across a number of sites; allow development of larger projects which will lower financing and development costs; and target commercial loads in rural areas like telecom towers, cold storages and small industries to bring in greater bankability to the project.

Several stakeholders were consulted on the programmatic strategy. These include Solar Energy Corporation of India (SECI); IREDA; Rural Electrification Corporation Ltd. (REC); Beltron Telecommunication Green Energy Ltd. Dalberg; Art of Living Foundation; AuroRE; Gram Power and SunEdison.

The proposed off-grid RE strategy has also been shared with state nodal agencies in Uttar Pradesh, Madhya Pradesh and Chhattisgarh. Going forward, the program team plans to make detailed presentations to the state nodal agencies to seek their buy-in for implementing the programmatic approach. It will also organize stakeholder workshops in the focal states to get expert inputs and guidance.

Commercial and Industrial

On-site captive RE generation in the Commercial and Industrial (C&I) segment provides a significant opportunity: ~10 gigawatt of solar equivalent capacity and additional shift of 2,500 tonne of oil equivalent of fossil fuel-based thermal energy. This also has the potential to support rural electrification by providing anchor loads.

The PACE-D TA Program has identified following sectors: petrol pumps, railways, defense establishments, buildings (commercial, residential and educational institutes) and health centers as focal segments for the C&I activities.

The team has developed a detailed concept note for a programmatic approach for the C&I segments and held meetings with stakeholders including SECI, Small Industries Development Bank of India (SIDBI), IL&FS Energy Development Company Limited (IEDCL), and oil marketings firms to get their feedback on the approach.

The team is currently pursuing options to design a program and facilitate implementation of pilot projects for C&I end users. This will include assessment of financial and institutional support required by these projects. The team will also identify policy gaps and provide suggestions for development of an appropriate policy framework for RE deployment.

Off-Grid Renewable Energy Fund

The off-grid RE fund is one of the key innovative financing mechanisms proposed under the PACE-D TA Program. Quality programs and access to finance is required to scale up distributed generation in rural and urban areas using RE sources. A program oriented approach, which aggregates demand allows participation of business enterprises as mainstream energy companies, enhances project ticket sizes and allows access to more competitively priced capital resources.

The proposed off-grid fund will support applications, which are either off-grid or rely primarily on off-grid and/or on-site renewable energy sources for energy generation, to promote sustainable development or address issues such as electricity shortage, reliability or quality issues.

The fund will provide debt, mezzanine capital, etc. to developers, entrepreneurs and product developers while also attracting mainstream lenders and private investors to invest in the supported programs or business entities.

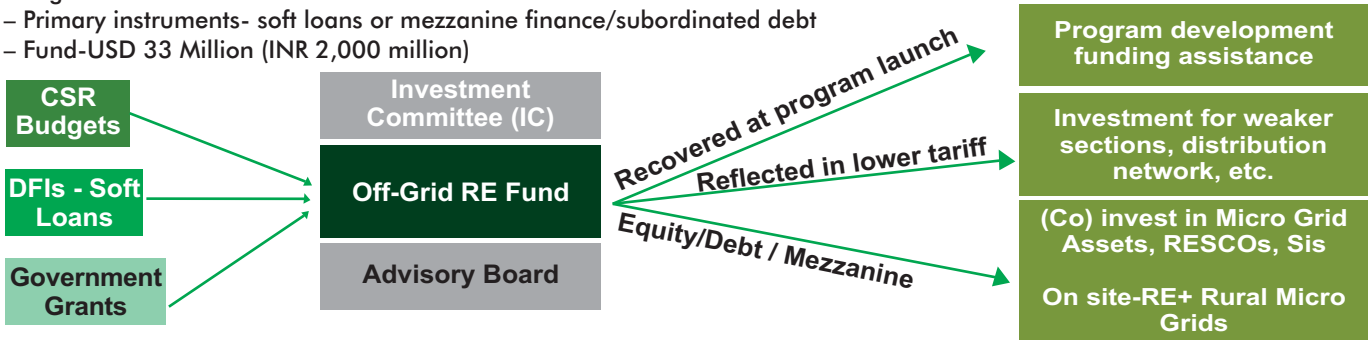
Key Drivers

- On-site and off-grid energy generation presents a significant opportunity in the Indian energy market. The market potential for these systems is expected to be 30 GW+ (over USD 60 billion+) by 2030. This market potential will comprise of the demand emanating from:
  - Off-grid as well as grid interactive systems (to meet captive energy needs), and
  - Off-grid energy systems servicing rural energy demand as well as large scale C&I complexes.
- Nearly 250 stakeholders are involved in servicing the off-grid market value chain in India. Most of these are local players without large balance sheets, and limited understanding of the opportunities to replicate and scale up.

Off-Grid Fund: Proposed Structure

Goal:

– To Scale Up 'Energy Access for Rural Areas' and 'On-site Renewable Energy use by Commercial and Industrial segments'.
– Primary instruments- soft loans or mezzanine finance/subordinated debt
– Fund-USD 33 Million (INR 2,000 million)



70% of the funds will be used to finance rural energy systems
30% of the funds can support on-site RE applications in C&I segment (especially the ones with significant sustainable development co-benefits)

DFIs = Development Finance Institutions

Smart Grids

India has significant scope for improving energy efficiency across the energy supply chain from generation to end consumption. The GOI has rolled out several initiatives to promote deployment of smart grid technologies among the Indian power utilities. An inter-ministerial body–India Smart Grid Task Force (ISGTF)–and a public-private partnership–India Smart Grid Forum (ISGF)–has been set up to promote deployment of smart grid technologies and provide support to the stakeholders.

The PACE-D TA Program is supporting the Ministry of Power through ISGTF in implementing smart grid initiatives underway in India and creating a facilitative environment for taking these to the next level. The program has undertaken the following activities:

- Supported in developing the RFP for selection of Smart Grid Implementing Agency (SGIA).
- Developed the evaluation criteria for the selection of SGIA. The evaluation criteria will help the pilot utilities to make informed decision regarding the SGIA and take the first critical step towards effective implementation of the pilot.
- Developed a draft measurement and verification (M&V) framework for the pilot projects which is currently under review.
- Compiled a draft paper on "leveraging infrastructure created under R-APDRP to ascend towards smart grids" which is currently under finalization.

The program is also supporting the Ministry in the development of a smart grid regulatory framework. This is being developed under the guidance of the technical committee, comprising of regulators from the state and central level, set up by the Ministry to guide the process.

One of the key initiatives under the program is to build the capacity of the 14 utilities implementing the smart grids pilots. Thus far, the program has organized three capacity building workshops for the 14 utilities and published three technical papers: Demand Response in the Indian context; Smart Imperatives for Grid Integration of Renewable Energy; and "A Roadmap for Communication and Application Interoperability in India".

A high level study trip including officials from the Ministry, regulatory commissions and 14 utilities implementing the pilots was also organized to the U.S. in January 2014. Details of the study trip are mentioned on page 12.

Functionalities of SG Utility Pilots in India

National Priorities	Smart Grid Interventions proposed under the 14 GOI Pilots		
Power Demand Storage	Demand Side Management	Demand Response	
	Peak Load Management		
Clean Energy	Renewable Energy Integration	Demand Response *(for balancing)*	
Loss Reduction/ Operational Efficiency Improvement	Theft Management & Tamper Detection	Asset Monitoring	Meter Data Management System
	Substation Automation	AMI	
Consumer Service Standards	Power Quality	Work Force/Crew Management	Outage Management
	Automatic Billing	Consumer Portal	

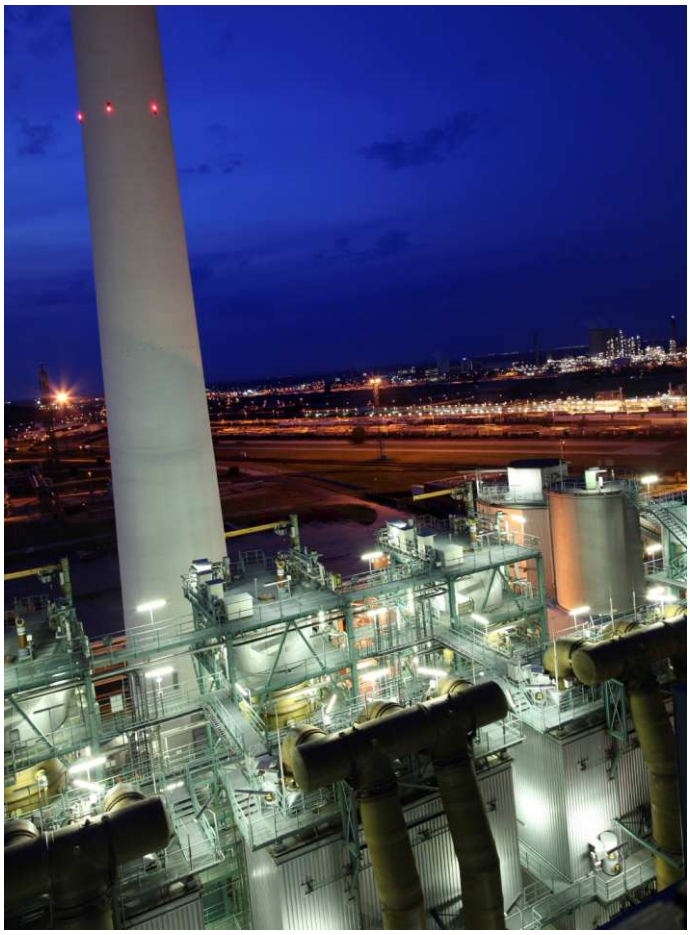
Industrial Energy Efficiency

Waste heat utilization (WHU) technologies can contribute significantly to India's efforts towards energy conservation. In its first year, the PACE-D TA Program undertook a WHU market assessment study and conducted a WHU pilot feasibility study for a sponge iron unit. A background paper outlining the strategies which are being deployed globally for promotion of WHU technologies was also developed.

The study revealed that despite the high potential, the actual penetration of WHU in key sectors is estimated at 30 percent. It was also identified that the challenges were greater in the case of low temperature WHU, where very little information is available on the market potential and technology diffusion.

Currently, the program is working closely with BEE to carry out a situational analysis on low grade WHU with a view to developing an appropriate policy mechanism for identified high priority low grade WHU technologies. The program has developed a methodology for potential assessment of low grade WHU technologies and is currently reviewing policy instruments and identifying potential hosts and markets for WHU applications.

Sugar and textile sectors have been identified in three priority states for assessment of low grade WHU. Data collection formats for gathering primary data from the industrial units in the state have been developed and is being collected with support from BEE and the state designated agencies.



The data collected will be analyzed and will form the basis for potential assessment in these segments leading to preparation of a situational analysis report. The situational analysis report will be presented to stakeholders at a meeting jointly organized with BEE. Based on the feedback of stake holders, target markets will be identified and policy and strategy recommendations proposed to the BEE.

The program is also exploring the formation of a stakeholder platform as a strategy for increasing the market penetration of WHU technologies in India. It will also support the development of a GOI policy paper outlining the required administrative arrangements, fiscal and monetary support, financing, awareness, promotion and capacity building activities for market acceleration.

Building Energy Efficiency

Building sector is one on the biggest consumers of electrical energy in India, consuming about 33 percent annually. Studies predict that India will add 66 billion square feet of floor space, roughly 70 percent of its existing stock, by 2030. Meeting the ensuing energy demand without compromising its energy security will be a formidable challenge which can only be adequately addressed by aggressively transitioning to a highly energy efficient building industry.

The program is supporting BEE to promote energy efficiency in the building sector. These activities build upon BEE's past activities in the buildings sector and will be centered on the Energy Conservation Building Code (ECBC) implementation under India's 12th Five Year Plan (2012-2017), with a strategic vision of leapfrogging the vibrant Indian green building sector towards NZEBs.

Market-driven EE Technology Deployment	Net Zero Energy Buildings (NZEB)
	Heating Ventilation and Air Conditioning
Institution Capacity Building for EE Deployment	Energy Conservation Building Code (ECBC) Technical Update
	ECBC Implementation Support

As part of this initiative, the program is facilitating the process of the technical update of the ECBC 2007 through a consultative process. The technical update is being undertaken to reflect the changes in the market scenario, make the code more appropriate to the construction practices in India and move Indian buildings towards net-zero energy status in the future. The update task was initiated with the formation of technical and steering committees, and working groups to review and oversee the process.

In addition, the program is assisting BEE in ECBC implementation in three focal states by supporting the development of rules and regulations for compliance, delivering training programs on ECBC and supporting the development of ECBC compliance tools. A state-level survey was conducted in September 2013 to assess the preparedness for ECBC implementation process. The development of state specific ECBC implementation action plans is underway.

The program is also focusing on the promotion of NZEBs and low-energy heating, ventilation and air-conditioning (HVAC) systems by creating awareness, disseminating knowledge and supporting the implementation of NZEB and HVAC retrofit pilot projects in different climatic zones of India.

Credit/ITC Gardenia, Bangalore

In the first year of the program, a two day international seminar on NZEB was organized in May 2013 to create interest and disseminate knowledge about NZEB definitions, policies, and case studies that can help achieve net zero goals for buildings in India. The program is also supporting two NZEBs pilots - Nalanda University and Uttar Haryana Bijli Vitran Nigam Limited. MOUs have been signed between BEE and these two pilots for technical assistance support. The details of these projects are available on Page 16.

A stakeholder workshop was organized to discuss the potential of deployment of low energy comfort systems in India in March 2013. A HVAC Market Assessment Study has been completed and a draft report compiled to understand the current HVAC market for commercial and residential buildings. The report is currently under review by BEE.

Technical Reports

- **Financing Energy Efficiency in India (October 2013):** A report providing an overview of the EE financing landscape in India. It reviews and documents recent Indian experience in establishing and using financial instruments for EE; and present recommendations for the development and piloting of seven innovative financing mechanisms.

- **Financing Renewable Energy in India (October 2013):** The report focuses on efforts to overcome the existing barriers to financing of RE projects in India. It reviews and documents recent Indian experience in establishing and using financial instruments for RE; and presents recommendations for the development and piloting of seven innovative financing mechanisms.
- **Smart Grids: A Roadmap for Communication and Application Interoperability in India (November 2013):** The report compiles, analyses, and refines the different approaches to interoperability and standardization in the field of power distribution networks. It defines an analysis framework or "Interoperability Matrix", and uses this to categorize and compare the different existing approaches.

- **Best Practices Manual for Indian Supercritical Plants (February 2014):** The manual is a compilation of the lessons learned and the experience gained from operating supercritical thermal power plants in U.S. utilities. Information is provided under various chapters addressing four key areas of interest: current status of supercritical plants globally, reduction of GHG emissions, improved fleet reliability and workforce safety in the power sector.

- **Assessment of Role of Energy Storage Technologies for RE Deployment in India (March 2014):** The report presents a range of energy storage technologies available today and analyzes their costs, performance, and maturity levels. It also makes recommendations for future research topics and activities including policy frameworks, simulation tools and detailed demand assessments.

These reports can be downloaded from http://www.pace-d.com/pace-d-usaid-resources/

Study Trips

1. Cleaner Fossil Technologies Utility Exchange Program: July 22 – August 3, 2013

India's huge demand for power capacity addition makes it important to add MWs through supercritical technologies to improve efficiency and reduce emissions. The exchange program to the U.S. focused on facilitating knowledge exchange on coal blending and supercritical technology. Indian participants got an opportunity to observe best practices in the U.S.; interact with U.S. technology counterparts; build network and collaborate for future technology transfer engagement. The exchange program included visits to utilities, research institutes as well as universities.

2. Smart Grid Study Tour to the U.S.: January 20-30, 2014

As smart grid development progresses in India there is a need to look at good practices, technologies, initiatives and programs being adopted globally. The study tour facilitated such knowledge transfer and provided participants an opportunity to obtain first-hand experience of latest smart grid technologies and initiatives in the U.S., and also observe live demonstrations of smart grid practices. The tour covered a cross section of institutions including: two U.S. government agencies; five utilities; three public utility commissions; two national level research institutions; and two agencies related to rural electricity and system operation.

International Conferences

1. Seminar on Net-Zero Energy Buildings in India: May 16-17, 2013

A two-day international seminar was organized in New Delhi to focus on Net-Zero Energy Buildings (NZEB) policies and technologies to facilitate market transformation in the Indian building sector. The seminar brought together local and international experts who deliberated on how to develop an appropriate roadmap for NZEBs in India. More than 150 experts and energy efficiency specialists, including architects, designers, and developers attended the seminar.

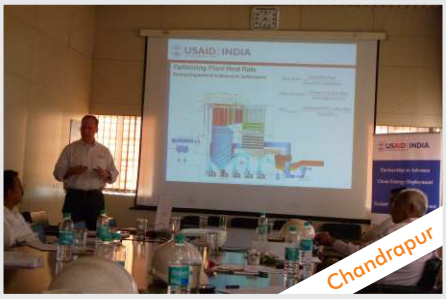
2. Advanced Technologies and Best Practices for Supercritical Thermal Power Plants: November 21-22, 2013

India's power sector has dual challenges of maintaining the efficiency of the older subcritical units and the new fleet of supercritical units. An international conference was organized under the PACE-D TA Program to facilitate knowledge exchange on best practices for improving performance and reliability of supercritical power plants; and help identify advanced technologies for better diagnostics and life enhancement of power plants. The conference, held in New Delhi, was attended by over 300 participants including representatives from state-owned and private utilities, service providers and manufacturers.

Training Programs

January 23, 2013
PACE-D TA Program Supported
AEEE Workshop on DSM-EMV for
DISCOMS, CMVPs and DSM Verifiers

March 4-8, 2013
Workshop on Heat Rate
Improvement



March 11-15, 2013
Workshop on Heat Rate
Improvement

March 18-21, 2013
Workshop on Benchmarking
and Best Practices

May 27-28, 2013
Effective Smart Grid Pilot Planning
and Implementation Workshop

September 12, 2013
Heat Rate Improvement
Plan Workshop

September 14, 2013
Heat Rate Improvement
Plan Workshop

September 19, 2013
Heat Rate Improvement Training
Workshop for Power Utilities

November 7-8, 2013
Capacity Building Workshop for Smart
Grid Regulatory and Administrative Planning

Consultation Workshops

Feb 28 – March 1, 2013
Workshop on Low
Energy Comfort Systems

May 16-17, 2013
Seminar on Net-Zero Energy
Buildings in India

October 9, 2013
Launch of RE and EE Finance
Reports and Stakeholder Workshop

October 10, 2013
Stakeholder Workshop on Off-Grid
Renewable Energy

November 26, 2013
Workshop on Energy Storage for
Renewable Energy Deployment in India

February 24-26, 2014
Workshop on Sharing of Best Practices
in Clean Energy Policies and Regulations

Pilot Projects

Building Energy Efficiency

The PACE-D TA Program is supporting two pilot projects – Nalanda University in Bihar and Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL) headquarters in Haryana – for NZEB demonstration. These pilot projects will demonstrate the technical feasibility of the NZEB concept and also provide the opportunity to engage stakeholders across the building value chain and disseminate information about tools, technologies, costs, performance, and measurement and verification data over a period of time.

One of the world's oldest known center for learning - Nalanda University (fifth century AD to 1197 AD) - is being revived in India, with international support from sixteen countries from the East Asian Summit (EAS). USAID, via its PACE-D TA Program, has signed a MOU with the Nalanda University for the development of a net zero (energy, water and waste) campus in Rajghir, Bihar.

Technical support was provided under the program to develop the technical specifications and evaluation criteria for the net zero energy campus master planning and building design; and to identify experts for the net zero energy viability assessment of the international architectural design competition entries.

The program will further support the University in evaluating energy efficiency and renewable energy options for the campus, facilitate partnership with key stakeholders in the buildings industry and create awareness about Nalanda's NZE success.

Credit/Nalanda University

Ruins of the old Nalanda University

Similarly, as part of this initiative, the PACE-D TA Program is supporting UHVBN to strive towards a NZEB status in its upcoming office building in Panchkula, Haryana. The program has so far supported the UHVBN team in developing the criteria for selection of architects and design, and also helped in technical evaluation of proposals. It is also taking active part in technical committee meetings to ensure that the project moves towards its NZE goal.

Cleaner Fossil Technologies

The PACE-D TA Program is piloting the VISTA(TM) software that supports fuel-related performance and economic analyses of fossil-fired power generation facilities. The pilot project, at a supercritical power station in Sipat, is being conducted in partnership with NTPC-CenPEEP. Vista quantifies the cost and performance impacts associated with burning alternate coals in a power plant.

In the current Indian context, the fuel mix at Indian thermal power plants includes a significant proportion of imported coal while the boilers were built for Indian coal. Thus, Vista's equipment-specific engineering models (rather than generic correlations) evaluate performance impacts, with predictions based on equipment configuration and component information coupled with detailed calibration data supplied by the user. Economic results are calculated from the Vista performance predictions using costs (e.g., fuel, waste disposal, replacement power) input by the user.

Vista provides a detailed comparison of the key performance and economic results for each of the alternate coals evaluated. The use of VISTA like tools will enable Indian utilities to effective and efficiently assess the fuel mix resulting in improvement performance and corresponding GHG abatement.

Partnerships

India traditionally had several trade and industry associations (e.g. Indian Wind Energy Association, Indian Biomass Power Association, and Solar Energy Society of India) representing the RE sector. However, an organized approach to represent the interest of the wider RE stakeholders as an unified voice was missing.

The need to establish and support an apex RE association in India to bring together all the facets of the diverse Indian RE industry and advocate for an enabling regulatory and policy environment for investments in this sector was felt. The PACE-D TA Program is working closely with the American Council on Renewable Energy (ACORE) to provide support to the Indian Renewable Energy Federation (IREF), an apex RE association, to collaborate, address barriers to RE development in India and facilitate market transformation.

The partnership between ACORE and IREF, formally launched in April 2013, is expected to help IREF to learn from the vast experience of ACORE in establishing IREF as an unified voice of RE stakeholders in India by creating linkages between policy, finance, market drivers and technology and sharing best practices. The partnership will also help IREF develop a financially sustainable model and program components.

IREF Indian Renewable Energy Federation

ACORE American Council On Renewable Energy

Launch of ACORE-IREF Partnership in April 2013

The program facilitated the visit of ACORE representatives to India to interact directly with the IREF team and deliberate on various activities including organizational structure, membership, market outreach, communication and branding. It is in the process of organizing a visit for IREF's core team members to visit ACORE in the U.S. and interact with their staff and funding members.

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