



Report

Vietnamese Delegation's Energy Efficiency Knowledge Exchange Program in India

25th February – 1st March 2019

New Delhi, India

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Prepared for
The World Bank Group

BY

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Acronyms

BEE	Bureau of Energy Efficiency
DISCOM	Distribution Companies
DSM	Demand Side Management
ECBC	Energy Conservation Building Code
EE	Energy Efficiency
EESL	Energy Efficiency Service Limited
EREA	Electricity and Renewable Energy Authority
ESCOs	Energy Service Companies
FEEED	Framework for Energy Efficient Economic Development
IIEC	International Institute for Energy Conservation
IREDA	Indian Renewable Energy Development Agency
JICA	Japan International Cooperation Agency
MOIT	Ministry of Industry and Trade
MoP	Ministry of Power
MSME	Medium, Small and Micro Enterprises
NAPCC	National Action Plan for Climate Change
NDC	Nationally Determined Contributions
NDMC	New Delhi Municipal Council
NMEEE	National Mission on Enhanced Energy Efficiency
PAT	Performance, Achieve, Trade
PNB	Punjab National Bank
RE	Renewable Energy
SDMC	South Delhi Municipal Corporation
SIDBI	Small Industries Development Bank of India
VCFEE	Venture Capital Fund for Energy Efficiency
VNEEKEP	Vietnamese Delegation Energy Efficiency Knowledge Exchange Program
WB	World Bank
WBG	World Bank Group

1. Executive Summary

The Vietnamese Delegation's Energy Efficiency Knowledge Exchange program was held in New Delhi, India from 25th February 2019 to 1st March 2019 for a group of Energy Efficiency (EE) practitioners from Vietnam to study national and state level EE programs and schemes like Perform, Achieve and Trade (PAT) in India. This program was held under the auspices of a collaborative platform to provide opportunity to Vietnam for knowledge exchange and learning in order to enhance the capacity to deliver EE, Demand Side Management (DSM) and Smart Metering programs in Vietnam.¹ The program aimed to enhance greater connectivity between the community of the World Bank Group's (WBGs) EE practitioners and country stakeholders from Vietnam, led by the Ministry of Industry and Trade (MOIT) and in India, led by the Bureau of Energy Efficiency (BEE) and Energy Efficiency Services Limited (EESL). The overall emphasis of the knowledge exchange was on financing, implementation and delivery of energy efficiency.

This report focuses on this Knowledge Exchange program which took place in India during 25th February 2019 – 1st March 2019, its objectives, detailed discussions, outcomes and learning's from key EE practitioners from India and Vietnam. Twenty-two EE practitioners representing public and private sector agencies, financing institutions and banks and from World Bank office in Vietnam had participated in this Knowledge Exchange Program.

The program was organized by the World Bank in collaboration with Bureau of Energy Efficiency (BEE) and Energy Efficiency Services Limited (EESL). The International Institute for Energy Conservation (IIEC) implemented the 5-day program in India, as a technical consultant to the World Bank. The exchange program consisted of meetings and interactive sessions with experts BEE, EESL, financing institutions, industry and international agencies working in India. The participants also visited the industries to learn about the implementation of energy efficiency measures under PAT Scheme.

The program not only provided the opportunity to learn from the information shared by the key speakers but also to network with each other, exchange knowledge, enabled technology transfer and build partnerships for design and implementation of innovative EE programs in future in Vietnam. IIEC also undertook a short feedback survey from the participants at the end of the 5 day-long program. The participants shared constructive feedback on the training and content of the sessions. Participants also provided their inputs for future improvements in the design of exchange programs. The recommendations also included some observations which can be used to develop strategic partnerships between the two countries.

2. Overview of the Vietnamese Delegation's Energy Efficiency Knowledge Exchange Program in India

The Knowledge Exchange Program was supported under the ESMAP-funded activity "Improving Energy Efficiency in Vietnam" managed by World Bank's Vietnam office. It was coordinated in conjunction with World Bank's ongoing EE operations in India (such as the India Energy

¹ A similar Exchange was held earlier when the Vietnam delegation went to China in 2018 to learn the (1) Chinese mandatory EE target setting, allocation, and enforcement, institutional framework, standards and codes, monitoring and enforcement; (2) ESCO business models; (3) financing mechanisms; and (4) EE implementation at provincial and industrial enterprise level.

Efficiency Scale-Up Program Loan with EESL, and India Partial Risk Sharing Facility for EE Project with EESL and Small Industries Development Bank of India), and is in line with the knowledge and experience sharing objectives of World Bank's India Lighthouse initiative.

The Vietnam government is planning to develop their 10-year National Energy Efficiency (EE) program and to bring a shift from a voluntary based approach to a mandatory one for implementation of Energy Efficiency programs. Additionally, the Government is looking to scale up energy efficiency initiatives and align it with the National Goals.

Further to support their national goals, Vietnamese delegation was keen to learn the following aspects of Energy Efficiency in Indian context:

1. India's national EE program, with a focus on the mandatory PAT scheme for improving EE in energy-intensive industries, in particular regarding target setting, allocation to industrial enterprises, penalties and incentives, M&V, enforcement, etc.;
2. EESL and other energy service company (ESCO) business models;
3. EE financing schemes (as the Bank has an EE credit line and an EE risk sharing project in Vietnam); and
4. Demand side management (DSM) and implementations and use of smart grid technologies.

The Vietnamese Delegation's Energy Efficiency Knowledge Exchange Program in India (VNEEKEP) was organized from 25th February 2019 to 1st March 2019. Twenty-Two EE practitioners representing public and private sector agencies, financing institutions and banks and from World Bank office in Vietnam had participated in this EE Knowledge Exchange Program. The program was organized by the World Bank in collaboration with Bureau of Energy Efficiency (BEE), Energy Efficiency Services Limited (EESL). The International Institute for Energy Conservation (IIEC) implemented the 5-day program in India, as a technical consultant to the World Bank. The exchange program consisted of meetings and interactive sessions with experts BEE, EESL, financing institutions, industry and international agencies working in India. The participants also visited the industries to learn about the implementation of energy efficiency measures under PAT Scheme and visited New Delhi Municipal Corporation site to learn from the implementation of smart metering program.

Among the participants and speakers were representatives from:

- Indian Organizations
 - Ministry of Power (MoP), Government of India
 - Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India
 - Energy Efficiency Services Limited (EESL), Ministry of Power, Government of India
 - International Institute for Energy Conservation (IIEC), India
 - The World Bank
 - Grasim Bhiwani Textiles Ltd., Bhiwani, Haryana, India
 - Small Industries Development Bank of India (SIDBI), India
 - Punjab National Bank (PNB), India
 - Yes Bank, India
 - Indian Renewable Energy Development Agency (IREDA), India
 - New Delhi Municipal Council (NDMC), India
- Vietnam Organizations
 - Energy Efficiency and Sustainable Development Department, Ministry of Industry and Trade, Government of Vietnam

- Electricity and Renewable Energy Authority (EREA), Vietnam
- Science and Technology Department, Vietnam
- Hai Phong Energy Efficiency and Conservation Center, Vietnam
- Hanoi Department of Industry and Trade, Vietnam
- International Fund Division, Vietcom Bank, Vietnam
- Dong Thap Energy Efficiency and Cleaner Production Center, Vietnam

The VN EE Knowledge Exchange in India program provided an opportunity to enable participants to share and learn about EE policies, business models and financing mechanisms to promote demand-side EE improvements across different sectors. The program also provided a cross-learning opportunity on topics such as addressing barriers in transforming EE markets on scale, becoming more efficient, adapting and applying the implementation models that worked successfully in India and other countries. The knowledge exchange program was also a platform for dissemination, sharing and exchange of knowledge in the area of EE and DSM, steered by robust policies, legislations supported by financial mechanisms, institutional development and increased awareness.

The following team members provided the support for designing, organizing and delivering this Knowledge Exchange Program:

Organization	Name	Designation
IIEC	Sanjay Dube	Chief Executive Officer
IIEC	Ankit Kamra	Senior Project Manager
IIEC	Sumedha Awasthy	Research Associate
IIEC	Kartik Dube	Research Associate
IIEC	Akansha Sharma	Research Associate
IIEC	Amar Yadav	Senior Admin Officer
BEE	Abhay Bakre	Director General
BEE	Dr. Ashok Kumar	Director
BEE	Arijit Sengupta	Director in charge of International Cooperation
BEE	Sumit Mudgal	Project Engineer
BEE	Ujjwal Gaur	Project Engineer
BEE	Ajitesh Upadhyaya	Textile Sector Expert
EESL	Venkatesh Dwivedi	Director (Projects)
EESL	SP Garnaik	Chief General Manager (Technical)
EESL	Girja Shankar	Assistant General Manager (Technical)
EESL	Ayan Ganguly	Engineer (Technical)
EESL	Bansi Shukla	Engineer (Technical)
EESL	Titiksha Sharma	Engineer (Technical)
World Bank	Dr. Ashok Sarkar	Senior Energy Specialist
World Bank	Thi Ba Chu	Senior Energy Specialist, Vietnam
World Bank	Xiaodong Wang	Senior Energy Specialist, Vietnam
World Bank	Franz Gerner	Energy Sector Coordinator, Vietnam
World Bank	Ritika Rodrigues	Program Assistant, New Delhi
World Bank	Huong Thu Vu	Program Assistant, Vietnam
World Bank	Hoa Chau Nguyen	Program Assistant, Vietnam
EE Expert	K.K Chakravarti	PAT Scheme and EE Sector Expert

The presentations made during the EE Knowledge Exchange are all available at <https://drive.google.com/open?id=1ptsJmNWSiUqjmj9P-n6ggUJ8C2Z8k8iW>

3. Summary of the Knowledge Exchange Program

3.1. Day 1, 1st Half: Meeting with the Bureau of Energy Efficiency (BEE)

Date: 25th February 2019

Venue: Bureau of Energy Efficiency, Ministry of Power, Govt. of India, 4th Floor, Sewa Bhawan, R. K. Puram, New Delhi - 110066 (INDIA)

Website: <https://beeindia.gov.in/>

About Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India

The Government of India has set up Bureau of Energy Efficiency (BEE) on 1st March 2002 following the prerequisites of the Energy Conservation Act, 2001. The purpose of the Bureau of Energy Efficiency is to help in promoting policies and strategies with a push on self-regulation and market strategies, within the overall structure of the Energy Conservation Act, 2001 with the initial objective of diminishing the energy strength of the Indian economy. This will be accomplished with the effective participation of all stakeholders, producing in the accelerated and continued confirmation of energy efficiency in all sectors.

Role of Bureau of Energy Efficiency (BEE)

BEE co-ordinates with designated consumers, designated agencies, and other organizations and recognizes, identify and utilize the existing resources and infrastructure, in performing the functions assigned to it under the Energy Conservation Act. The Energy Conservation Act provides for regulatory and promotional functions.

Regulatory Functions of BEE include:

- i. Develop least energy performance patterns and labeling design for tools and appliances
- ii. Promote precise Energy Conservation Building Codes
- iii. Promote Projects focusing on selected users
- iv. Promote special energy expenditure norms
- v. Verify Energy Managers and Energy Auditors
- vi. Authorize Energy Auditors
- vii. Describe the manner and periodicity of necessary energy audits
- viii. Develop reporting formats on energy consumption and action used on the advice of the energy auditors

Promotional work of Bureau of Energy Efficiency includes:

- Create awareness and disseminate information on energy efficiency and conservation
- Arrange and coordinate training of employees and professionals in the techniques for effective use of energy and its conservation
- Strengthen consultancy services in the field of energy conservation
- Promote research and development
- Improve testing and certification methods and promote examination facilities
- Formulate and promote the implementation of pilot plans and presentation projects
- Promote the use of power efficient processes, tools, devices and systems
- Take necessary steps to promote preferred treatment for use of energy efficient equipment or appliances
- Support innovative funding of energy efficiency schemes

- Give financial support to organizations for encouraging efficient use of energy and its maintenance
- Prepare institutional curriculum on efficient use of energy and its conservation among school and college students
- Execute international co-operation plans relating to efficient use of energy and its conservation

Proceedings of Day 1, 1st Half

Day 1 started off with the welcome of the Vietnamese delegation by Mr. Abhay Bakre, Director General at Bureau of Energy Efficiency, Ministry of Power, and Government of India. He provided an overview of the India's energy context and brief on some of the prominent energy efficiency programs on Perform, Achieve and Trade (PAT) Scheme, Standards & Labeling Program, Buildings Program, to name a few.



Next, BEE invited Ms. Nguyễn Thị Lâm Giang, Director General, Energy Efficiency & Sustainable Development Division, Ministry of Industry and Trade, Government of Vietnam, to take the entire group through a brief overview of current programs, initiatives and policies for energy efficiency and sustainable development in Vietnam

This was followed by a detailed presentation by Dr. Ashok Kumar, Director at Bureau of Energy Efficiency on the nuances of BEE's flagship program Perform, Achieve and Trade Scheme. ***Below are some of the key excerpts from his presentation.*** For further details, you may please refer the attached detailed presentation.



Topic:

Perform, Achieve and Trade (PAT) - An instrument for Enhancing Energy Efficiency in Energy Intensive Sectors in India

Speaker:

Dr Ashok Kumar, Director & Mr. Arijit Sengupta, Director

The National Action Plan on Climate Change

(NAPCC)² released by Honorable Prime Minister of India in June 2008, outlined Eight National Missions, **The National Mission for Enhanced Energy Efficiency (NMEEE)**³ is one of the eight national missions with the objective of promoting innovative policy and regulatory regimes, financing mechanisms, and business models which not only create, but also sustain, markets for energy efficiency in a transparent manner with clear deliverables to be achieved in a time bound manner.

The Ministry of Power (MOP) and Bureau of Energy Efficiency (BEE) were tasked to prepare the implementation plan for the NMEEE. NMEEE spelt out the following four new initiatives to enhance energy efficiency, in addition to the programs on energy efficiency being pursued. They are:

1. Perform Achieve and Trade (PAT): A market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded.
2. Market Transformation for Energy Efficiency (MTEE)⁴: Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable.
3. Energy Efficiency Financing Platform (EEFP)⁵: Creation of mechanisms that would help finance demand side management programs in all sectors by capturing future energy savings.
4. Framework for Energy Efficient Economic Development (FEEED)⁶: Developing fiscal instruments to promote energy efficiency.

Perform Achieve and Trade (PAT)⁷

PAT is a market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded. The genesis of the PAT mechanism flows out of the provision of the Energy Conservation Act, 2001, herein after referred to as the Act. Section 14 (e) of the Act empowers the Central Government to notify energy intensive industries, as listed out in the Schedule to the Act, as Designated Consumers (DCs).

Launched in 2012 as a market based regulatory instrument, Perform, Achieve and Trade (PAT) program, is being administered by the BEE that sets mandatory, specific targets for energy consumption for larger, energy-intensive facilities. Currently in its third phase, PAT Scheme is being implemented in three phases- the first phase ran from 2012-2015 covering 478 facilities from eight energy-intensive sectors, namely aluminum, cement, chlor-alkali, fertilizer, iron and steel, pulp and paper, textiles and thermal power plants.

Aimed towards bringing down the specific energy consumption, the program provides unit specific targets to the industrial sector based on their current efficiency to enhance the cost

² <http://moef.gov.in/division/environment-divisions/climate-changecc-2/national-action-plan-on-climate-change/>

³ <http://pib.nic.in/newsite/PrintRelease.aspx?relid=85182>; <https://beeindia.gov.in/content/nmeee-0>

⁴ <https://beeindia.gov.in/content/mtee-0>

⁵ <https://beeindia.gov.in/content/eefp>

⁶ <https://beeindia.gov.in/content/feeed>

⁷ <https://beeindia.gov.in/content/pat-3>

effectiveness through tradable energy saving certificates e.g. inefficient plants will have a higher target vis-à-vis an energy efficient one.

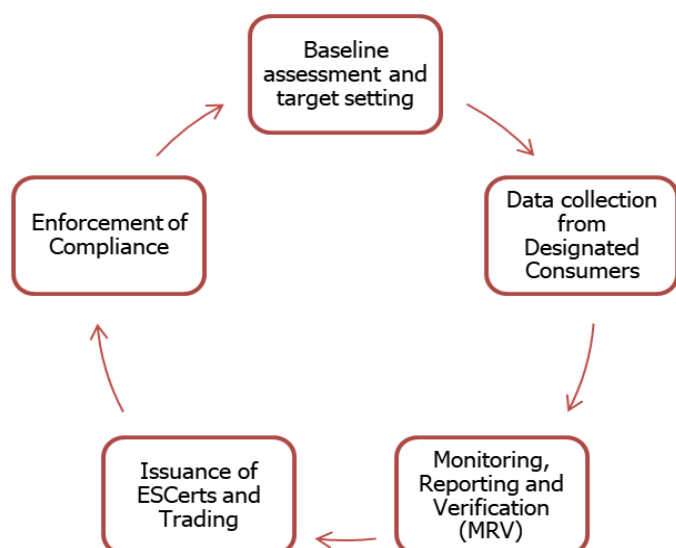
For the energy efficiency achievements against the set targets, ESCerts (Energy Saving Certificates) are issued to the Designated Consumer. The benefit of these ESCerts is that they are tradable through an exchange. Whereas overshooting the target leads to a penalty of INR 1 million, in addition to INR 10,000 per day. Non achiever DCs can purchase these ESCerts to meet targets. In 2017, ESCerts trading generated a daily business of INR 64 million (approx. USD 1 million). Some of the other achievements include:

- PAT 1 cycle (2012-2015) resulted in a saving of 5635 MW power and USD 5.8 billion and 31 million tonnes of CO₂.
- PAT 2 cycle (2016-19) resulted in a saving of 17.5 mtoe of energy USD 3 billion and 60 million tonnes of CO₂.
- PAT III cycle is under evaluation and the targets for PAT IV cycle are being developed.

Institutional Design of the PAT Scheme

Type of Institution	Operations	Compliance	Trading (ESCerts)
Nodal Authority	Bureau of Energy Efficiency (BEE)		
Adjudicators, Quasi-Judicial & Judicial Institutions	-	State Electricity Regulatory Commission (SERC) and Adjudicating Officers, Appellate Tribunal	-
Agencies that interact with Designated Consumers (DCs)	State Designated Agency (SDA) & Inspecting Officers, Accredited Energy Auditors (AEA), Energy Auditor/Energy Manager at the Designated Consumer (DC)		Power Exchanges
Others	Energy Saving Companies (ESCOs)	Legal Experts	Traders

Stages of the PAT Cycle



Framework of Energy Efficiency Financing In India

To facilitate uptake of Energy Efficiency measure in the country, Government of India announced its Mission on Enhanced Energy Efficiency (NMEEE) under the National Action Plan on Climate Change (NAPCC). The key thought behind the NMEEE, aimed at industry, was the establishment of a Framework for Energy Efficient Economic Development (FEEED), which mainly focuses on developing fiscal and investment guarantee instruments to promote energy efficiency.

On behalf of Ministry of Power, Government of India, BEE has taken up several initiatives to strengthen the market for energy efficiency including innovative mechanisms to scale up financing of energy efficiency projects in India.

Under the initiative of Framework for Energy Efficient Economic Development (FEEED), BEE has created two financial instruments – **Partial Risk Guarantee Fund for Energy Efficiency (PRGF)** and **Venture Capital Fund for Energy Efficiency (VCFEE)** – to help financial institutions actively engage with industries, large commercial establishments, and project implementation agencies and provide funds for energy efficiency projects across the country.

Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)

The PRGFEE is a risk sharing mechanism to provide commercial banks with a partial coverage of risk involved in extending loans for EE projects. Eligible projects for which the PFI can apply for a guarantee could be credit facilities extended to ESCOs for EE projects. Sectors in the mandate of PRGFEE include government buildings, municipalities, SMEs and industries.

Framework and Activities

Parameter	Mission Design
Finance	USD 52 Million set aside
Policy Administration: Regulatory Frameworks	Participating Financial Institution (PFI) empanelled by the BEE to take guarantee from PRGFEE before disbursement of loan to the borrower. Guarantee will not exceed USD 50 billion or 50% of the loan (only principal), whichever is less.
Policy Administration: Coordination	BEE to select a PFI as an Implementing Agency (IA) for all activities - approval of proposals, signing guarantee agreements, regular monitoring and appointment of M&V consultant for processing guarantee claims.
Policy Administration: Monitoring	A Supervisory Committee has been constituted to provide guidance as well as monitor progress.

The roles and responsibilities of primary stakeholders under PRGFEE are:

BEE	Implementing Agency (IA)	Financial Institution (FI)
Nodal agency, appoints the IA	Assistance to BEE in empanelment of Participating Financial Institutions (PFIs)	Evaluates loan application
Updates the list of empanelled ESCOs	Reviews progress reports and statement of accounts	Monitors borrower account
Empanels independent M&V agency, and PFIs under PRGFEE	Updates Supervisory Committee on progress of the scheme	Safeguards primary securities

Carries out annual visits and submits reports to Supervisory Committee (SC)	Processes guarantee application and signs agreements with PFIs	Submits verification report with due diligence
Administer the program		Safeguards interest of PRGFEE

Venture Capital Fund for Energy Efficiency (VCFEE)

The VCFEE is a fund that provides risk capital to support EE investments in new technologies, goods and services. The fund helps in creating a volume in EE deal flow by the fund manager through advertising and soliciting opportunities in the EE area. ESCOs and companies that plan to undertake EE projects in the performance-contracting mode are the key beneficiaries. The support under VCFEE is limited to government buildings and municipalities.

Framework and Activities – VCFEE

Parameter	Mission Design
Finance	USD 35 Million set aside under the 12 th Five Year Plan
Policy Administration: Regulatory Frameworks	Fund is registered with Securities and Exchange Board of India (SEBI) under its Alternative Investment Funds Regulation. The BEE selects a Participating Financial Institution (PFI) as the Fund Manager. Any single investment by the fund cannot exceed USD 0.3 million or 15% of total equity, whichever is lesser, through Special Purpose Vehicles (SPV).
Policy Administration: Coordination	Fund Manager responsible for making investments
Policy Administration: Monitoring, Compliance	Board of trustees has been formed comprising Director General of Bureau of Energy Efficiency, Joint Secretary of Ministry of Law, Joint Secretary of Ministry of Power, a senior person from Power Finance Corporation and an energy efficiency expert. Trustees to monitor quarterly reports presented by the Fund Manager.

The roles and responsibilities of primary stakeholders under VCFEE are:

BEE	Fund Manager	Board of Trustees
Applies to Fund Manager for equity	Conducts due diligence	Approve the investment strategy
Submits documents for pre-approval	Develops investment strategy and pipeline of projects	Review the progress of funds regularly
Raises remaining equity and debt	Makes decisions on investments, exit strategies, management of liquidity and participate in management of investee equities	-

Towards the closing of the session, Mr. Abhay Bakre, Director General, BEE delivered the closing remarks and highlighted some of key points about the Energy Efficiency Landscape in India. Some of the key excerpts from his speech are as follows:

India has a total generation of 343 GW of which nearly 40% is consumed by the industrial sector followed by the residential sector. The Bureau of Energy Efficiency (BEE), created in 2001, as mandated under Energy Act, 2000 is responsible for providing regulatory support and

environment for the uptake of energy efficiency measures. India also has a National Mission on enhanced Energy Efficiency, launched in 2008. To promote energy efficiency, several initiatives have been taken at central level. Flagship initiatives include:

- Standards and Labeling for appliances & equipment, which has been hugely successful in India, now covers 21 equipment's, with 10 made mandatory and the standards over time have been made more stringent.
- Energy Consumption norms for energy intensive industries (PAT),
- Demand Side Management programs,
- Energy Conservation Building Code (ECBC) for commercial buildings, ECBC, which especially started as voluntary program has now been converted into mandatory regime. Though adopted from various existing programs, the Indian ECBC has been further developed as per the Indian climatic conditions. As of now, 12 states have already included it as bylaws.

Another key program, launched by the Government is the Unnat Jyoti by Affordable LEDs for all (UJALA), which targeted replacement of 770 million bulbs to be replaced by LED Bulbs, has already witnessed replacement of over 300 million bulbs. The government estimates a potential market of EE worth 20 million USD, for which ESCOs have been empaneled to institutionalize energy efficiency services and promote energy efficiency delivery mechanisms. The government is constantly working on exploring more options for implementing EE. Some identified options are developing state energy efficiency index, electric mobility plan.

Further towards the Governments' commitment to meet Nationally Determined Targets (NDC) agreed in the COP 21, the government is extensively working to promote and outreach, improving financing options, covering small and medium enterprises, conduct school level painting competitions and conducts seminars, workshops and capacity building programs.

Towards the end part of his speech, he ensured full support from Ministry of Power and especially Bureau of Energy Efficiency to the Vietnamese delegation in replicating or conceptualizing any of the similar programs in Energy Efficiency. He also extended best wishes on behalf of the Bureau for the rest of the Knowledge Exchange week.

3.2. Day 1, 2nd Half: Meeting with Energy Efficiency Services Limited (EESL)

Date: 25th February 2019

Venue: Bhabha Chamber, SCOPE Convention Center, 1st Floor, Core - 8, SCOPE Complex, 7 Lodi Road, New Delhi - 110 003 (INDIA)

Website: <https://www.eeslindia.org>

About Energy Efficiency Services Limited (EESL)

Energy Efficiency Services Limited (EESL) is a joint venture of four national Public-Sector Undertakings – NTPC Limited, Power Finance Corporation Limited, Rural Electrification Corporation Limited and POWERGRID Corporation of India Limited. As South Asia's first and foremost energy efficiency leader, EESL leads the market-related activities of the National Mission for Enhanced Energy Efficiency (NMEEE), one of the eight national missions under the Prime Minister's National Action Plan on Climate Change.

Growth and Impact

Founded in 2009 by the Government of India, EESL has reduced India's carbon footprint, peak energy demand, and electricity bills through energy efficiency intervention projects worth Rs. 43 billion in domestic lighting.

With an unprecedented 140X growth in 2 years, EESL's flagship initiative, Unnat Jyoti by Affordable LEDs for All (UJALA), has revolutionized India's access to energy efficient LED bulbs and reduced carbon emissions by up to 32 million tonnes every year. Energy Efficiency and Conservation (EE&C) across India's energy intensive industries and other key demand-side economic sectors promise an investment potential of INR 740 million through large-scale deployments.

Objectives of EESL

- To carry out and promote the business of Energy Efficiency and climate change including manufacture and supply of energy efficiency services and products.
- To provide consultancy services in the field of Clean Development Mechanism (CDM) projects, carbon markets, demand side management, energy efficiency, climate change and related areas.
- To act as resource center in the field of Energy Efficiency and take up the activities of Capacity Building, Training and other related activities.
- To carry out such other activities as offered by the Central Govt., Bureau of Energy Efficiency or any other agency related to Energy Efficiency and Climate Change.

EESL Business Models

EESL has designed an innovative business model that is scalable, flexible, embraces different and emerging technologies, is independent of public funding, and incentivises all stakeholders. Capable of delivering outcomes in a time-bound manner to enable more, it has the power to unlock demand in sectors where none existed. EESL can therefore drive large-scale initiatives to create markets for disruptive solutions.

The business model:

- Is simple and easy to comprehend, ensuring high adoption of solutions, thereby creating value for stakeholders by addressing sector-specific barriers
- Enables availability of future-ready solutions that are relevant to all sections of society – individuals, institutions, utilities, and governments
- Has low transaction cost, to enable ease of adoption, scalability and replicable across geographies
- Is flexible and agnostic of technologies, platforms, and solutions, and can drive markets across the value chain, from LED bulbs and solar photovoltaic (PV) plants to electric vehicles
- Has tangible and lasting economic and social benefits, and encourages all sections of the value chain
- Effectively communicates benefits to stakeholders to stimulate their participation
- Transparently disseminates performance-based outcomes and outputs in the public domain to enhance credibility and drive demand



Enabling smooth implementation of our programs, EESL work on two specific models:

Energy Service Company (ESCO) Model

Under this model, we undertake the entire upfront investment for the project, instead of relying on consumers or clients. The investment is recovered through periodic instalments which result from deemed energy savings over a mutually agreed-upon project period. Operation and maintenance of new equipment is liability of EESL during the contract period. This can enforce effective product warranties to ensure minimal downtime due to equipment malfunctions.

Project Management Consultant (PMC) Model

Under this model, EESL plays the role of Project Management Consultant (PMC) for project implementation. The upfront investment for the project in this model is borne by the client. For a one-time payment cost of services for energy efficiency projects, our client receives a lifetime of energy savings, translating to monetary savings

Proceedings of Day 1, 2nd Half

Day 1, 2nd half started off with the welcome of the Vietnamese delegation by Mr. Venkatesh Dwivedi, Director (Projects) at Energy Efficiency Services Limited (EESL). He gave the delegation an overview of the India's energy efficiency context along with a brief on EESL mandate and some of their flagship & largest programs like:

- Unnat Jyoti by Affordable LEDs for All (UJALA): World's largest zero-subsidy domestic LED bulb Program
- Street Lighting National Program (SLNP): World's largest street light replacement Program
- Agriculture Demand Side management (AgDSM): World's largest Agricultural Demand Side Management Program

Next, Mr. Prabhat Kumar, National Program Manager for EESL's Building Energy Efficiency Program, gave a detailed presentation on the Program followed by questions and answers.

Below are some of the key excerpts from his presentation. For further details, you may please refer the attached detailed presentation.



Topic: EESL's Building Energy Efficiency Program (BEEP)

Speaker: Mr. Prabhat Kumar, National Program Manager, Building Energy Efficiency Program

Under the Building Energy Efficiency Program, EESL intends to bring investment to the tune of USD 166 million covering more than 10,000 large government/private buildings in next 2-3 years. It is estimated that about 10 million LED lights, 1.5 million energy efficient ceiling fans and 0.15 million energy efficient ACs will be retrofitted by EESL in these buildings. Apart from retrofitting, EESL also aims to widen its services in areas like centralized AC system, Energy Audits and New Generation Energy Management System in buildings.

Building energy consumption accounts for over 30% of electrical energy consumption in the country and is rising annually at a rate of 8%. Till date (as on 24 Feb 2019), EESL's Building Energy Efficiency Program (BEEP) has completed LED lighting implementation in total 10,102 buildings including Railway stations and Airports. Work is under progress in 650 buildings across India. The Program has two business models.

1. The ESCO (Energy Servicing Company) model, where the entire upfront investment is done by EESL which is paid back by the building owner from the energy saving resulted by the intervention.
 - a. Project Cost = Upfront Investment + PMC Fees + Interest on Debt + Return on Equity
2. The other model is PMC (Project management consultancy), where onetime payment cost of services is paid to EESL who then support the complete project implementation.

Some challenges that the program implementation still faces since its launch are lack of awareness of energy efficiency projects, lack of baseline data in energy efficiency, ESCO credibility, lack of awareness about energy performance contracting, access to finance and technical know-how. To facilitate the market, there are provisions by EESL under ESCO. There is cost aggregation by demand aggregation as well as comprehensive warranty by EESL. There is also National Building Dashboard to monitor the same.

This was followed by a presentation by the EESL's Street Lighting National Program (SLNP) team. ***Below are some of the key excerpts from the presentation.*** For further details, you may please refer the attached detailed presentation.

Topic: EESL's Street Lighting National Program (SLNP)

Speaker: Mr. Santosh Kumar Thakur, General Manager (Technical)

Street Light National Program (SLNP) is an initiative of the Government of India to promote energy efficiency in the country.

Launched by Hon'ble Prime Minister on 5th January, 2015 to replace the approx. 13.4 million numbers of conventional street lights with smart and energy efficient LED street lights to achieve set targets of Expected annual energy savings of 9 billion kWh, Expected reduction of installed street light load of 1,500 MW, Annual estimated greenhouse gas emission reductions of 6.2 million tonnes of CO₂, by 2019.

Energy Efficiency Services Limited (EESL), a Public Energy Services Company under the administration of Ministry of Power, Government of India (GoI) is the implementing agency for SLNP.

Objective of this Program

- Mitigate climate change by implementing energy efficient LED based street lighting
- Reduce energy consumption in lighting which helps DISCOMs to manage peak demand
- Provide a sustainable service model that obviates the need for upfront capital investment as well as additional revenue expenditure to pay for procurement of LED lights
- Enhance municipal services at no upfront capital cost of municipalities

EESL Service Model

EESL replaces the conventional street lights with LEDs at its own costs and consequent reduction in energy and maintenance cost of the municipality is used to repay EESL over a period of time. The contracts that EESL enters into with Municipalities are typically of 7 years duration where it not only guarantees minimum energy savings but also provides free replacements and maintenance of lights at no additional costs to the municipalities. The service model enables the municipalities to go in for the state of the art street light with no upfront capital cost and repayments to EESL are within the present level of expenditure. Thus there is no additional revenue expenditure required to be incurred by the municipality for change over to smart and energy efficient LED street lights.

Procurement

EESL procurements conform to Bureau of Indian Standards (BIS) specification & carry a 7-year warranty against technical defects. EESL conducts appropriate quality checks right from the bidding stage to the field level. This has resulted in the LEDs' overall technical fault being less

than 2% of lights installed by EESL in the country. EESL has maintained an uptime of 97% for all street lights across the country.

Grievance Redressal Mechanism

EESL has a stringent complaint redressal mechanism wherein consumers can go to the "Register your complaint" section on the program dashboard www.ujala.gov.in, or on EESL social media handles - for Twitter [@EESL_India](https://twitter.com/EESL_India) and for Facebook [@EESLIndia](https://www.facebook.com/EESLIndia) for registering complaints. They can also contact the All-India helpline number 1800 180 3580. The official EESL complaint registration email ID is helpline@eesl.co.in. Consumers can also register their complaints at the EESL complaint logging portal - <http://support.eeslindia.org/>. Further EESL has installed **Centralized Control and Monitoring System (CCMS)** to enable remote operation and monitoring of the street lights. CCMS provides real time information on energy consumption and remote monitoring of the street lights.

Till-date achievement:

- Number of street lights replaced – 8.4 million
- Expected annual energy savings – 5.6 billion kWh
- Expected reduction of installed street light load – 941 MW
- Annual estimated greenhouse gas emission reductions – 3.89 million tonnes of CO₂
- Coverage across states: 12 States in India

Present status

The real-time present status of the Program can be accessed at <http://slnp.eeslindia.org/>

The next presentation was on the Smart Meter Program in India. ***Below are some of the key excerpts from the presentation.*** For further details, you may please refer the attached detailed presentation.

Topic: EESL's Smart Meter National Program (SMNP)

Speaker: Ms. Mayuri Chaukhande, Assistant Manager

Working to rapidly establish its stated goal of pan-India universal electricity access, the Government of India is enabling Smart Grids which can offer affordability and other benefits to consumers. The first step towards realising Smart Grids is the implementation of Advanced Metering Infrastructure (AMI).

The Smart Meter National Program (SMNP) is being implemented to deploy smart meters across the country. The scheme is being implemented by Energy Efficiency Services Limited (EESL), a JV of PSUs under Ministry of Power.

Advanced Metering Infrastructure

AMI (Advanced Metering Infrastructure) is the collective term to describe the whole infrastructure from Smart Meter to two way-communication network to control centre equipment and all the applications that enable the gathering and transfer of energy usage information in near real-time. AMI makes two-way communications with customers possible and is the backbone of smart grid. The objectives of AMI can be remote meter reading for error free data, network problem identification, load profiling, energy audit and partial load curtailment in place of load shedding.

Building Blocks of AMI

AMI is comprised of various hardware and software components, all of which play a role in measuring energy consumption and transmitting information about energy, water and gas usage to utility companies and customers. The overarching technological components of AMI include:

- **Smart Meters** - Advanced meter devices having the capacity to collect information about energy, water, and gas usage at various intervals and transmitting the data through fixed communication networks to utility, as well as receiving information like pricing signals from utility and conveying it to consumer.
- **Communication Network** - Advanced communication networks which supports two-way communication enables information from smart meters to utility companies and vice-versa. Networks such as Broadband over PowerLine (BPL), Power Line Communications, Fiber Optic Communication, Fixed Radio Frequency or public networks (e.g., landline, cellular, paging) are used for such purposes.
- **Meter Data Acquisition System** - Software applications on the Control Centre hardware and the DCUs (Data Concentrator Units) used to acquire data from meters via communication network and send it to the MDMS
- **Meter Data Management System (MDMS)** - Host system which receives, stores and analyzes the metering information.

Benefits

The benefits of AMI are multi-fold and can be generally categorized as:

- **Operational Benefits** – AMI benefits the entire grid by improving the accuracy of meter reads, energy theft detection and response to power outages, while eliminating the need for on-site meter reading.
- **Financial Benefits** – AMI brings financial gains to utility, water and gas companies by reducing equipment and maintenance costs, enabling faster restoration of electric service during outages and streamlining the billing process.
- **Customer Benefits** – AMI benefits electric customers by detecting meter failures early, accommodating faster service restoration, and improving the accuracy and flexibility of billing. Further, AMI allows for time-based rate options that can help customers save money and manage their energy consumption.
- **Security Benefits** – AMI technology enables enhanced monitoring of system resources, which mitigates potential threats on the grid by cyber-terrorist networks.

Challenges

Despite its widespread benefits, deploying AMI presents three majors challenges that include high upfront investments costs, integration with other grid systems, and standardization.

- **High Capital Costs:** A full scale deployment of AMI requires expenditures on all hardware and software components, including meters, network infrastructure and network management software, along with cost associated with the installation and maintenance of meters and information technology systems.
- **Integration:** AMI is a complex system of technologies that must be integrated with utilities' information technology systems, including Customer Information Systems (CIS), Geographical Information Systems (GIS), Outage Management Systems (OMS), Work Management (WMS), Mobile Workforce Management (MWM), SCADA/DMS, Distribution Automation System (DAS), etc.
- **Standardization:** Interoperability standards need to be defined, which set uniform requirements for AMI technology, deployment and general operations and are the keys to successfully connecting and maintaining an AMI-based grid system.

AMI in the Indian Context

Modernizing India's grid system by investing in AMI promises to mitigate a number of strains placed on the grid due to growing demand for electric, gas and water resources. In particular, AMI will improve three key features of India's grid system including:

- **System Reliability:** AMI technology improves the distribution and overall reliability of electricity by enabling electricity distributors to identify and automatically respond to electric demand, which in turn minimizes power outages.
- **Energy Costs:** Increased reliability and functionality and reduced power outages and streamlined billing operations will dramatically cut costs associated with providing and maintaining the grid, thereby significantly lowering electricity rates.
- **Electricity Theft:** Power theft is a common problem in India. AMI systems that track energy usage will help monitor power almost in real time thus leading to increased system transparency.

Implementation of SMNP

The SMNP aims to replace India's 250 million conventional meters with smart meters. The smart meters procurement will be done by EESL. To begin with, the Program is initiated for the states of Haryana and Uttar Pradesh, states with AT&C losses as large as 28.42% and 34.36% respectively.

EESL's proven model of bulk procurement, aggregation of demand, and monetisation of savings will be the approach to roll out smart meters. This roll-out is proposed under the Build-Own-Operate-Transfer (BOOT) model, wherein EESL will undertake all the capital and operational expenditure with zero upfront investment from states and utilities.

EESL, on its investment, shall earn a nominal Internal Rate of Return (IRR) through a mutually agreed automated payback structure during the concession period, along with payment security mechanism from state governments and utilities.

Benefits to the consumer:

- Smart meters ensure consumer get real time and accurate bill for their electricity consumption
- Smart meters provide a greater control over electricity usage. Consumers can track their electricity usage and accordingly alter their habits – Time of Day / Time of Use Tariff
- Smart meters ensure energy and monetary savings
- Smart meters help consumers with new Value-added services.
- AMI functionalities improve customer satisfaction level for providing accurate billing due to automation, real time consumption information, automatic outage detection

This roll-out is proposed under the Build-Own-Operate-Transfer (BOOT) model, wherein EESL will undertake all the expenditure of investment and cost of operation with zero upfront investment from states and utilities. EESL will earn its pay back through a mutually pre agreed structure of internal rate of return (IRR) from state governments and utilities.

Installation of these smart meters with its associated Internet of Things (IoT) capabilities will enable the Electricity Distribution Companies (DISCOMs) to:

- Obtain real time energy consumption data of each consumer
- For subsequent analysis and will pave the way for initiating various smart measures by DISCOMs like
- Time of Day (TOD)/Time of Use (TOU) billing,
- Prediction and management of peak demand,

- Providing real time energy consumption data to consumer,
- Prepaid billing facility,
- Remote connection and disconnection of load,
- Accurate billing, etc.

Installation of these meters will also obviate the need for the meter reader's visit to each consumer.

The next presentation was on the Unnat Jyoti by Affordable LEDs and Appliances for All (UJALA). ***Below are some of the key excerpts from the presentation.*** For further details, you may please refer the attached detailed presentation.

Topic: EESL's Unnat Jyoti by Affordable LEDs for All (UJALA)

Speaker: Mr. Ashish Malviya, Senior Manager (Technical)-UJALA

The EESL's Unnat Jyoti by Affordable LEDs for All (UJALA, meaning Light in Hindi), is the world's largest lighting replacement Program. By 2019, UJALA aims to replace 770 million old wasteful lamps with modern, efficient and longer lasting LED lamps, without the need for any government subsidies.

To date more than 100 million LED bulbs have been delivered across the country, completely transforming the way people look at LED bulbs and energy efficiency.

UJALA's LED bulbs cost only 80 cents and UJALA allows the consumers to buy them for an initial payment of 16 cents, and the balance is paid through the consumer's electricity bills in equal monthly installments of 16 cents.

In the future, EESL plans to continue to deliver these and more multiple benefits to other Indian manufacturers with the introduction of new energy efficiency initiatives to transform the markets for residential fans, street lighting and agricultural pumps.

An ordinary bulb is an extremely energy inefficient form of lighting with just 5% of the electricity input converted to light. Efficient light bulbs like Light-emitting Diode (LEDs) consumes only one-tenth of energy used by ordinary bulb to provide the same or better light output. However, high cost of LEDs has been a barrier in adoption of such efficient lighting systems. The Domestic Efficient Lighting Program (DELP) on-bill financing scheme proposes to overcome this cost barrier.

The scheme was named "UJALA" – as an acronym for Unnat Jyoti by Affordable LEDs for All. Under the scheme, 20W LED tube lights and BEE 5-star rated energy efficient fans are also distributed to the consumers. The 20W LED tube lights are 50% more energy efficient than conventional 40W tube lights and are available for \$3.67 per tube, as against the market price of \$6.67-10. The energy efficient fans under the UJALA scheme come with a BEE 5 Star rating. These ceiling fans are rated 30% more energy efficient than conventional fans and are priced at \$20 per fan.

Present status

The real-time present status of the Program can be accessed at:

- National UJALA Dashboard <http://www.ujala.gov.in/>
- National Pavan Dashboard <http://fan.ujala.gov.in/>
- National Tube light Dashboard <http://ledtubes.ujala.gov.in/>

3.3. Day 2: Visit to GBTL Limited, Bhiwani (PAT Designated Industry Consumer)

Date: 26th Feb 2019 (Tuesday)

Venue: GBTL Limited (Formerly Grasim Bhiwani Textiles Ltd), BTM Road, Bhiwani, 127021, Haryana, INDIA

Website: Not Available

About GBTL Limited

GBTL Ltd. (Formerly known as Grasim Bhiwani Textiles Ltd.) has a strong presence in manufacturing of Polyester Viscose (PV) fabric and caters to the market under brands Grasim & Graviera. GBTL sells fabric both in the domestic as well as in the international market across geographies. The Domestic OTC division operates in Domestic over the counter (OTC) formal menswear fabric market by offering Ready to Stitch suiting. The Brands & Retailers division caters to domestic as well as international customers by supplying fabric and also acts as Full Service Provider by offering one stop solution of fabric to garmenting.

GBTL is the country's largest manufacturer of PV and PW suiting, selling its products under the "Grasim" and "Graviera" brands in India in over 25 countries. The biggest strengths of GBTL are its quality-conscious trade partners and global customers. GBTL caters to international fashion houses in the US and the UK, supplying fabric to them for making garments which are available in some of the largest retail chain stores.

Day 2 started off with early morning travel from Delhi to the PAT Site in Bhiwani (Bhiwani is a



city and a municipal council in Bhiwani district in the state of Haryana, India).

At the site, it started off with the welcome of the Vietnamese delegation by Mr. Dhruva Singh Chauhan, Whole Time Director at GBTL Limited. He gave the delegation an overview of the facility along with a brief on the compliances being followed by GBTL

Limited on the Perform, Achieve and Trade Scheme.

This was followed by a detailed presentation by Mr. Ram Kumar Upadhyay, Energy Auditor on the specific energy conservation initiatives undertaken by the facility.

Below are some of the key excerpts from the presentation. For further details, you may please refer the attached detailed presentation.

Topic: Energy Conservation Initiatives and PAT Compliance Measures at GBTL Limited

Speaker: Mr. Dhruva Singh Chauhan, Director & Mr. Ram Kumar Upadhyay, Energy Auditor

The **Indian Textile Market** is very large, about USD 150 billion as of July 2017, and plays a vital role in the Indian economy. It contributes to 4% of India's GDP, 14% of India's total manufacturing output, 14% of overall index of industrial production (IIP) and 13% of India's export earnings. India has 6% share in world textile export market, amounting to 37.74 billion USD during FY 2017-18, and is the third largest exporter of Textiles. The textile market is growing at a CAGR of 13.58% during 2009-2018. Indian Textile sector employs over 45 million people in about 3,400 mills.

Indian Textile industry is highly diversified in nature. It varies from the traditional hand-spun and hand-woven textile sub-sectors to the large mills sector. Power looms and Knitting sector form the largest part of the textile sector. The sector consists of many processes like spinning, weaving, knitting, dyeing, printing, finishing, etc.

Sectoral contribution to Country's Economic value

India's Textile Industry plays a vital role in terms of contribution to Indian economy through export. India's textile export was 37.74 billion USD during FY 2017-18. Indian Textile sector contributes to 13% of India's export earnings. India has approximately 3,400 textile mills ranging from large to small to micro scale industries. Out of these, 90 units were identified as DCs under PAT Cycle – I, based on the minimum threshold of energy consumption of 3000 TOE.

Textile industry can be divided broadly into 3 manufacturing processes:

1. Spinning
2. Weaving
3. Processing

PAT Cycle – I and Textile Sector

PAT is a regulatory instrument to reduce specific energy consumption (SEC) in energy intensive industries, with an associated market-based mechanism to enhance cost effectiveness through certification of excess energy savings, which could be traded. Energy Savings Certificate (ESCerts) are issued to the industries which reduces their SEC beyond the target, whereas, those who fails to achieve their target are entitled to purchase the certificate for compliance, or liable to be penalized. The platforms for trading of ESCerts are the existing power exchanges.

PAT cycle-I came into force from 2012, with financial years 2007–08 to 2009–10 as the baseline. The minimum gate-to-gate energy consumption (threshold) of textile sector was notified as 3,000 tonne of oil equivalent (TOE); plants in the sector consuming energy above the threshold value were notified as DCs. These plants were given the target Specific Energy Consumption (SEC) reduction based on the average value of specific energy consumed by them for the baseline years. Under PAT cycle-I, 90 textile units were listed as DCs (Designated Consumer) and were mandated to reduce their energy consumption as per the target given. The total reported annual energy consumption of these designated consumers was about 1.2 million TOE in the baseline period. These DCs were given SEC target reduction of 5.5% and

energy saving target of 0.066 million TOE, which was 0.99% of the total national energy saving target under PAT cycle-I.

Subsequently, after the completion of PAT Cycle-I, 99 units in Textile sector were notified as DCs with total energy consumption of 1.47 million TOE in PAT cycle-II. The targeted energy saving for PAT Cycle - II is 0.09 million TOE. In PAT Cycle-III, 34 DCs were notified with an annual energy consumption of 0.66 million TOE and target of 0.04 million TOE.

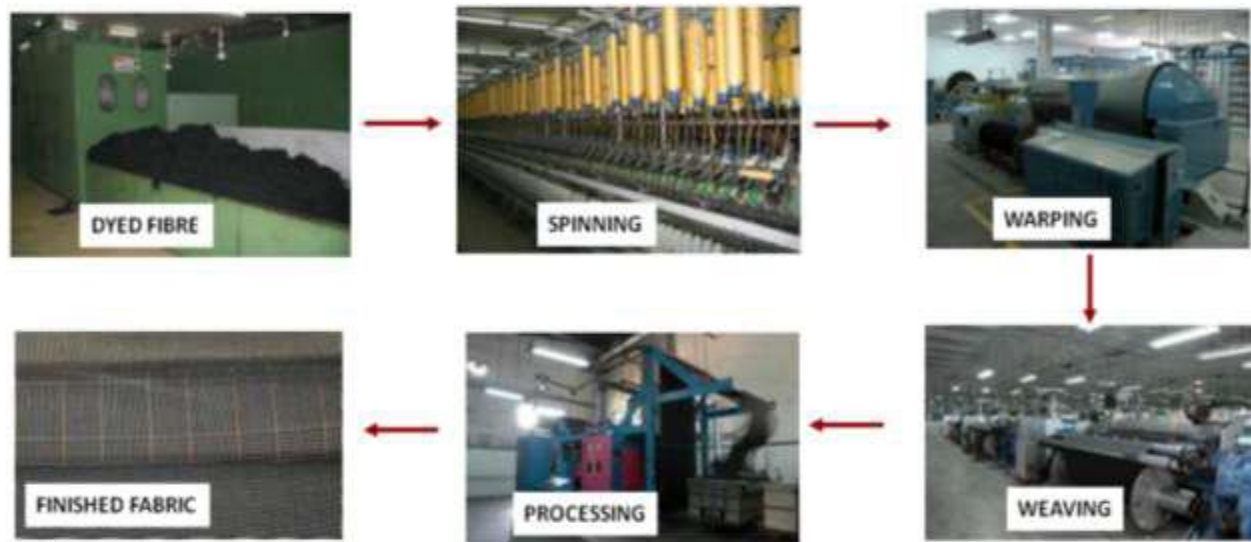
List of major energy saving opportunities in the sector

A list of major energy saving opportunities in the sector have been identified and listed below. The projects are listed based on readiness level, co- benefits obtained by installing the system and based on expected payback range by implementing the project.

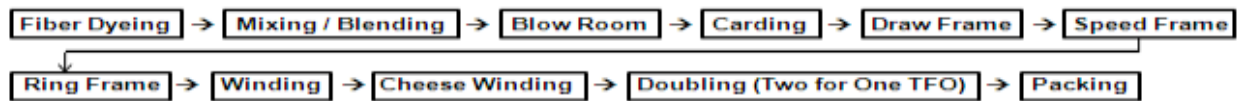
Technology Readiness Level (TRL):	Co-Benefits: POCDSME	Payback Horizon (PB)
TRL 1 – Research (Basic or Advanced)	Productivity (P)	PB 1 – less than 1 year
TRL 2- Proof of concept	Quality (Q)	PB 3 – 1 year to 3 years
TRL 3- Demonstration(Pilot)	Cost(C)	PB 5 – 3 to under 5 years
TRL 4- First of a Kind	Delivery (D)	PB 8 – 5 to under 8 years
TRL 5- Fully Commercial	Safety (S)	PB 12 – 8 to under 12 years
	Moral (M)	PB >12 – over 12 years
	Ethics, Environment (E)	

SL No.	Technology	Co-Benefits e.g.: (P, Q, C, D, S, M, E)	Readiness Level (TRL)	Payback
1	Centrifugal compressors installation	C, E	TRL-5	PB 5
2	Energy monitoring and management system	C, D, E	TRL-3	PB 8
3	Variable frequency drive	C, E	TRL-5	PB 3
4	Install waste heat recovery for stenters	C, E	TRL-5	PB 5
5	Replacing Electric heating with thermic fluid heating in Polymeriser	C, E	TRL-5	PB 3
6	Installation of photo cells for speed frames	C, E	TRL-5	PB 5
7	Installation of TIC controller for Processing machines	C, E	TRL-5	PB 3
8	Optimisation of Balloon settings in TFO machine	C, E	TRL-5	PB 5
9	Installation of Synthetic Flat belts for spinning ring frames	C,E	TRL-5	PB 3
10	Install automatic valves in continuous washing machine	C,E	TRL-5	PB 5
11	Condensate recovery in wet processing plant	C,E	TRL-5	PB 5
12	Install trans-vector nozzle for cleaning	C,E	TRL-5	PB 5
13	Installation of mechanical pre-drying	C,E	TRL-5	PB 3
14	Energy efficiency in electrical equipment (EE motors & LEDs)	C,E	TRL-5	PB 3
15	Cooling tower up-gradation (Retrofitting of CT & installation of VFDs)	C,E	TRL-5	PB 5

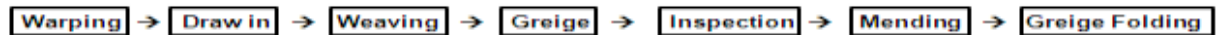
Process Flow at GBTL Limited



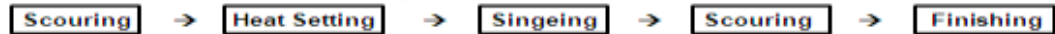
Process Flow of Fiber to Yarn



Process Flow of Yarn to Fabric



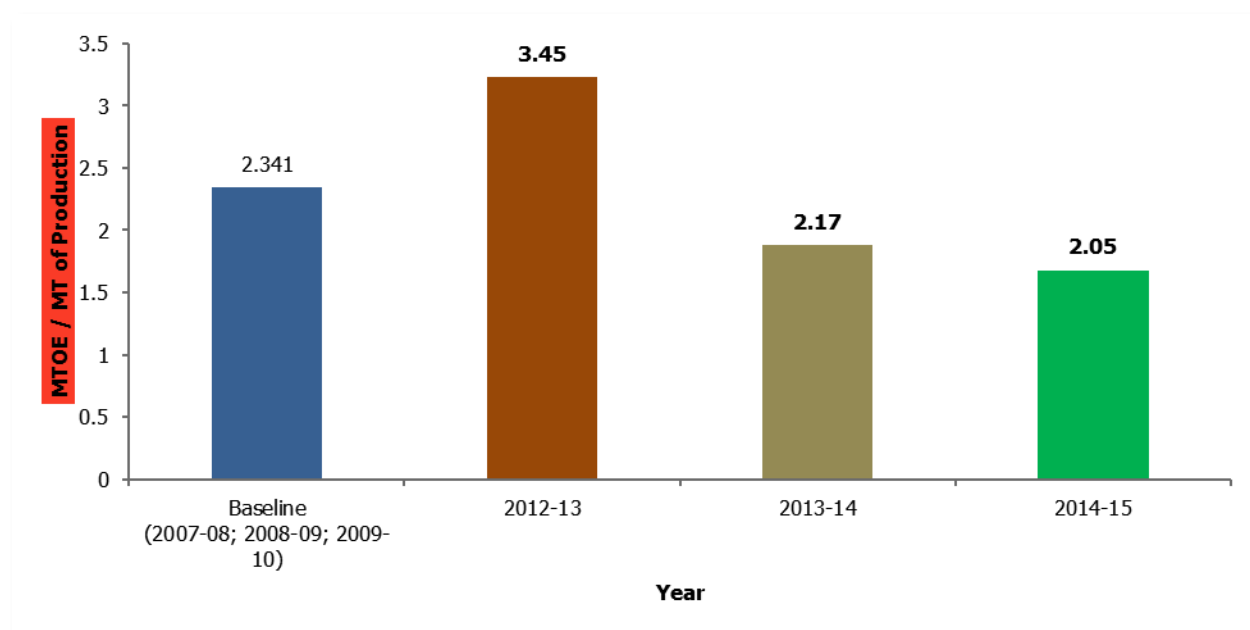
Process Flow of Fabric Processing



Annual Production Capacity

Spinning	35000 spindles
Weaving	140 looms
Processing	18 million meters
Power Plant	8MW

PAT-I Cycle Target for GBTL Limited



Energy Saving Target : 4.5%,
 Energy Saving Achieved : 16%
 ESCerts Earned : 3196 units

Energy Conservation Measures at GBTL Limited

Project (Electrical Energy)	Saving (Million kWh/year)	Saving (USD/year)	Investment (USD)	Payback (Yrs.)
Re-Engineering of Humidification Plants	1.37	112857	147000	1.30
Replacement of old inefficient motors (77 Nos.) of various ratings with energy efficient motors	0.28	23286	27000	1.16
VFD installation on Stenter machine	0.15	6571	13000	1.98
VFD Installation on ID Fan, FD Fan & Screw feeders of 30 Lac Kcal Capacity thermopac at SPH	0.08	6571	27000	4.11
VFD Installation HTHP (High Temperature High Pressure) Machine	0.04	3000	3571	1.19
Replacement of Straight type Overhead blowers with Bend type blowers	0.11	9143	0	0.00
Replacement of Old Chese Winding Machine with Energy Efficient Machine	0.06	5143	142857	27.78
Air Compressor pressure optimization at Spinning	0.10	8132	0	0.00
VFD Installation - BFWP 1 & 2 (Boiler Feed water Pump)	0.13	11143	73571	6.60
VFD Installation - PA Fan (Primary air fan)	0.04	3571	4714	1.32
VFD Installation - CT Fan (Cooling tower fan)	0.08	6714	3571	0.53
VFD Installation – Compressor	0.03	2571	4429	1.72
VFD Installation - ACWP (Auxiliary cooling water pump)	0.04	3286	1714	0.52
VFD Installation - CWP (Cooling water pump)	0.08	6429	4429	0.69
Total	2.597	208417	452856	2.17

Project (Steam Saving)	Saving (Million kcal/year)	Saving (USD/year)	Investment (USD)	Payback (Yrs.)
TPP Boiler Modification to reduce dump steam & to meet variable PLF requirement	0.08	95714	50000	0.52
TPP Boiler Automatic blowdown & blowdown flash steam recovery system	1.08	3429	18857	5.50
TPP Turbine Modification to reduce specific steam consumption	2.08	794143	472143	0.59
Total	3.24	893286	541000	0.60

Project (Water Saving)	KL/annum	Saving USD	Investment (USD)
Water Recovery from Relax Scouring Machine	60687	4117	50000
Backwash water from Softening Plant	60111	4078	0
ETP Water Recycle by RO Plant	106780	7244	28571
Cooling water Recycle in Process House	15901	2397	7143
Total	243479	17836	85714

3.4. Day 3: Meeting with Financial Institutions

3.4.1. Presentation by Punjab National Bank (PNB)

Day 3 kicked-off with meeting Punjab National Bank at the World Bank office in New Delhi.

Date: 27th Feb 2019 (Wednesday)

Venue: The World Bank Hindustan Times Building 18-20, Kasturba Gandhi Marg New Delhi 110001

Website: <https://www.pnbindia.in/>

About Punjab National Bank

Punjab National Bank, India's first Swadeshi Bank, commenced its operations on April 12, 1895 from Lahore, with an authorised capital of \$ 2,900 and working capital of \$ 290. Far-sighted visionaries and patriots like Lala Lajpat Rai, Mr. E.C. Jessawala, Babu Kali Prasono Roy, Lala Harkishan Lal and Sardar Dyal Singh Majithia displayed courage in giving expression to the spirit of nationalism by establishing the first bank purely managed by Indians with Indian Capital. During the long history of the Bank, 7 banks have merged with PNB.

The Bank's brand image and trust reposed by its customers have been reflected in growing customer base and rising business graph of the Bank. Domestic Business of the Bank is over \$0.167 Million and the Bank continues to maintain its forte in low cost CASA deposits. The Bank has shaken off one of the biggest adversities in its history and has rebounded back. Focus on recovery and arresting fresh slippages with a simultaneous shift towards higher earnings through qualitative credit growth along with rationalization of Risk Weighted Assets (RWAs) has helped Bank to return to profit and improve CRAR.

The Bank has been able to achieve better results in the quarter owing to MISSION PARIVARTAN, a transformational exercise underway for Business Excellence aimed at enhancing Efficiency, Productivity and Profitability for long term sustenance and giving the Bank an edge over its competitors. `Mission Parivartan Division`, an independent `THINK TANK` formed to initiate, implement and drive change through improvement in People, Products and Processes, has enabled Bank to serve the customers with enhanced vigour and zeal to live up to its tagline "The Name you can Bank Upon".

India: Solar Rooftop Investment Program by Asian Development Bank

The main objective of ADB PNB loan Program for solar rooftop is to support the implementation of MNRE grid connected rooftop Program with a focus on financing solar rooftop systems on Commercial and Industrial buildings on standalone or aggregate basis without GOI/State Govt. subsidy

The proposed \$505 million sovereign-guaranteed Solar Rooftop Investment Program (SRIP) is a multi-tranche financing facility, consisting of \$500 million financial intermediation loans and a \$5 million capacity development technical assistance. As requested by the Government of India, Punjab National Bank is the borrower, and the India provided a sovereign guarantee to the Asian Development Bank for the SRIP.

The SRIP intends to primarily finance large solar rooftop systems on industrial and commercial buildings on standalone or aggregated basis. Punjab National Bank's loans to sub borrowers will be priced based on Punjab National Bank's cost of funds and subproject-specific risks. The proposed accompanying technical assistance for \$5 million is critical to integrate the building blocks of the Government of India's sector development initiative to ensure a viable market demand, by strengthening (i) Punjab National Bank's institutional capacity, and (ii) certain market development elements.

SRIP's value addition, inclusive of \$330 million from ordinary capital resources and \$170 million from Clean Technology Fund, is to facilitate India's transition to a low carbon economy and therefore contribute to the climate change goal of reducing greenhouse gas emissions by 441,700 tons of carbon dioxide equivalent annually, or about 11 million tons of carbon dioxide equivalent over the typical 25-year lifetime of rooftop solar systems. Some of the key details for the Solar Rooftop Investment Program are as follows:

Project Name	Solar Rooftop Investment Program
Project Type / Modality of Assistance	Loan Technical Assistance
Source of Funding / Amount	<p>MFF Facility Concept 0095-IND: Solar Rooftop Investment Program</p> <p>Ordinary capital resources US\$ 330.00 million</p> <p>Clean Technology Fund US\$ 170.00 million</p> <p>TA 9187-IND: Solar Rooftop Investment Program</p> <p>Clean Technology Fund US\$ 5.00 million</p> <p>MFF Facility Concept: Solar Rooftop Investment Program</p> <p>World Bank (IBRD) US\$ 647.90 million</p>
Strategic Agendas	Environmentally sustainable growth Inclusive economic growth
Drivers of Change	Gender Equity and Mainstreaming Governance and capacity development Knowledge solutions Partnerships Private sector development
Sector / Subsector	Finance / Infrastructure finance and investment funds
Project Rationale and Linkage to Country/Regional	The Government of India (government) plans to expand the country's solar rooftop capacity by 40 gigawatts (GW) by 2022. To fuel India's economic growth, its power system will have to expand rapidly over the

Strategy	<p>next decade. This is also to maintain national energy security and expand energy access to all people in India.</p> <p>To ensure environmental sustainability, the government places a high priority on renewable energy development. India's National Action Plan on Climate Change (prepared in 2008) outlines existing and future policies and programs addressing climate mitigation and adaptation. Under the plan, the government launched the Jawaharlal Nehru National Solar Mission (JNNSM) in 2010 to add 20 GW of grid connected solar energy by 2022. On 17 July 2015, the Union Cabinet approved a revised JNNSM proposal to increase the original 20 GW solar energy target to 100 GW by 2022, including 40 GW of rooftop solar energy generation.</p> <p>The proposed Solar Rooftop Investment Program would therefore</p> <ol style="list-style-type: none"> i. establish a solar rooftop financing facility at Punjab National Bank to provide dedicated debt financing to help India meet its 40 GW solar rooftop capacity target by 2022; and ii. provide associated institutional capacity and market development support, leading to a pipeline of bankable subprojects.
Impact	Energy security provided to all in an environmentally sustainable manner, and renewable energy developed

Technical Assistance: Facilitating Solar Rooftop Investment in India

Introduction

A capacity development technical assistance (TA) grant in the amount of \$5 million will be provided to the Government of India (government) to support (i) the implementation of Asian Development Bank Solar Rooftop Investment Program (SRIP) and (ii) associated institutional capacity and market development in the solar rooftop sector in India. The rationale for such a capacity development TA is to provide the necessary conditions to create bankable solar rooftop subprojects to enable Punjab National Bank (PNB), the SRIP borrower, to finance these subprojects. The proposed capacity development TA is to be implemented over 5 years from January 2017 – January 2022, and aligned with the other relevant ongoing and future sector capacity development initiatives.

Outputs and Key Activities: The proposed TA would have three main components:

- I. PNB institutional capacity development,
- II. market development, and
- III. awareness campaign, each of which will be implemented jointly by Ministry of New and Renewable Energy (MNRE), 2 PNB, and/or ADB. While ADB will administer the proposed TA, the training component will be delegated to and implemented by MNRE and PNB, both of which will be the TA executing agencies of the training component.

Because the TA will partly leverage the capacities of existing training facilities: (i) MNRE's 35 partner institutions under its Solar Energy Training Network (SETNET) and (ii) PNB's 30 regional training centers, such extensive training programs under the TA are best managed by MNRE and PNB respectively. The executing agencies' capacities on procurement, consultants recruitment, financing management, risk management, financial reporting, and payment approval and procedures were assessed and found to be adequate.

I. PNB Institutional Capacity Development

- a. *Establishment of dedicated solar rooftop units at its headquarters and selected branches (ADB—administered).*

The proposed capacity development TA would help PNB establish solar rooftop units (SRU) at its headquarters and relevant branches by recruiting and deploying technical analysts to help originate, review, price, approve, administer, and/or monitor solar rooftop projects. The SRU established at PNB headquarters would also function as the ADB program administration unit.

- b. *Train-the-trainer component (PNB—administered).*

The capacity development TA will support the training efforts provided by the 30 PNB regional training centers dedicated for the SRIP. This will be achieved through training the trainers in PNB's training centers to provide the necessary skill sets to originate, review, price, approve, administer, and/or monitor solar rooftop projects. The training would be provided at both headquarters and branch (zonal) offices.

- c. *Business advisory support (ADB—administered).*

The proposed capacity development TA would recruit a renewable energy service company to work with potential sub borrowers to bring the developed subprojects to PNB for financing. The renewable energy service companies would (i) prepare feasibility studies, financial projections, project structuring, and other matters related to sub loan application to PNB; (ii) review compliance requirements, including necessary licenses, permits, and clearances; (iii) arrange service providers [e.g., equipment suppliers, and EPC (engineering, procurement, and construction) and maintenance contractors]; and (v) undertake other steps leading to system operation. The legal consultant (firm) would provide any related business legal support.

- d. *ADB project administration and monitoring (ADB—administered).*

This is the first time PNB will have undertaken a loan from ADB. The proposed capacity development TA would provide a team leader and the procurement consultant to help PNB follow ADB administration guidelines.

II. Market Development

- a. *Market training program (MNRE—administered).*

MNRE's 35 SETNET partner institutions would build capacities among the solar energy professionals community in India through various training methods, including standardized training curricula. The proposed TA consultants could support the training of relevant SETNET trainers and/or fund the training programs, including to selected state nodal agencies (SNAs), 5 power distribution companies, solar rooftop project developers, system installers and engineers, and others relevant stakeholders.

- b. *Recruitment and deployment of technical analysts (MNRE—administered).*

The proposed TA would support the establishment of dedicated solar cells in identified states and the recruitment of technical experts to be deployed to these solar cells, SNAs, or even power distribution companies, among others.

c. Dedicated websites and toolkit (ADB—administered).

ADB would work with MNRE and PNB to develop a dedicated solar rooftop website to provide a single information source, including a toolkit, for provide one-stop shop for solar rooftop project development and financing. The ADB primary TA consultants would help develop a toolkit, which would provide rooftop owners, developers, bankers, and other relevant stakeholder's information regarding all aspects of solar rooftop systems.

III. Awareness Campaign (MNRE and PNB—administered)

- a. The proposed capacity development TA would also help MNRE and PNB promote solar rooftop systems and available financing facilities in India by raising public awareness of their technical and commercial benefits. In particular, the TA consultants would help MNRE and PNB: (i) undertake a formal SRIP launch event of the ADB–PNB financing facility; (ii) conduct nationwide and state-level marketing and awareness multi-media campaigns including local media (e.g., newspapers, television, radio) and other available and effective media channels including Internet websites; (iii) undertake marketing calls to potential industrial, commercial, and residential clients; and (iv) develop other outreach programs. The websites and toolkits would support the efforts under this component. These activities will be carried out through third party contracts. The ADB communication consultant will provide the relevant support to MNRE and PNB.

Cost and Financing

The proposed capacity development TA is estimated to cost \$5,000,000 to be financed on a grant basis by the Clean Technology Fund.

For details on the specific scheme, please refer additional documentation in the shared drive or visit <https://mnre.gov.in/file-manager/UserFiles/PNB-Scheme-for-Financing-Rooftop-Projects.pdf>

Topic: Emerging Innovative Clean Energy Financing Mechanisms and Business Models)

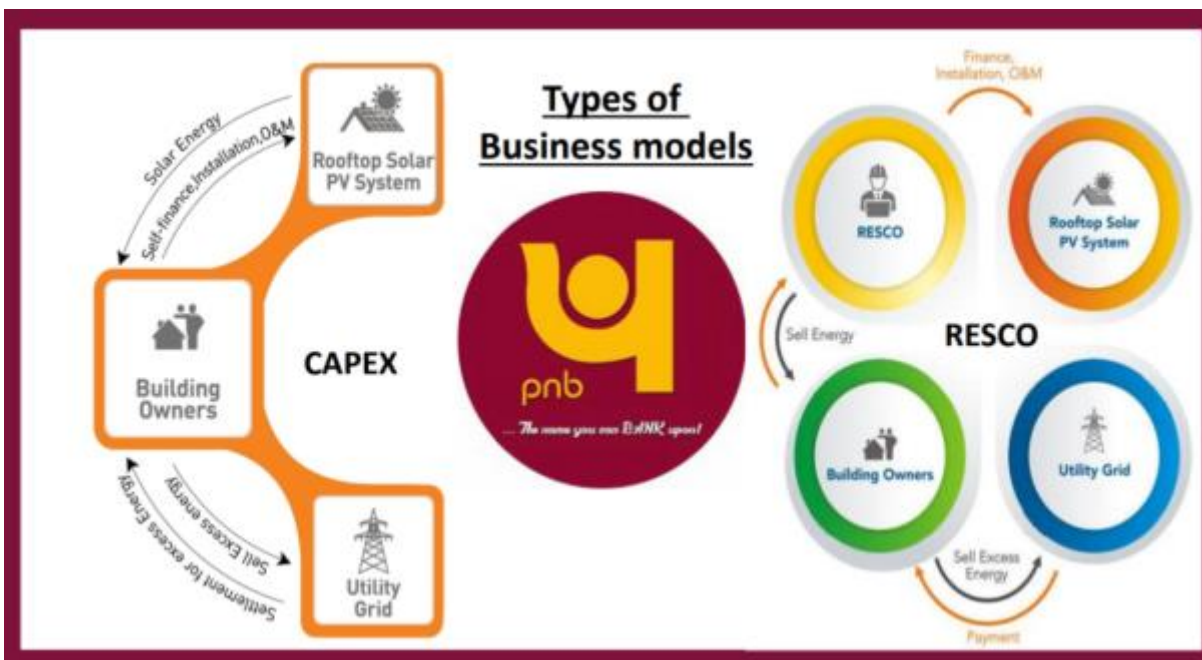
Speaker: Mr. PR Khichi, Asst. General Manager

Key Excerpts from the presentation by Punjab National Bank

Different Financing Models for Solar Rooftop Projects

Different business models affect the exposure to upfront cost by buyer and encourage adoption of solar energy.





CAPEX Model

The most common solar rooftop financing option where customer has to pay 100% cost upfront. One among many advantages of this model is that consumers are eligible to claim accelerated depreciation to gain tax savings & make reasonable return on investment. Consumers who are facing high liquidity problems are not advised to opt for this finance option. Here O & M responsibilities are of the rooftop owner.

RESCO Model

Under the RESCO model, a third-party company finances, installs, operates and maintains the rooftop solar project. A power purchase agreement /lease agreement is signed between the installer and the consumer at a mutually agreed price (tariff). The main advantage of this model is that consumer can install a solar PV system and simultaneously have the choice whether or not to consume the electricity. Based on the consumption choice, the model is further divided into two types –

- a. In **Rooftop Leasing Model**, the project developer will be paying a fixed lease payment to a building owner over the time of the lease period for installing the solar panel on the rooftop.
- b. In **Power Purchase Agreement**, the project developer can sell the power back to the building owner in favour of a lower solar power tariff. The excess power could be sold by the developer to the utility.

Benefits of RESCO Model

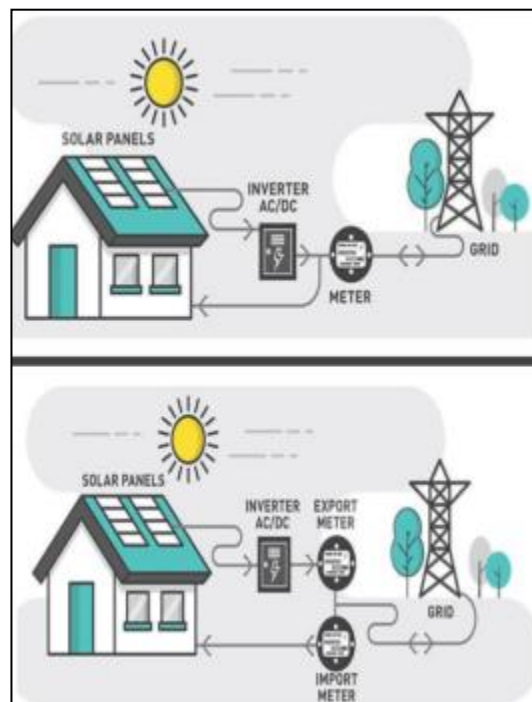
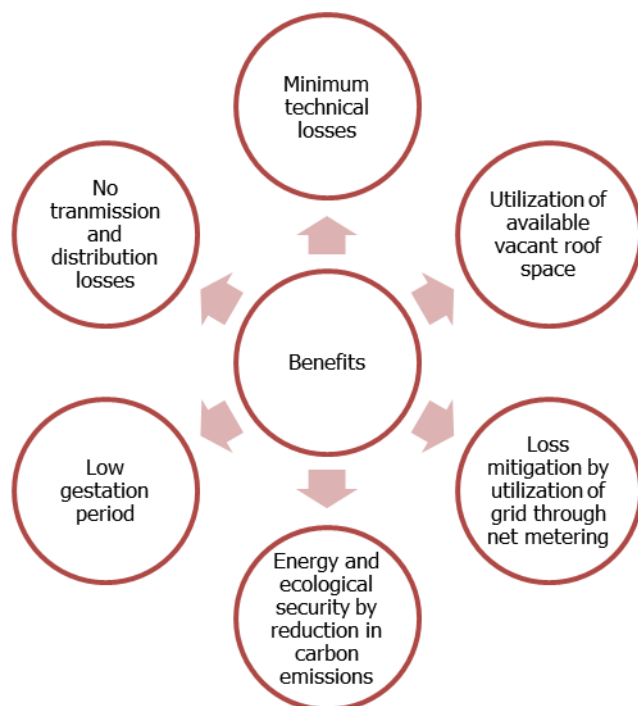
1. No Upfront Payment, Payment only in convenient mutually agreed monthly instalments.
2. Consumer enjoy solar saving on his electricity bills without any upfront investment
3. Consumer also has flexibility to own the plant at defined duration after paying a defined % of the cost of System and enjoy electricity at very low cost.

Metering Arrangements

Net Metering: The energy generated by the solar rooftop plant is first allowed for self-consumption and the excess energy is injected to the grid.

Gross Metering: The total energy generated by the solar rooftop plant is to be injected into the grid without allowing the generated solar energy to be consumed directly by the consumer.

Benefits



Salient FEATURES of the Scheme

Eligibility	Financing shall be available for Grid Connected Roof Top Solar PV projects at commercial, Industrial and Institutional buildings having unutilized rooftop space- Both Public and Private or any other structure (excluding subsidy linked projects).
Project Cost	The present Benchmark cost for installation of Grid Connected Solar Rooftop projects is between \$750-1000 per KW. The cost of Grid Connected Solar Rooftop may further vary depending upon cost of modules, inverter and mounting structure for the specific roof or as per latest notifications issued by Ministry of New & Renewable Energy (MNRE).
Target Group	Sole proprietorship firms, partnership firms including Limited Liability Partnership (LLP), Limited companies, Private Limited companies, Trusts, Associations, Special Purpose Vehicle (SPV), Non-bank financial institution (NBFCs) and registered societies.
Purpose	To finance Grid Connected Solar Rooftop PV projects under CAPEX and RESCO models
Margin	Minimum 30% with a suitable upfront contribution of the required margin.
Rate of	One year MCLR (Marginal Cost of Funds based Lending Rate - MCLR is the

Interest	minimum interest rate, below which a bank is not permitted to lend) plus spread is competitive in the market.
Repayment Period	Door to Door tenor of maximum 15 years which comprises construction / installation, moratorium and repayment period.
Moratorium	1 year after 1 st disbursement or 4 months from COD (Commercial Operations Date) whichever is earlier.

3.4.2. Presentation by Small Industries Development Bank of India (SIDBI)

This was followed by a detailed presentation by Small Industries Development Bank of India (SIDBI).

Date: 27th Feb 2019 (Wednesday)

Venue: The World Bank Hindustan Times Building 18-20, Kasturba Gandhi Marg New Delhi 110001

Website: <https://www.sidbi.in/>

Topic: Emerging Innovative Clean Energy Financing Mechanisms and Business Models)

Speakers:

1. Mr. Rajeev Thakur, Chief Technical Specialist
2. Mr. Sachin Verma, Sr. Energy Expert
3. Mr. Kiran Kumar, Sr. Tech Expert
4. Mr. Mekala Amruth Sudheesh. Sr. Energy Expert
5. Pawan Kr. Bharti, Manager



Key Excerpts from the presentation by Small Industries Development Bank of India (SIDBI)

About Small Industries Development of India (SIDBI)

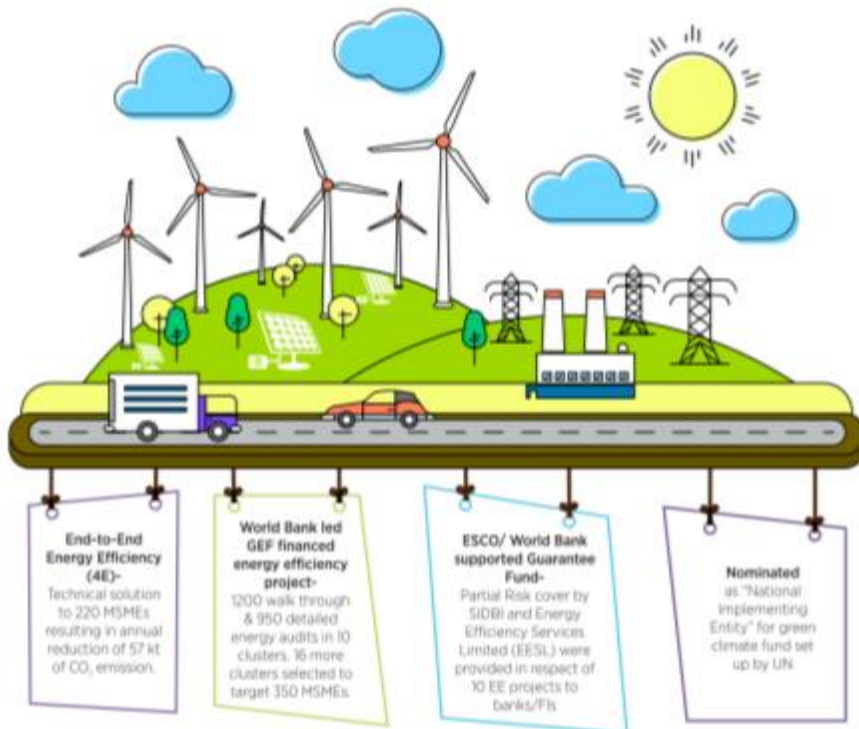
SIDBI is the Primary Financial Institution for promoting, developing and financing [MSME](#) (Micro, Small and Medium Enterprise) sector. Besides focusing on the development of the Micro, Small and Medium Enterprise sector, SIDBI also promotes cleaner production and energy efficiency. SIDBI helps MSMEs in acquiring the funds they require to grow market, develop and commercialize their technologies and innovative products. The bank provides several schemes and also offers financial services and products for meeting the individual's requirement of various businesses.

SIDBI is active in the development of Micro Finance Institutions through SIDBI Foundation for Micro Credit, and assists in extending microfinance through the Micro Finance Institution (MFI) route. Its promotion & development program focuses on rural enterprises promotion and entrepreneurship development.

In order to increase and support money supply to the MSE sector, it operates a refinance program known as Institutional Finance program. Under this program, SIDBI extends Term Loan assistance to Banks, Small Finance Banks and Non-Banking Financial Companies. Besides the refinance operations, SIDBI also lends directly to MSMEs.

The Japan International Cooperation Agency (JICA) has extended a Line of Credit to Small Industries Development Bank of India (SIDBI) for financing Energy Saving Projects in Micro, Small, and Medium Enterprises (MSMEs) Sector.

The project is expected to encourage MSME units to undertake energy saving investments in plant & machinery / production process to reduce energy consumption, enhance energy efficiency, reduce CO₂ emissions and improve the profitability in the long run. The financial assistance to MSMEs will be through SIDBI, as well as through refinance to banks / State Finance Corporations (SFCs) and Non-Banking Financial Companies (NBFCs). Under the Line technical assistance is also provided to financial institutions and MSME units for dissemination of information and successful implementation of Energy Saving projects in MSME Sector. The interest rate is based on internal risk rating within the band i.e. Fixed rate: 9.5 – 10% per annum and Floating rate: 9.75 – 10.5% per annum.



With a view to transform the EE consultancy services market so that the services mentioned above are reasonably priced and also there is an assurance on the quality of performance/ results/ benefits, SIDBI has developed "4E (End to End Energy Efficiency) Solutions".

SIDBI launched the 4E Intervention on the occasion of "World Environment Day" on June 5, 2014 to provide technical backstopping and support MSME clients for reducing their power & fuel cost.

End to End Energy Efficiency or 4E Scheme aims to promote Energy Efficiency Investments in MSME's (Micro, Small and Medium Enterprises). Under this scheme SME's (Small and Medium-sized Enterprises) can avail Loan for their Investments towards Implementing Energy Efficiency Measures, New Technology Up



gradation in Machinery which conserves energy, Investment towards Roof Top Solar Etc. The MSMEs will be assisted with Technical Consultancy and Financial Facilitation at better rate of Interest (below 10%).

Purpose of SIDBI 4E Scheme

- For implementing the Energy Efficiency measures on an end to end basis.
- For meeting the part cost of capital expenditure including for the purchase of equipment, machinery, civil works, installation and commissioning.
- For enacting the Energy Efficiency measures as recommended in the project report any other related expenditure required by the MSME unit, provided it is not more than 50% of Project Cost
- Financing for second-hand machinery or equipment; purchase of land and construction of the building (except minor civil works) will not be taken up under the scheme

As per this scheme, a mandatory Detailed Energy Audit (DEA) is undertaken by a qualified Energy Auditor and Consultant empanelled with India SME Services Technology Limited (ISTSL) a Joint Venture of SIDBI at a highly subsidized rate.

- A Detailed Project Report (DPR) is developed which again evaluated by the qualified Technical Team at SIDBI before furnishing them to the respective MSME Units.
- A provision of financing options ranging between USD 16,667 - 0.25 million at a highly subsidized rate of interest is made available to the MSMEs to implement the suggested Energy Conservation Measures (ECM).
- All possible implementation Support, Monitoring and Verification support, will be provided to the MSMEs at no extra cost.

Benefits of 4E Scheme

- The 4E Program helps MSMEs improve bottom line through energy savings (10-25%), by availing the services of Technical Consultants at a reasonable cost with assurance on the quality of services and assured savings.
- A back-to-back financing product support is provided with the help of the World Bank to provide loans for EE projects to MSMEs. The term loans are provided at concessional interest rates and on softer terms.

Eligibility

The Eligible borrowers for this Scheme are Micro, Small or Medium Enterprises in the Manufacturing or Service Sector. In order to avail Loan under this Scheme, the Plant has to submit Detailed Energy Audit (DEA) & Detailed Project Report (DPR). The Audits and DPR will be done through India SME Services Technology Limited (ISTSL) a Joint Venture of SIDBI.

Documents required

- Filled in application form
- Filled in questionnaire
- Advance money from the unit as per the application form
- Borrower registration certificate (depending on the type of entity)
- GST Details

Loan Amount and Tenure

- Up-to 90% of the Project cost with minimum loan amount of \$16,667 and maximum loan amount not to exceed \$250,000
- Eligible loan amount should not exceed 1/5th of the total turn-over of the applicant unit.

- The repayment period including initial moratorium period of up-to 6 months, shall not be more than 36 months for loans up-to \$166,667 and 60 months for loans beyond that amount.

Interest Rate

Interest rate will be in the range of 8.10 – 9.9%. The repayment period is 36 Months for Loan up to \$166,667 and 60 Months for Loan Up to \$250,000 including initial moratorium period up to 6 months.

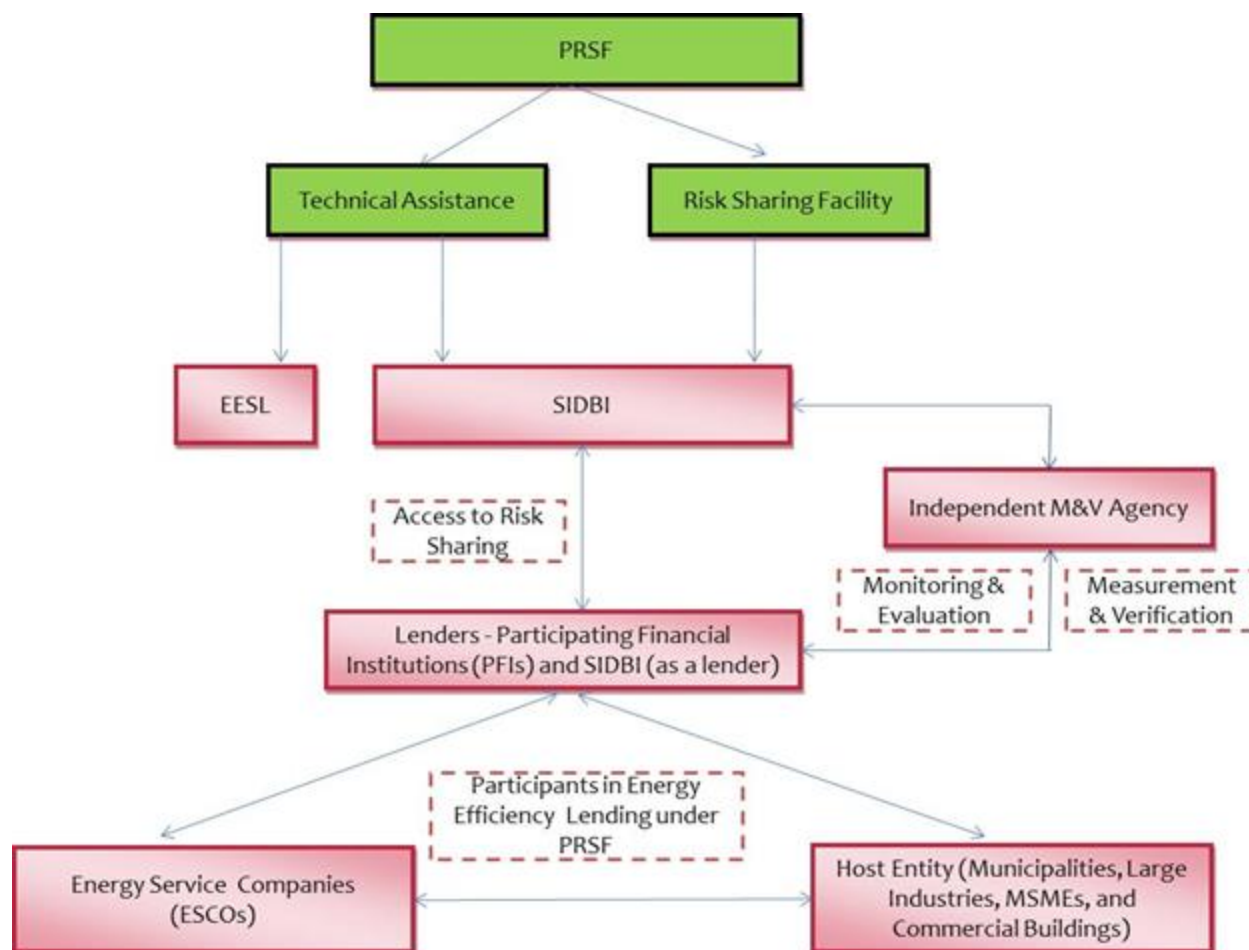
Partial Risk Sharing Facility for Energy Efficiency (PRSF)

The Partial Risk Sharing Facility for Energy Efficiency (PRSF) aims to support India's Energy Savings Performance Contracting (ESPC) market for Energy Efficiency projects. **It provides guarantees to the Participating Financial Institutions (PFIs) i.e. Banks/ Financial Institutions/ Non-Banking Financial Company for the Energy Efficiency loans extended by them through Energy Service Companies (ESCOs).**

PRSF was launched by the Small Industries Development Bank of India (SIDBI), India's foremost financial Institution to promote, finance, and develop Micro, Small & Medium Enterprises (MSMEs) in India, with a risk-sharing corpus of US\$ 37 million.

The main objective of this program is to stimulate and transform India's ESPC-based ESCO market by promoting increased level of EE projects and create a banking ecosystem to finance ESCO projects in India. PRSF consists of a risk-sharing facility for energy efficiency, managed by SIDBI, (US\$37 million), funded from a Global Environmental Facility (GEF) contribution of US\$12 million and backstopped by a Clean Technology Fund (CTF) Guarantee, in the form of contingent finance, of US\$25 million, and a technical assistance component.

The project provides partial credit guarantees to Participating Financial Institutions (PFIs) to cover a share of default risk faced by them in extending loans to Energy Efficiency (EE) projects implemented by the **Host** entity through Energy Service Companies (ESCOs) after entering into Energy Saving Performance Contracts (ESPC).



Eligibility Criteria

Projects

- Any project in which ESCO enters into ESPC with the Host, with the objective of bringing about demonstrable energy savings.
- In case of ESCO being a JV or consortium, the share in equity or contract value, as applicable, of ESCOs falling under MSME shall not be less than 51% for such JV or consortium to be treated as MSME.

Sectors

- Large industries (excluding thermal power plants), including those notified under the BEE's energy consumption norms and standards (i.e. through PAT scheme).
- MSMEs
- Street lighting (municipalities)
- Buildings.

Loans

- The Energy Efficiency (EE) loans sanctioned by PFIs to either the ESCO or the Host entity, falling within the micro and small enterprises category of MSMED Act shall only be covered.
- Minimum 75% of the guaranteed loan should be towards the cost of the investments required for implementation of the EE project which shall include expenditure on purchase,

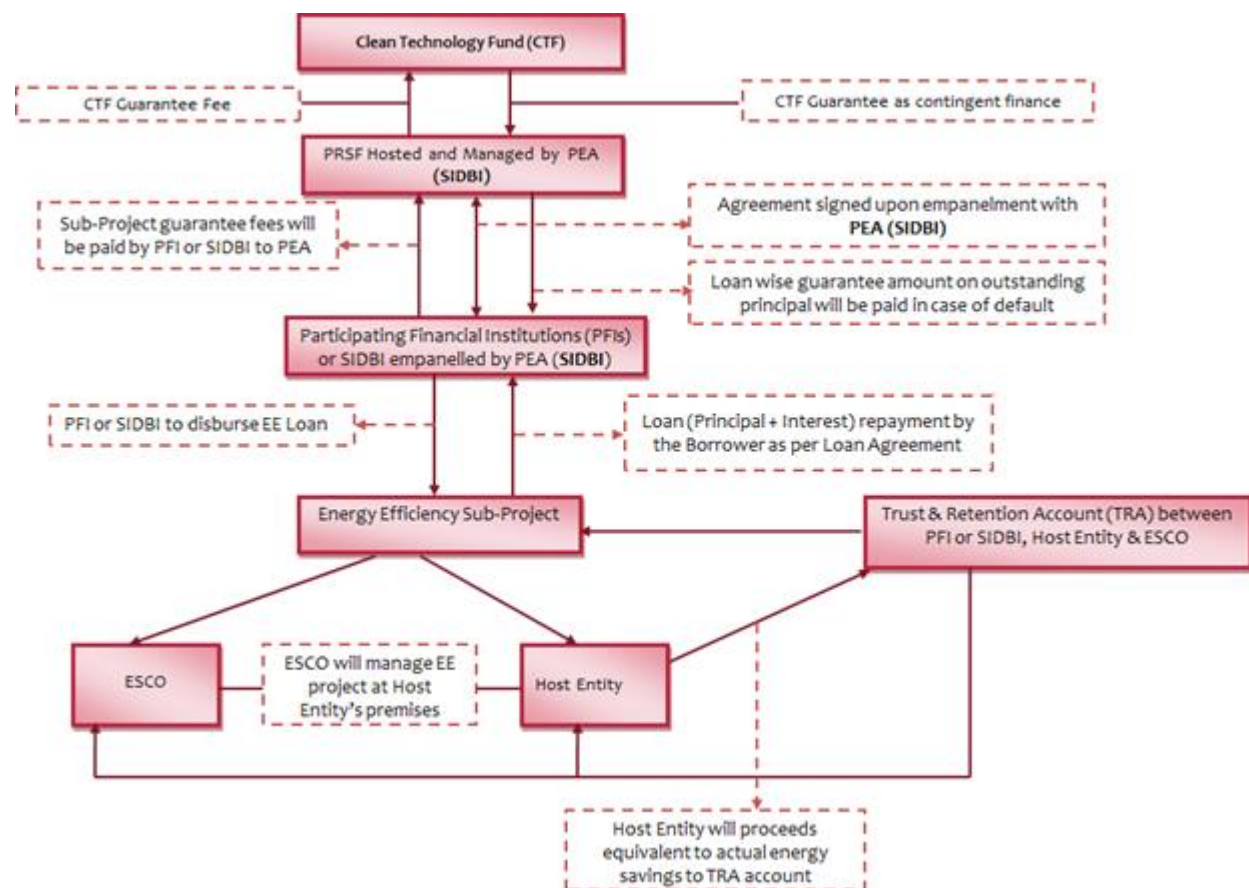
erection & commissioning, installation or retrofit / modification of the equipment, etc. contributing to energy savings.

- Any project in respect of which the envisaged aggregate energy savings performance for the project is specifically guaranteed by any other Government scheme (whether introduced by a State government or the Government of India) will not be covered.
- Projects involving only substitution of conventional energy with off-grid or captive renewable energy source, except those involving significant savings in energy consumed, will not be covered.

Operational Mechanism

- The Scheduled Commercial Banks / NBFCs shall sign a MoU with PEA to participate under the project as PFIs.
- Complete preparatory activities, fulfill the laid down norms and subsequently sign a Master Guarantee Agreement with PEA.
- Sanction of EE loan by the PFIs to eligible ESCO or Host for implementation of eligible EE Projects.
- Submission of Guarantee Application with appropriate Guarantee fee to PEA.
- Sanction and issuance of guarantee letter to PFIs by PEA
- Repayment of EE loan by the Borrower to PFI
- Guarantee claim by PFI, in case of default of EE loan
- Release of eligible guarantee coverage to PFI

The operational mechanism including various transactions involved under the Risk Sharing Facility is shown at the figure below:



The Scheduled Commercial Banks / NBFCs shall sign a MoU with PEA, complete preparatory activities, fulfill the laid down norms and subsequently sign a Master Guarantee Agreement with PEA to participate under PRSF as PFIs.

After sanction of loan by the PFIs to eligible ESCO or **Host** for implementation of eligible EE Projects, the PFI will enter the PRSF Application details in the PRSF website using the User id & Password provided to it by PEA. PEA may call for additional details and documents where considered necessary.

Upon approval of a Guarantee Application by the PEA, PFI shall be issued a Guarantee Letter containing the terms & conditions specific to that individual Guarantee. This Letter shall be read along with the Master Guarantee Agreement executed by that particular PFI; the guarantee shall come into force from the date of first disbursement or the date of payment of first installment of guarantee fee to PEA, whichever is later. Further, PFI shall also submit to PEA, for its records, the hard copy of the print-out of the guarantee application duly signed by the Authorized signatory along with the other supporting documents as may be specified by PEA (i.e. Copy of the DPR, copy of the Appraisal Note, Sanction letter, etc.).

Based on the energy savings performance contract (ESPC) entered between ESCO and **Host**, the **Host** entity shall deposit the proceeds equivalent to actual energy savings to the TRA account. The modus operandi of TRA is explained at section 6. The repayment of loan (principal and interest) to the PFI will be done through the designated priorities of the TRA.

PRSF Guarantee claims originate from underperformance of the underlying energy efficiency investments and the resulting cash shortfall for debt service (principal and interest). The required cash buffer in the TRA will carry the borrower over temporary liquidity problems but cannot make up for extended, chronic cash shortfalls.

In the latter case, insufficient cash to service the debt will lead to a default, which allows the PFI to make a guarantee claim to PRSF, up to the amount of debt covered and provided that the M&V Agency has verified the eligibility of the claim.

For additional information, please refer <http://prsf.sidbi.in/>

Project Partners



THE WORLD BANK

Project Implementing Entity



Project Executing Agency (PEA) and Technical Assistance
Executing Agency



Technical Assistance Executing Agency

Project Funding

The Project has a total outlay of USD 43 million consisting of the "Risk Sharing Facility for Energy Efficiency" component of USD 37 million and technical assistance component of USD 6 million.

The entire "Risk Sharing Facility" component of USD 37 million is managed by SIDBI, under which partial credit guarantees are provided to cover a share of default risk faced by Participating Financial Institutions (PFI) in extending loans to eligible EE projects implemented through ESCOs.

The technical assistance component of USD 6 million are managed by SIDBI and EESL, under which capacity building activities and other developmental/operational support for the project are provided.

Extent of guarantee

The extent of guarantee coverage under PRSF is 75% of the loan amount guaranteed. Guarantee cover will be calculated on the lowest of the following:

- Principal outstanding as on date of account turned into NPA
- Principal plus interest as on date of claim has been lodged with PEA, and
- Sanctioned Loan amount guaranteed.

The minimum amount of single guaranteed loan shall be INR 1 million. The maximum amount of loan amount guaranteed shall not exceed INR 150 million.

Guarantee Tenure

The maximum tenure of the guarantee will be 5 years (or such other period as may be decided by PEA) from the date of the first disbursement of the guaranteed loan or till the last date of the operational period of PRSF, whichever is earlier. However, the guarantee tenure shall not exceed the loan tenure.

Guarantee Approval

After sanction of a loan by PFIs to eligible ESCO or Host for implementation of EE Projects, the Participating Financial Institution (PFI) will enter the Guarantee Application details in the PRSF website using the user id & password provided to it by PEA.

Project Executing Agency (PEA) shall provide online approval of the guarantee coverage. The guarantee shall come into force from the date of payment of the first installment of guarantee fee to PFI. Further, PFI shall also submit to PEA, for its records, the hard copy of the print-out of the guarantee application duly signed by the authorized signatory along with the other supporting documents as may be specified by PEA (i.e. Copy of the DPR, copy of the Appraisal Note, Sanction letter, ERMF Compliance certificate, etc.). The guarantee shall apply only to loan amounts disbursed by PFI within a period of 18 months from the date on which the guarantee has been approved.

3.4.3. Presentation by Yes Bank

The next presentation was delivered by Yes Bank team.

Date: 27th Feb 2019
(Wednesday)

Venue: The World Bank
Hindustan Times Building 18-20, Kasturba Gandhi Marg New Delhi 110001

Website:
<https://www.yesbank.in/>

Topic: Emerging Innovative Clean Energy Financing Mechanisms and Business Models)



Speaker:

1. Chandan Bhavnani, Executive Vice President, Responsible Banking
2. Husnal Kaur, Senior Vice President, Multinational Corporate Banking
3. Ankush Kumar Gupta, Vice President, Corporate Finance Infrastructure Banking
4. Arnesh Sharma, Assistant Vice President, Responsible Banking

Key Excerpts from the presentation by Yes Bank

About Yes Bank

YES BANK, India's fourth largest private sector bank is a high quality, customer centric and service driven Bank. Since inception in 2004, YES BANK has grown into a 'Full Service Commercial Bank' providing a complete range of products, services and technology driven digital offerings, catering to corporate, MSME & retail customers. YES BANK operates its Investment banking, Merchant banking & Brokerage businesses through YES SECURITIES and its Mutual Fund business through YES Asset Management (India) Limited, both wholly owned subsidiaries of the Bank. Headquartered in Mumbai, it has a pan-India presence across all 29 states and 7 Union Territories in India including an IBU at GIFT City, and a Representative Office in Abu Dhabi.

Responsible Banking @ Yes Bank

Rapid globalization and digitization are increasingly shaping our world in an unprecedented manner. Technological advances that are unparalleled in their speed and impact are making it imperative for businesses to innovate and be Future Ready, Now.

Bringing the future to the present for the Bank, therefore, involves an intrinsic and sustainable transformation by future-proofing the business. Developing solutions to minimize negative effects while taking advantage of positive impact of future events holds the key. To reap full benefits of this evolution, innovations in technology, policy formation and finance are the way forward. Thus, at YES BANK, Future Now, a philosophy to bring the future to the present

through innovation and various interventions, is not only a commitment to business, but also towards achieving the global development goals.

YES BANK institutionalized Responsible Banking as a key differentiator and one of its six strategic pillars since inception. It believes that there is an inherent need for financial institutions to play a central role in India's economy to create positive social and environmental impact.

With a greater understanding of its stakeholders' needs and an uncompromising focus on corporate governance and risk management, YES BANK has been able to establish sustainability impact through cutting-edge solutions in climate finance and community interventions. The Bank's visionary approach to prioritizing Environmental, Social and Governance (ESG) performance in the Indian banking sector with early efforts at bringing future to the present for all its stakeholders has borne fruit, endorsed by recognition at various platforms.

YES BANK is the first Bank in India to establish dedicated knowledge champions with subject matter expertise in Renewable & Clean Energy space – which has seen significant thrust from the Government of India as well.

Future Ready Climate Action

YES BANK believes that financial institutions are catalysts to a sustainable economy. Building a sustainable future involves propagating the use of future-ready technologies like blockchain, electric vehicles and smart buildings. These sunrise sectors offer an investment opportunity of USD 3.1 trillion in India. The Bank, through its Responsible Banking ethos, is pioneering this low-carbon transformation with a focus on:

- Integrating Environmental and Social parameters into its lending decisions
- Innovating for the Bottom of the Pyramid by leveraging technology
- Proactively investing in positive impact sectors
- Greening its own operations
- Climate literacy

The Bank's 360-degree risk framework integrating ESG parameters is central to future proofing the business. The Bank proactively looks at mitigating emerging risks and creates new opportunities in India's climate-resilient business sectors. YES BANK believes that climate change is a business opportunity for transition to a low-carbon economy and has pioneered the Green Bond market in India.

In December 2017, the Bank became the first Indian bank to solely arrange a Social Bond, the proceeds of which would go towards financing affordable housing projects.

This, along with a pilot blended-finance project for salt pan farmers in Little Rann of Kutch (A District of Gujarat state in western India), showcases the Bank's futuristic approach to financial innovations for sustainable communities.

Catalyst in Climate Change Action

YES BANK believes financial institutions can become catalysts in driving climate action by adopting a proactive approach to address climate change issues. The Bank is committed to this role with its innovative financial mechanisms.

The Bank has envisaged a holistic climate strategy, which would be instrumental in institutionalizing a targeted approach for climate action. It intends to further strengthen its risk management and disclosure in line with TCFD recommendations. The Bank also aims to enhance its recognition as a green bank with the launch of green products, ensuring sustainable operations, and deepening ties with Development Finance Institutions (DFIs) and sustainability focused investors

Renewable Energy Lending and Advisory

India has an ambitious target of establishing 175 GW Renewable Energy (RE) capacity by 2022. Apart from RE target, India's NDCs are laid out to drive climate action in the country with an investment of USD 2.5 trillion.

YES BANK has sanctioned credit for setting up RE projects of capacity 1,264.96 MW during FY 2017-18.

YES BANK has also committed to mobilize USD 1 billion till 2023 and USD 5 billion till 2030 towards financing solar energy projects in India at the World Energy Summit 2018.

Renewable Energy Finance Facility

YES BANK launched a USD 400 million renewable energy finance facility as a joint initiative with European Investment Bank (EIB) to support the expanding renewable energy sector. Along with the Bank, this facility will be supported by EIB with an investment of USD 200 million, project promoters and other financial institutions.

This initiative is EIB's first-of-its-kind engagement with any Indian commercial bank. The 15-year tenor of the association is EIB's longest lending tenor. This program will streamline financing for a range of renewable energy projects being built and operated by leading Indian organizations. Eligible solar projects have been identified in Rajasthan, Telangana, Maharashtra and Karnataka states of India, while additional projects are being examined.

In October 2017, YES BANK signed a long-term credit line of USD 30 million with OeEB, the Austrian Development Bank, for dedicated financing of wind and solar power projects in India.

Energy Efficiency Investments

India's Micro Small & Medium Enterprises (MSMEs) sector is emerging as a growth powerhouse. Over 51 million MSMEs account for 40% of the country's total exports and 38% of its GDP. For YES BANK, providing finance for sustainable MSMEs is a part of their core business strategy.

The Bank signed a MoU with the Bureau of Energy Efficiency (BEE) to become the Participating Financial Institution (PFI) for availing risk guarantee under the Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE). The PRGFEE is an innovative financial instrument, which uses public resources to channelize private sector finance towards promoting energy efficiency in different sectors of the economy, including MSMEs, buildings and municipalities.

YES BANK will channelize the Bank finance for energy efficiency projects through BEE approved Energy Services Companies (ESCOs). The Bank also trained select employees across the country through the BEE – PRGFEE (Partial Risk Guarantee Fund for Energy Efficiency; <https://beeindia.gov.in/content/prgfee>) workshop.

Another similar scheme was launched, under a World Bank initiative, by Small Industries Development Bank of India (SIDBI) to provide partial guarantee of 75% of the loans up to USD 2.5 million for energy efficiency projects. Under this Partial Risk Sharing Facility (PRSF) the focus would remain on MSMEs and working through Energy Service Performance Contracting (ESPC) delivered through Energy Service Companies (ESCOs). In July 2016, YES BANK became the first Financial Institution (FI) to sign a MoU with SIDBI to implement this scheme.

During the UN Climate Summit in September 2014, the bank had committed to invest in 5,000 MW commitments over five years starting in February 2015. With these motivations the bank came up with the following highly welcomed green bonds. In a significant step, the bank issued India's first -ever Green Bonds (AA+ by CARE) and this is one of the first issuances in emerging economies, raising an amount of INR 10 billion, in accordance with Green Bond Principles.

The Bank's second issuance of USD 52.5 million bond raised on a private placement basis with IFC. It was the first-ever investment by IFC, a part of World Bank Group, in a green bond issuance in emerging markets. The innovative aspect of the transaction was that the IFC paid for the placement using the proceeds from the first Green Masala Bond raised in the offshore rupee market. ***Notably, the bond was awarded the "most innovative bond structure" by Environmental Finance in May 2016.***

3.4.4. Presentation by Indian Renewable Energy Development Agency (IREDA)

The next presentation was given by a team from Indian Renewable Energy Development Agency (IREDA)

Date: 27th Feb 2019 (Wednesday)

Venue: The World Bank Hindustan Times Building 18-20, Kasturba Gandhi Marg New Delhi 110001

Website: <https://www.ireda.in/>

Topic: Emerging Innovative Clean Energy Financing Mechanisms and Business Models)



Speaker:

1. Abhilakh Singh, General Manager
2. KP Philip, Deputy General Manager

Key Excerpts from the presentation by IREDA

About IREDA

The India Renewable Energy Development Agency Limited (IREDA) is a Public Limited Government Company established in 1987 under the administrative control of the Ministry of New and Renewable Energy (MNRE). The mission of IREDA is to promote, develop and extend financial assistance for renewable energy and energy efficiency/conservation projects.

The IREDA financial services include direct project financing, equipment finance, business development finance, loans for manufacturing facilities of energy efficiency equipment, and loans to banks/financing institutions for on-lending. It is funded partly through the Central government and also receives funding from the German development bank (KfW), French development bank (AFD), Nordic Investment Bank (NIB), European Investment Bank (EIB), Japan International Cooperation Agency (JICA), World Bank (WB), Asian Development Bank (ADB), and other international financial institutions.

Objectives of IREDA

1. To give financial support to specific projects and schemes for generating electricity and / or energy through new and renewable sources and conserving energy through energy efficiency.
2. To strive to be competitive institution through customer satisfaction.
3. To maintain its position as a leading organization to provide efficient and effective financing in renewable energy and energy efficiency / conservation projects.
4. Improvement in the efficiency of services provided to customers through continual improvement of systems, processes and resources.

Sectors Eligible for Loan Assistance

All the projects in Renewable Energy (RE), Energy Efficiency/ Conservation and other Environmental Sustainable technologies, including Power Generation, Transmission, Renovation & Modernization, which are techno-commercially viable, are eligible to obtain finance from IREDA. The eligible sectors are as under:

- Wind Energy
- Hydro Power
- Solar Energy
- Biomass including Bagasse & Industrial Cogeneration
- Biomass Power Generation
- Waste to Energy
- Energy Efficiency & Energy Conservation
- Bio-fuel / Alternate Fuel including Ethanol & Bio-Diesel
- Hybrid Projects with RE Technologies
- New & Emerging Renewable Energy Technologies

Wind Energy

- Machine types eligible (Wind Electric Generator - WEG) for financing wind projects will be as per Revised List of Models and Manufacturers (RLMM) of Wind Turbines issued by Centre for Wind Energy Technology (C-WET)

Hydro Power

- IREDA also finance medium and large hydro projects (above 25 MW) under consortium/ co-finance mode only with other lenders

Biomass including Bagasse & Industrial Cogeneration

- Use of high energy efficient equipment in sugar / paper mills for supporting co-generation projects are encouraged
- In case of Sugar Mill, the minimum size of Sugar Plant should be 2500 TCD.
- If alternate fuel is required for extension of operating days in a year, fossil fuels up to 15% of annual fuel consumption is allowed

- In case of project size up to 5.0 MW (except sugar industry), the minimum applicable boiler pressure will be 42 kg/ cm²
- In case of project size above 5.0 MW (Both for Sugar and Non-Sugar Industry), the minimum applicable boiler pressure will be 63 Kg/cm².

Biomass Power Generation

- IREDA shall finance not more than one independent Biomass Power Project excluding captive Biomass/ Bagasse based Co-generation, in a radius of 50 KM, whether funded by IREDA/other FIs/Banks.
- For Biomass direct combustion power projects, IREDA's loan exposure may be limited up to 50% of project cost.
- Biomass direct combustion power projects exceeding 7.5 MW capacity up to a maximum of 10 MW, will be considered on case to case basis subject to careful examination, particularly with reference to Biomass availability, presence of other Biomass power/ Biomass cogeneration projects in that area, linkage for off-season fuel, water availability etc. and the loan from IREDA shall not exceed loan for 7.5 MW of the project. However, IREDA may also consider projects exceeding 7.5 MW up to maximum of 10 MW on a 70: 30 debt equity ratio and may take exposure up to 50 % of project cost subject to above condition and that the promoter shall bring in upfront 75 % of their contribution.
- Projects based on captive biomass/ energy plantation are encouraged.
- Use of high energy efficient equipment in Biomass Power Plants are encouraged

Bio-fuel / Alternate Fuel Including Ethanol & Bio- Diesel

- IREDA loan is available only for projects for oil extraction & trans esterification process
- In case of Fuel cells, IREDA loan is available for power/ vehicle applications only.

Waste to Energy

- The loan exposure of IREDA would be limited up to 50% of the project cost
- Loan is restricted to energy generation system and excludes pre-fuel processing system

Grid Inter-connection Facility for RE Evacuation / Transmission /Distribution facility

- IREDA shall extend term loan for 100% of eligible equipment cost limited to a maximum of 70% of total project cost.
- The above loan shall be applicable to all grid connected power projects

Miscellaneous

- RE/EE Proposals not covered in the above will be considered for financing on the individual merit basis.

Types of Energy Efficiency and Conservation Projects Considered for Financing / Term Loan

- Replacement / retrofit of selected equipment with energy efficient equipment
- Modification of entire manufacturing processing
- Recovery of waste heat for power generation

Industrial Sectors Covered under Energy Efficiency/Conservation

- Iron and steel sector
- Fertilizers
- Textile
- Cement
- Pulp & Paper

- Aluminum
- Sugar
- Petrochemical
- Glass & Ceramics
- Refineries
- Domestic / Commercial Sector
- Street Lighting
- Energy Saving Scheme

Incentive available for Energy Efficiency/Conservation Projects

- Rebate in central excise duty
- Rebate in interest rate on term loan
- Rebate in prompt payment of loan installment

Procurement Procedures

The borrower is required to follow the established market practices for procurement and shall demonstrate that the quality goods and services are being purchased at reasonable and competitive prices. Wherever the loan is sanctioned against international lines of credit such as the World Bank, Asian Development Bank, kfW, etc., the relevant procedures will have to be followed and requisite documents will have to be submitted by the borrower.

Financing Norms

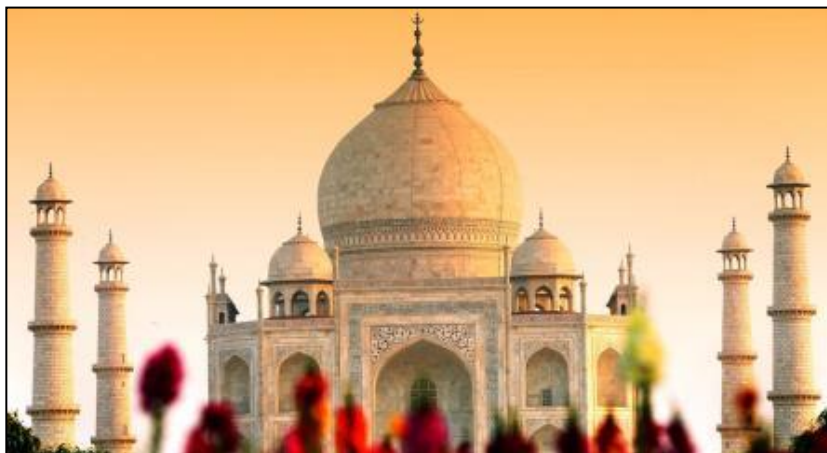
#	Borrower/Sector	State Sector Borrowers/ CPSUs (Category 'A++') [AND] Identified CPSUs [AND] AAA rated Companies	State Sector Borrowers/ CPSUs (Category 'A+')	State Sector Borrowers/ CPSUs (Category 'A' &'B') [AND] Central Sector Borrowers (Other than Identified CPSUs & AAA rated) - New category	
1.	Renewable Energy Projects except Biomass and Waste to Energy projects	9.80%	9.95%	10.20%	
2.	Biomass and Waste to Energy (WTE) projects	10.25%	10.75%	11.15%	
#	Borrower/Sector	Private Sector Borrower			
		GRADE I	GRADE II	GRADE III	GRADE IV
3.	Roof top Solar	9.80%	10.05%	10.35%	10.70%
4.	Wind Energy, and Grid Connected Solar PV	9.80 %	10.15 %	10.50 %	10.95 %
5.	Co-generation, Hydro and CSP, Energy Efficiency , Energy Conservation & Solar Thermal /Solar PV Off-Grid, Biomass Power and other sector	10.25%	10.75%	11.15%	11.45%
6.	Manufacturing (All sectors)	Existing units – 10.80 %		Green Field – 11.00%	
7.	LoC for Refinance	Cost of domestic borrowing + 1% to 2% spread			

3.5. Day 4: Visit to Agra⁸

On Day 4 i.e. 28th Feb 2019, the delegation utilized the open time to visit Taj Mahal, one of the Seven Wonders of the World and 'The World Heritage Site in India'.

Website:

<https://www.tajmahal.gov.in/>



Brief synthesis

The Taj Mahal is located on the right bank of the Yamuna River in a vast Mughal garden that encompasses nearly 17 hectares, in the Agra District in Uttar Pradesh. It was built by Mughal Emperor Shah Jahan in memory of his wife Mumtaz Mahal with construction starting in 1632 AD and completed in 1648 AD, with the mosque, the guest house and the main gateway on the south, the outer courtyard and its cloisters were added subsequently and completed in 1653 AD. The existence of several historical and Quranic inscriptions in Arabic script have facilitated setting the chronology of Taj Mahal. For its construction, masons, stone-cutters, inlayers, carvers, painters, calligraphers, dome builders and other artisans were requisitioned from the whole of the empire and also from the Central Asia and Iran. Ustad-Ahmad Lahori was the main architect of the Taj Mahal.

An area of 10,400 sq km around the Taj Mahal is defined to protect the monument from pollution. The Supreme Court of India in December, 1996, delivered a ruling banning use of coal/coke in industries located in the Taj Trapezium Zone (TTZ) and switching over to natural gas or relocating them outside the TTZ. The TTZ comprises of 40 protected monuments including three World Heritage Sites - Taj Mahal, Agra Fort and Fatehpur Sikri.

⁸ The original agenda included visit to Mumbai (Day 4 and Day 5) to meet with Rashtriya Chemicals & Fertilizers (PAT Industry Consumer), State Bank of India, Maharashtra Energy Development Agency (MEDA) and Maharashtra State Electricity Distribution Company Limited (MSEDCL) but was canceled due to cancellation of onward flight to Mumbai (due to closure of Air space). Hence, the program was modified to include an additional meeting in New Delhi with New Delhi Municipal Council (one of the municipal corporations in Delhi) and visit to Agra.

3.6. Day 5: Visit to New Delhi Municipal Council (NDMC)

Date: 1st Mar 2019 (Friday)

Venue: New Delhi Municipal Council, Palika Kendra, Parliament Street, (in front of Jantar Mantar), New Delhi – 110001

Website: <https://www.ndmc.gov.in/>

Topic: Advanced Metering Infrastructure Solutions Implemented at New Delhi Municipal Council (NDMC)

Speakers:

1. Mr. Narendra Gautam,
Director
(Power/Commercial)
2. Mr. Virender Singh,
Director (Training)
3. Mr. A.W. Ansari, Jt.
Director (IT)

Key Excerpts from the presentation by NDMC

About New Delhi Municipal Council (NDMC)

New Delhi Municipal Council (NDMC) is the municipal council of the city of New Delhi, India, and the area under its administration is referred to as the NDMC area.



About the Project

When India's Minister for Power, New and Renewable Energy Mr. R.K. Singh launched the New Delhi Municipal Council's (NDMC) smart metering project on 9th Jan 2019, it became the first municipality in India to achieve 100% smart metering.



The New Delhi Municipal Council office on the iconic Janpath in India's capital

The project replaced 50,000 conventional electricity meters with smart meters in the NDMC area. NDMC will benefit from enhanced consumer satisfaction resulting from better complaint management, faster restoration of outages, awareness of optimized consumption pattern, and improvement in system stability, reliability and transparency.

The Advanced Metering Infrastructure (AMI) solution fetches instantaneous meter readings and load profile data from smart meters and makes it available to billing and analytics applications after thorough validation. Automated remote meter reading helps NDMC save on reading costs and eliminate associated errors in meter reading and billing, thereby improving billing efficiency. Other advantages of AMI include anytime, anywhere access to meter data and critical events such as meter tampering. NDMC will also be able to disconnect and reconnect electricity supply remotely. NDMC consumers can view their energy usage pattern and take necessary decisions to save on energy using NDMC's web or mobile apps.

This is a significant step towards converting all the 250 million power meters in India into smart and prepaid meters by 2022, in line with the National Smart Grid Mission (NSGM) of the Government of India.

EESL has funded and built the Smart Metering (AMI) Solution in the NDMC project area. It will also operate and manage the system enabling NDMC to benefit from smart meters with zero upfront financial investment. NDMC's repayment to EESL will be through the monetisation of energy savings, resulting from enhanced billing accuracy, avoided meter reading costs and other efficiencies. This includes the immediate elimination of the cost of manual meter readings. These savings further enable NDMC to invest in value-added services for its consumers.

NMDC's large-scale adoption of smart meters is a significant measure towards future-ready technologies. Smart meters pave the way for the smart grid as they enable two-way real-time communication between DISCOMs and consumers through GPRS technology.

Implementing smart meters is one of the operational performance parameters under the Government of India's Ujwal DISCOM Assurance Yojana (UDAY). The scheme would help in reducing AT&C losses. It will also help in monitoring round-the-clock power supply eventually leading to greater efficiency and a pathway to meeting the government's vision of 24X7 Power

for All. Under its Smart Meters National Program, EESL aims to replace 250 million conventional meters with smart meters in India.

4. Communication and Outreach



5. Evaluation, Feedback and Recommendations

IIEC conducted an evaluation using a format designed for post-evaluation of the program. The participants provided the constructive feedback about the 5 day-long Exchange Program. The participants also shared some valuable suggestions on how to improve such knowledge exchange programs in the future.

Overall, the evaluation results indicate (see survey, Annex 2) the program was well received by the participants. At the end of the 5 day-knowledge exchange, they found this program extremely rewarding, as they highly appreciated the value add provided to improve their knowledge on a number of relevant EE topics across the region. The overall program and content of the meetings was found to be quite relevant by all participants. 75% of the participants agreed that the program was relevant to their work and the country's needs and 56% of the participants felt that the sessions were designed to cover almost all up-to-date and latest issues of EE that were useful to them.

The presentations made by the Indian speakers gave the participants ideas and content relevant to their country programs. The participants actively interacted with the speakers to find out more about the key factors of success of EE in India and how they could be replicated so the Vietnam would be able to become more energy efficient. 56% participants were completely agreed that all the relevant organizations and Indian counterparts were engaged in the exchange of knowledge program. 50% of the attendees felt that the speakers were able to answer their questions fully and satisfactorily.

The group indicated that the most valuable takeaway from the 5 day-long exchange was the session on information sharing the overview of Energy Efficiency Policy, Regulatory and Institutional Framework in India covering:

- Industrial Energy Efficiency (Perform, Achieve and Trade - PAT Scheme)
- Energy Efficiency Partial Risk Guarantee Fund (PRGF)
- Building Energy Efficiency Codes and Policies (Energy Conservation Building Code/Green Building Program)
- Appliances Energy Efficiency Standards and Labeling
- Utility Demand Side Management (DSM) Interventions

Participants also expressed the need for in-depth study and more time dedicated to such specific subjects during the program in future.

Given the overall feedback and observations made during the program, it is certain that such type of an exchange not only helps in information exchange but also helps the participants forge relationships and develop programs which can enhance the deployment of EE.

This program is very useful for me, allowing me to have a big picture of India's energy efficiency policies and schemes. It enables me to make relevant policy recommendations in Vietnam.

- Official, Science and Technology Department

The program was very meaningful to us as it informs about the energy efficiency policy development and measures.

-Vice Manager of Energy Management Division, Binh Duong Department of Industry and Trade

Feedback from Participants

Program was super and we also got very good feedback from our Vietnamese client and I again want to thank you and the whole IIEC team for the fantastic job you have been doing.

- Energy Sector Coordinator, The World Bank in Vietnam

Some overarching themes and key takeaways from the program include:

1. An opportunity to support Vietnam to help them in developing a clean energy framework with various energy efficiency measures taken into consideration e.g. cap-n-trade scheme for industries, standard and labeling, energy efficiency in buildings
2. There's a strong possibility to replicate overarching framework, procurement procedures, technical specifications, for design and implementation of large scale energy efficiency programs in Vietnam
3. There is a strong need for training and capacity building on energy efficiency and related aspects of government officials from the region through similar exchange programs.
4. Energy Efficiency is often side-lined in the funding planning while countries maybe making efforts to adopt clean energy mechanisms and frameworks. There is a great opportunity here for strengthening and capacity building of Financial Institutions.
5. The learning's from the success of the some of the flagship programs in and around similar geographies (e.g. PAT Scheme, Standards and Labeling program) can be used to formulate similar programs in Vietnam.
6. Buildings present a huge opportunity in terms of being the biggest energy consumers where programs such as smart energy management and energy efficient technologies can help in achieving the EE targets. This presents an opportunity for international FIs that can support such programs.
7. Data on EE continues to be a big challenge. There is a tremendous opportunity for conducting more energy research to develop country level frameworks.
8. Strong need for Enhanced Awareness and information dissemination amongst policy makers, regulators, general public, about the efficacy, need and comparative use of energy efficient technologies
9. Need for training and capacity building of financial institutions, to make them aware of the benefits of energy savings and remove the perception that funds for energy efficiency projects carry very high risks

6. Annex 1: Agenda

<u>Vietnamese Delegation's Energy Efficiency Knowledge Exchange in India</u> <i>February 25 - March 1, 2019</i> <u>AGENDA</u>			
DAY 1 (NEW DELHI) - 25th Feb 2019			
Time	Topic	Presenter/Organizer	Venue
0900-0930	Travel from Hotel to Bureau of Energy Efficiency (BEE) Office, New Delhi		
0930-0940	Introduction of the Vietnamese delegation	All	Conference Room, Bureau of Energy Efficiency, Ministry of Power, Govt. of India, 4th Floor, Sewa Bhawan, R. K. Puram, New Delhi
0940-0955	Introductory Address by The World Bank	The World Bank	
0955-1010	Welcome Address by Bureau of Energy Efficiency (BEE)	Mr. Abhay Bakre, Director General, Bureau of Energy Efficiency, Ministry of Power, Government of India	
1010-1025	Special Address by Shri Raj Pal, Economic Advisor, Ministry of Power	Mr. Raj Pal, Economic Advisor, Ministry of Power, Government of India	
1025-1035	Setting the Context - Agenda for the week	Mr. Sanjay Dube, CEO, International Institute for Energy Conservation (IIEC)	
1035-1100	Overview of Vietnam Energy Efficiency Strategies, Programs and Challenges	Ms. Nguyễn Thị Lâm Giang, Director General, Energy Efficiency and Sustainable Development Department, Ministry of Industry and Trade, Government of Vietnam	
1100-1110	Group Photo		
1110-1120	Tea Break		
1120-1310	Overview of Energy Efficiency Policy, Regulatory and Institutional Framework in India covering: 1. Industrial Energy Efficiency (Perform, Achieve and Trade - PAT Scheme) 2. Energy Efficiency Partial Risk Guarantee Fund (PRGF) 3. Building Energy Efficiency Codes and Policies (Energy Conservation Building Code/Green Building Program) 4. Appliances Energy Efficiency Standards and Labeling 5. Utility Demand Side Management (DSM) Interventions	Bureau of Energy Efficiency, Program Heads	

	6. Discussions		
1310-1330	Open Discussion		
1330-1415	Lunch		
1415-1445	Travel from BEE Office (New Delhi) to SCOPE Complex, New Delhi		
1445-1500	Introduction of the Vietnamese delegation	All	
1500-1510	Special Address by The World Bank	Dr. Junaid Ahmad, Country Director-India, World Bank (TBC)	Bhabha Chamber, SCOPE Complex, 7 Lodi Road New Delhi
1510-1520	Introductory Address by EESL	Mr. Saurabh Kumar, Managing Director, EESL	
1520-1645	Presentation on Overview of Energy Efficiency Implementation and Financing in India, covering: 1. Industrial Energy Efficiency & Demand Side Management 2. Energy Efficiency Financing 3. Smart Meter Program 4. Building Energy Efficiency Program 5. LED Street Lighting National Program (SLNP) 6. LED Domestic Lighting - Unnat Jeevan by Affordable LEDs and Appliances for All (UJALA)	EESL Program Heads	
1645-1730	Open Discussion		
1730-1800	Networking and Tea		
1800-1830	Travel back to Hotel (Hotel: ITC Maurya, Diplomatic Enclave, Sardar Patel Marg, New Delhi)		
DAY 2 (NEW DELHI) - 26 th Feb 2019			
Time	Topic	Presenter/Organizer	Venue
0700-1100	Travel from Hotel to PAT Designated Consumer Site (GBTL Ltd., formerly known as Grasim Bhiwani Textiles Ltd., Bhiwani, Haryana)		
1100-1330	Site Visit: PAT Designated Consumer Site (Contact Point: Mr Ram Kumar Uppadhya upadhyay.rk@gbtl.in)		
1330-1430	Lunch at site		
1430-1830	Travel back to Hotel (Hotel: ITC Maurya, Diplomatic Enclave, Sardar Patel Marg, New Delhi)		
DAY 3 (NEW DELHI / MUMBAI) - 27 th Feb 2019			

Time	Topic	Presenter/Organizer	Venue
0730-0830	Check out from Hotel (Hotel: ITC Maurya, Diplomatic Enclave, Sardar Patel Marg, New Delhi)		
0830-0930	Travel from Hotel to World Bank Office (New Delhi)		
0930-0950	Meeting with Punjab National Bank (PNB) <i>(Topic: Emerging Innovative Clean Energy Financing Mechanisms and Business Models)</i>	Mr. PR Khichi, Asst. General Manager – Credit, Punjab National Bank (+ other key officials)	World Bank Conference Room, Hindustan Times Building, 18-20, Kasturba Gandhi Marg, New Delhi
0950-1010	Open Discussion		
1010-1030	Meeting with Small Industries Development Bank of India (SIDBI) <i>(Topic: Emerging Innovative Clean Energy Financing Mechanisms and Business Models, including the Partial Risk Sharing Facility)</i>	Mr. MK Pandey, General Manager, SIDBI & CEO, India SME Technology Services Ltd (+ other key officials)	World Bank Conference Room, Hindustan Times Building, 18-20, Kasturba Gandhi Marg, New Delhi
1030-1050	Open Discussion		
1050-1110	Meeting with Yes Bank <i>(Topic: Emerging Innovative Clean Energy Financing Mechanisms and Business Models)</i>	Mr. Chandan Bhavnani, Executive Vice President, Responsible Banking, Yes Bank (+ other key officials)	
1110-1130	Open Discussion		
1130-1150	Meeting with Indian Renewable Energy Development Agency (IREDA) <i>(Topic: Emerging Innovative Clean Energy Financing Mechanisms and Business Models)</i>	Mr. Abhilakh Singh, General Manager, IREDA & Mr. K P Philip, Deputy General Manager (Technical Services), IREDA	
1150-1210	Open Discussion		
1210-1300	Lunch		
1300-1430	Travel from World Bank Office (New Delhi) to Hotel		
DAY 4 (DELHI) - 28 th Feb 2019 ⁹			
Time	Topic	Presenter/Organizer	Venue

⁹ The original agenda included visit to Mumbai (Day 4 and Day 5) to meet with Rashtriya Chemicals & Fertilizers (PAT Industry Consumer), State Bank of India, Maharashtra Energy Development Agency (MEDA) and Maharashtra State Electricity Distribution Company Limited (MSEDCL) but was canceled due to cancellation of onward flight to Mumbai (due to closure of Air space). Hence, the program was modified to include an additional meeting in New Delhi with New Delhi Municipal Council (one of the municipal corporations in Delhi) and visit to Agra.

Full Day – Open Time			
DAY 5 (DELHI) - 1 st Mar 2019			
Time	Topic	Presenter/Organizer	Venue
Morning till 1100	Open Time		
1200-1245	Lunch		
1245-1400	Travel from Hotel to NDMC Site Visit		
1400-1530	NDMC Site Visit (Contact Point: Mr. Girja Shankar gshankar@eesl.co.in)		
1530-1630	Travel from NDMC Site Visit to Hotel		
1630-2030	Open Time		
2030 onwards	Check-out from Hotel and Travel to Airport		

7. Annex 2: List of Speakers

Organization	Name	Designation
BEE	Abhay Bakre	Director General
BEE	Dr. Ashok Kumar	Director
BEE	Arijit Sengupta	Director in charge of International Cooperation
BEE	Ajitesh Upadhyaya	Textile Sector Expert
EESL	Venkatesh Dwivedi	Director (Projects)
EESL	Girja Shankar	Assistant General Manager (Technical)
GBTL	Dhruva Chauhan	Business Director and Unit Head
GBTL	Ram Kumar Uppadhyaya	Head – Engineering
PNB	PR Khichi	AGM
SIDBI	Rajeev Thakur	Chief Technical Specialist
Yes Bank	Chandan Bhavnani	Executive Vice President, Responsible Banking
IREDA	Abhilakh Singh	General Manager
IREDA	KP Philip	Deputy General Manager
NDMC	Narendra Gautam	Director (Power/Commercial)
World Bank	Dr. Ashok Sarkar	Senior Energy Specialist
EE Expert	K.K Chakravarti	PAT Scheme and EE Sector Expert

8. Annex 3: Evaluation Survey Results

Questions	Total # of Responses	Completely Agree	Somewhat Agree	Neutral	Somewhat Disagree	Completely Disagree	Total
The program was relevantly designed, as per our work and country's requirements	16	75%	25%	0%	0%	0%	100%
The program was up-to-date and covered latest issues and provided an opportunity to learn something new and relevant to our domain	16	56%	44%	0%	0%	0%	100%
The program engaged relevant organizations and Indian counterparts for the exchange of knowledge from our domain	16	56%	44%	0%	0%	0%	100%
The presentation durations and time allotted	16	56%	38%	0%	0%	0%	100%

for discussions was sufficient							
The time management of the program, including the planning of meeting slots, travel and breaks were appropriate	16	63%	25%	6%	6%	0%	100%
The quality of the presentations in terms of language and clarity was good	16	25%	69%	0%	6%	0%	100%
The presentations were interesting, practical and well aligned to the subject	16	38%	56%	0%	6%	0%	100%
The presenters were able to answer questions fully and satisfactorily	16	50%	44%	0%	6%	0%	100%
The program venue, audio-visual set up and other logistics were up to mark	16	25%	56%	13%	6%	0%	100%
The sites visited were relevant and interesting	16	56%	31%	13%	0%	0%	100%
The members of the organizing entity (IIEC) were cooperative and well behaved	16	63%	31%	0%	6%	0%	100%
Please rate your overall stay and comfort for the entire time of the program	16	50%	50%	0%	0%	0%	100%

9. Annex 4: List of Participants

Salutation	Last Name	First Name	Designation	Email Address
Ms	NGUYEN	Thi Lam Giang	Director General - Energy Efficiency and Sustainable Development Department (EESD), Head of Delegation	giangntl@moit.gov.vn
Mr	DINH	Van Chau	Official, EESD	chaudv@moit.gov.vn
Ms	DANG	Thi Thuc	Official, EESD	thucdt@moit.gov.vn
Mr	TA	Thanh Hai	Official, Electricity and Renewable Energy Authority (EREA)	haithh@moit.gov.vn
Mr	DUONG	Khac Hien	Official, Science and Technology Department	hiendk@moit.gov.vn
Ms	TO	Thi Kim Loan	Official, MOIT Office	loanttk@moit.gov.vn
Mr	DAO	Sy Thanh	Director, Hai Phong Energy Efficiency and Conservation Center	daosythanhhaiiphong@gmail.com
Mr	NGUYEN	Thanh Hai	Vice Director, Hanoi Department of Industry and Trade	morskoe@yahoo.com
Mr	LAI	Ngoc Quy	Manager of International Fund Division, VCB	quy.ho@vietcombank.com.vn
Ms	PHAM	Thi Thanh Phuc	Officer, International Trust Fund Division, BIDV	phucptt@bidv.com.vn
Ms	NGUYEN	Thi Thuy Mai	Vice Director, Da Nang Department of Industry and Trade	maintt1@danang.gov.vn
Mr	MAI	Van Doi	Director, Dong Thap Energy Efficiency and Cleaner Production Center	doiscndt@gmail.com
Mr	TRAN	Kiem Hieu	Manager of Legislation Division, HCM City Department of Industry and Trade	kiemhieutran@gmail.com
Mr	TRAN	Cong Danh	Vice Manager of Energy Management Division, Binh Duong Department of Industry and Trade	danhtc2006@gmail.com
Mr	NGUYEN	Thanh Tung	Vice Director, Can Tho Energy Efficiency and Conservation Center	Thanhtung_ecc@yahoo.com
Mr	PHAN	Van Quyet	Interpreter	phanvanquyet@gmail.com
Ms	VU	Thi Van Anh	Official, Business Department, Electricity of Vietnam	anhvtv@evn.com.vn
Mr	NGUYEN	Ngoc Giap	Official, Business Department, Electricity of Vietnam	giapnn@evn.com.vn
Ms.	LE	Thi Hoa Binh	Vietcombank	BINHLTH.HCM@vietcombank.com.vn
Ms.	DOAN	Thi Phuong Chi	Vietcombank	CHIDTP.HCM@vietcombank.com.vn
Mr	GERNER	Franz	Energy Sector Coordinator, The World Bank in Vietnam	fgerner@worldbank.org
Mr	CHU	Ba Thi	Senior Energy Specialist, The World Bank in Vietnam	tchu@worldbank.org
Dr	SARKAR	Ashok	Senior Energy Specialist, The World Bank	asarkar@worldbank.org
Ms.	GUPTA	Divya	World Bank, Communications Consultant for India Lighthouse Initiative	Divyagupta2@gmail.com

10. Annex 5: Logistics Note

VIETNAMESE DELEGATION'S ENERGY EFFICIENCY KNOWLEDGE EXCHANGE IN INDIA

February 25 (Monday) – March 1, 2019 (Friday)

LOGISTICS AND INFORMATION SHEET

1. HOTEL ARRANGEMENT AND PAYMENT MODALITIES

All Participants shall be staying at the hotels listed below.

ITC Maurya, New Delhi Address: Diplomatic Enclave, Sardar Patel Marg, New Delhi - 110021 India Phone: +91- 11- 26112233 Email: reservations@itchotels.in Website: www.itchotels.in	Check in: 24 th February (Sunday) Stay: 25 th and 26 th February (Monday and Tuesday) Check Out: 27 th February (Wednesday)
ITC Maratha, Mumbai Address: Sahar, Andheri (E) Mumbai - 400099 Phone: +91-22-28303030 Email: reservations@itchotels.in Website: www.itchotels.in	Check in: 27 th February (Wednesday) Stay: 28 th February (Thursday) Check Out: 1 st March (Friday)
ITC Maurya, New Delhi Address: Diplomatic Enclave, Sardar Patel Marg, New Delhi - 110021 India Phone: +91- 11- 26112233 Email: reservations@itchotels.in Website: www.itchotels.in	Check in: 1 st March (Friday) Stay: 1 st March (Friday) Check Out: 2 nd March (Saturday)

- The rooms are blocked and the booking confirmations will be sent to all the participants. The room rate includes double occupancy room, daily breakfast, Wi-Fi, and both side airport transfers.
- Each double-occupancy room at the Hotel will be shared by two people (this applies to the **15+ 1 Vietnamese delegation members**)

- If you have informed about any dietary restrictions, the same has been conveyed to the hotel.
- Check-in date is no earlier than Sunday, 24th February 2019, 1400 hrs and check-out is no later than Saturday, 2nd March 2019, 12 noon.
- For 15 Vietnamese participants and 1 interpreter Hotel room payments will be taken care by International Institute for Energy Conservation (IIEC).
- Any other **incidental charges** (telephone calls, mini-bar, laundry, etc.) will be billed **directly** to the guest.
- Should participants change their arrival date or cancel their trip, please intimate Ms Sumedha Awasthy (sawasthy@iiec.org) at the earliest.

2. GROUND TRANSPORTATION

Transportation for your pick-up from the Indira Gandhi International Airport, New Delhi has been organised through the hotel. The participants **DO NOT** have to pay for the hotel taxi as the costs for your pick-up and drop have already been paid by IIEC. The distance between the airport and the hotel is approximately 10 Km. The driver will be waiting in front of **GATE NUMBER 6** with name of the delegation on a placard.

On 2nd March 2019 or depending on the timings of the return flights, the participants will be dropped off at the Indira Gandhi International Airport, New Delhi by Hotel Taxi, already booked by IIEC. The participants **DO NOT** have to pay for the airport drops.

PLEASE NOTE: The **check-out time of the hotel is 12.00 pm**. Thus, all the participants **MUST** check out by 12.00 pm on 2nd March 2019.

3. TRAVEL INSURANCE

The Travel insurance for all the participants will **NOT** be covered by the organizers. **PLEASE NOTE** that you are responsible for your own medical insurance during the travel and whilst you are in India. Please ensure that you have an insurance policy that provides sufficient coverage for medical expenses and repatriation to your home country.

4. CURRENCY EXCHANGE

- Money can be converted to local currency (**INDIAN RUPEES - INR**) at the bank branches and money changers located at the Indira Gandhi International Airport, New Delhi and in the nearby markets.
- The current exchange rate is approximately **US\$ 1 = INR 70.55**. Exchange rate is subject to fluctuations. Currency can also be exchanged at your hotel.

5. ELECTRICAL CONNECTIONS

The voltage used in India is 220 volts. The plug/socket is **Type D** and you may want to carry an appropriate travel plug/adaptor.

6. BUYING A SIM CARD IN INDIA

On arrival in India, you can buy a SIM card at the international airport from the kiosks of mobile service providers such as **Airtel, Vodafone or Reliance**, which are located almost immediately after you clear customs. If you have the required documentation handy, all you have to do is fill up a form and submit it to the vendor. Once the documents are verified, you can purchase the SIM immediately (approximate costs INR 550 or \$10) and will get a 10-digit mobile number. Usually, the SIM is activated within 24 hours, after a confirmation call is made to your mobile phone for verifying the details provided in your application.

You will need to provide the following documents to the vendor along with the application form.

- 2 colour passport photographs of yourself
- A photocopy of the personal details page of your passport. You will also have to produce your passport for verification, after which it will be returned to you.
- A photocopy of your Indian visa. Once again, you will have to show the original visa for verification.
- A photocopy of the proof of your home address in your country of residence. This could be your passport, driver's license or any other Government issued document. Remember to carry the original document along for verification.

7. DRESS CODE

Please note that the dress code for all activities during the event is **business casual**.

8. WEATHER

The **weather forecast for New Delhi indicates cool weather with sunlight** for the week of 24th Feb 2019 to 2nd March 2019, with **temperatures ranging between 15°C to 24°C**. The **weather forecast for Mumbai indicates pleasant weather** for the week of 24th Feb 2019 to 2nd March 2019, with **temperatures ranging between 20°C to 30°C**. Therefore, it is advised to carry light warm clothes, umbrellas, caps, sunglasses or sunscreens to protect you from the sun during the field visits on 26th, 27th and 28th Feb 2019.

9. EMERGENCY CONTACTS of organizers in India (IIEC)

INTERNATIONAL INSTITUTE FOR ENERGY CONSERVATION

- **Ms Sumedha Awasthy** – Cell / WhatsApp Number: +91-958-228-9010
Email: sawasthy@iiec.org
- **Mr Kartik Dube** – Cell / WhatsApp Number: +91-992-351-6655
Email: kdube@iiec.org
- **Mr Amar Nath Yadav** – Cell / WhatsApp Number: +91-782-726-6999
Email: ayadav@iiec.org

IMPORTANT INSTRUCTIONS FOR DELEGATES

Please consider these as standing instructions for the entire course of time that the program is proposed for, in India.

- For Checking-out from the hotel room, on whichever day it is indicated in the program agenda, please report to the hotel desk 30 min prior to avoid any delay in the scheduled plan
- According to the agenda, for the start of the day please report at the bus, 15 min prior to avoid any delays to the scheduled plan
- For all days the breakfast will be served at the hotel from 6:30 AM onwards
- Please do care to check your respective room for any personal belongings left behind before checking out
- Please always make sure to carry your identification proof (Passport)
- Please always make sure to carry your ID badge provided by IIEC as it also contains instructions and contacts in case of any emergency
- The members of the delegation are requested not to leave the group without notifying the IIEC officials for any kind of travel / excursion / shopping etc. on their own
- There will be a daily briefing at the end of every day where the IIEC officials will be giving out an overview of the meeting planned for the next day
- Dinner has already been arranged in the hotel of stay for all days if you wish to opt for any local cuisine from outside, it will be at your own expense
- Please handover your boarding pass from Delhi-Mumbai-Delhi to Ms. Sumedha Awasthy (IIEC)

11. Annex 6: Photographs



