This basic course, delivered in classroom style training, includes the following topics:

Smart Grid Orientation Program (1/2 day)

Session 1	Session 2	Session 3
Introduction to Smart Grids, its applications, and developments in India and outside	Smart Grid deployment experience and utility case studies	Regulatory and customer related consideration in Smart Grid projects

Smart Grid Foundation Course (3-day)

DAY 1	DAY 2	DAY 3
Introduction to Smart Grids	Loss reduction, asset monitoring & optimization, and outage management system	Cyber security
Building blocks of Smart Grid	Grid integration of renewables & energy storage	Customer engagement and participation
Peak load management & demand response	Smart Grids and quality of supply and service	Smart Grid analytics and data management issues
Smart Grid readiness assessment and maturity model	Communications technology	Smart Grid and its role in smart city context

Pilot Projects

Tripura State Electricity Corporation Limited (TSECL)

TSECL is the state power utility responsible for implementing the Smart Grid pilot project in Agartala, Tripura. The pilot project at TSECL envisaged establishment of control center along with supply, installation, testing and commissioning of complete Advanced Metering Infrastructure (AMI) and Peak Load Management system involving smart meters, Data Concentrator Units, Meter Data Acquisition System, Meter Data Management, communication system, hardware and software for control center, etc. along with integration of Geographic Information System mapping and billing and collection with AMI system. The PACE-D TA Program provided support to TSECL in developing strategy for measurement and verification and baseline development; building the capacity of the Smart Grid project team; assisting in software documentation review and database analysis, and report definitions; and documenting the lessons learned. The Program, in collaboration with the NSGM and MOP, organized three capacity building workshops for TSECL utility professionals.

Ajmer Vidyut Vitran Nigam Limited (AVVNL)

AVVNL is responsible for electricity distribution and supply in 11 districts of Rajasthan. The utility has AT&C losses ranging around 21 percent. The objective of the pilot programme was to demonstrate benefits of select functionalities to the utility by implementing a proof of concept on selected feeders (two feeders with approximately 500 consumers each in Phase 1, and subsequently prepare a base for a larger roll-out in Phase 2). The project was implemented via an innovative Pay for Service (or "rental") model where the entire implementation was treated as a service rather than considering it as a one-time capital expenditure. The PACE-D TA Program provided support in baselining and pre-implementation analysis; installation of equipment identified for demonstration of selected functionality; analytics software/mobile application for generating periodic reports and alerts related to energy audit, energy theft, load violation, etc.; and cost-benefit analysis for the utility. The commercial operation of the pilot was announced by the MOP and NSGM in October 2016.

About the PACE-D TA Program

The PACE-D TA Program is a five-year bilateral initiative led by the U.S. Agency for International Development (USAID) and the U.S. Department of State, and implemented in partnership with the Ministry of Power (MOP) and the Ministry of New and Renewable Energy (MNRE).The Program has three key components: energy efficiency (EE), renewable energy (RE) and cleaner fossil technologies. Within each of these components, the Program's focus is on institutional strengthening, capacity building, technology pilot projects, innovative financing mechanisms and increasing the awareness of clean energy technologies.

Please access www.pace-d.com for more information

Apurva Chaturvedi
Program Management Specialist
USAID/India
Email: achaturvedi@usaid.gov

Nithyanandam Yuvaraj Dinesh Babu
Chief of Party
PACE-D TA Program
Email: ydbabu@nexant.com

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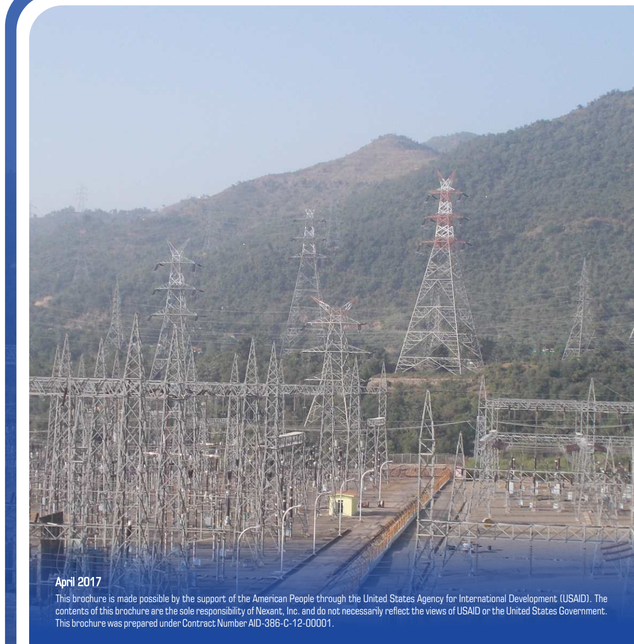
MINISTRY OF POWER

Smart Grid

Partnership to Advance Clean Energy-Deployment (PACE-D)
Technical Assistance Program



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Overview

India has an installed capacity of 319.6 GW and generates over 1,159 billion units of electricity annually, of which 23 percent is lost in aggregate technical and commercial (AT&C) losses. The AT&C losses due to pilferage, defective meters, and errors in meter reading, result not only in wastage of electricity that could otherwise be used productively, but also hamper the growth of distribution utilities and deplete state finances.

While utilities are undertaking several measures to reduce the AT&C losses, adoption of Smart Grid technologies will assist them to achieve their goals in a more cost effective manner. Smart Grid solutions can monitor, measure and control power flows in real-time, which in turn can help identify and reduce losses, optimize operational performance, and reduce costs for the customers and distribution utilities. At the same time, these technologies enable adoption of multiple solutions, including distributed generation, storage, etc. to co-exist in an integrated manner that could not be envisaged earlier.

To tap this opportunity, the Government of India (GOI) constituted the inter-ministerial India Smart Grid Task Force (ISGTF) in September 2010 to advice on appropriate policies and programs for accelerated development of Smart Grids in India. The Ministry of Power (MOP) also released a comprehensive Smart Grid Vision and Roadmap for India in August 2013 that complements the ongoing programs such as the Restructured Accelerated Power Development and Reforms Programme (R-APDRP) and the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY). The GOI has selected 14 electricity distribution utilities to implement Smart Grid pilot projects, which will allow evaluation of the technological and commercial benefits and assess the potential of wider nationwide roll-out.

The U.S. Agency for International Development (USAID), through the Partnership to Advance Clean Energy - Deployment Technical Assistance (PACE-D TA) Program, provided support to the MOP on three key interventions: a) development of an enabling regulatory framework for Smart Grids, b) building the capacity of utility professionals, c) and implementing Smart Grid pilot projects.

The Program facilitated knowledge transfer of industry best practices, Smart Grid project implementation methodologies, and first-hand experience of the latest Smart Grid Technologies. The knowledge transfer--done via training programs, study tour, opinion papers and pilot projects--aimed to equip the utility participants with the technical, commercial and regulatory knowledge essential to effectively implement their respective pilot projects.

Key Smart Grid Activities under the PACE-D TA Program

Regulations

The Program provided support to develop draft Smart Grid regulations under the guidance of the technical committee constituted by the MOP. The proposed regulations covered different themes such as investments, tariff design, customer engagement, establishment of a Smart Grid cell, and engagement of state nodal officers. The draft Smart Grid Regulations were submitted to the Forum of Regulators (FOR) in 2014 and were formally adopted by the FOR in June 2015.

Opinion Papers

The Program developed opinion papers on key topics including a) Communication and Application Interoperability; b) Approach for Dynamic Pricing; c) Smart Imperatives for Grid Integration of Renewables; d) Demand Response in the Indian Context; e) Design Evaluation, Monitoring and Verification Framework for Smart Grid Projects; and f) Leveraging R-APDRP Infrastructure for Smart Grid Projects. These papers helped in creating awareness and knowledge base among Indian utility professionals.

Capacity Building

As a part of its capacity building initiative, the Program organized several training programs with specific themes such as issues faced by utilities during the pre-award stage and the importance of communication technology in the successful deployment of Smart Grid projects. In all, five workshops were organized which also included field trips to Tata Power Delhi Distribution Limited, Puducherry Electricity Department, Paschimanchal Vidyut Vitran Nigam Limited, and the smart meter manufacturing facility of Secure Meters which helped the participants (nodal officers of the Smart Grid pilot utilities) to understand the practical issues faced during the conceptualization and implementation phase of Smart Grids. The Program also organized a study tour to the U.S. in January 2014 to facilitate knowledge transfer of best practices and first-hand experience of the latest Smart Grid technologies. The study tour, comprising key officers of the distribution utilities that are directly responsible for carrying out the Smart Grid pilot programs, provided a better understanding of implementation strategies of Smart Grids and facilitated networking opportunities between the U.S. and Indian stakeholders. In addition, the Program developed a Smart Grid curriculum for utility professionals with the aim of capacity building in design, planning and implementation of Smart Grid projects in India.

Institutional and Implementation Framework

The Program is providing technical assistance to the NSGM to develop an Institutional and Implementation Framework. The NSGM institutional structure is a critical starting point for successful implementation of Smart Grid Roadmap for India. An institutional structure is needed for NSGM to function effectively, design related policies and programs to meet the NSGM Goals, develop new ways of financing large-scale grid investments, promote new standards and technologies and build the capability of various stakeholders.

Cost-benefit Analysis Framework

The Program is developing cost-benefit analysis framework for Smart Grid pilot projects. This will enable utilities to determine financial feasibility of their Smart Grid project and get regulatory approval for investment.

Awareness Film

The Program, in collaboration with the MOP, developed a short film on "Smart Grid and its Transformative Impact on Utility Operations and Customer Energy Empowerment".

Smart Grid Training Network (Smart-NET)

The PACE-D TA Program also designed a basic Smart Grid course for utility personnel. The objective was to develop a foundation course that would provide a well-rounded exposure to the utility participants on varied aspects of Smart Grid planning and deployment. The Program organized the above mentioned course at two levels:

- A half-day orientation module for the top management (Chairmen, Managing Directors and Directors) of the distribution companies to provide a broad understanding of the various components of planning and implementation of Smart Grid projects.

- A three-day Smart Grid foundation course for utility professionals to sensitize them on Smart Grid technologies and related operational issues.

The course ensures relevance to the Indian Context and has a mix of lecture and practical insights and cases, both national and international.

The Program assisted the NSGM to organize two training programs for utilities. The first three-day training was held in July 2016 at CENPEID campus of Tata Power, Delhi. Nearly 45 participants from 22 utilities, representing 16 states, were trained on different facets of Smart Grids. The second three-day training program was held in December 2016 at the Central Power Research Institute (CPRI) campus in Bengaluru. Twenty-seven utility personnel from 15 utilities were trained on key Smart Grid building blocks such as Advanced Metering Infrastructure, Peak Load Management and Grid Integration of Renewables and Energy Storage.

Going forward, these training programs will be rolled out with support from partner institutions by establishing a network of these institutions (Smart-NET) that will work with the National Smart Grid Knowledge Centre under the NSGM. The proposed training programs will facilitate dissemination of tools, approaches and methodologies used for planning and designing Smart Grid projects, and build the capacity of utility professionals.