ENERGY EFFICIENCY SERVICES LIMITED
A JV of PSUs under the Ministry of Power

Conference on Inclusive Energy Resilience In Bangladesh

Session 1 - Smart Grid Innovation in the Sub-region & Learnings for Bangladesh

23rd -24th April, 2019

PART I - ABOUT EESL & OUR PROGRAMMES

About EESL

- Energy Efficiency Services Limited (EESL) is a joint venture company of four Public Sector Enterprises of Ministry of Power, Govt. of India

- NTPC Limited (India's Largest Power Generating Company) Share Capital : 36.36%
- REC Limited (Leading Infrastructure Finance Company) Share Capital : 21.70%
- Power Finance Corporation Limited (Leading Non-Banking Financial Corporation) Share Capital : 36.36%
- Power Grid Corporation of India Limited (India's Largest Power Transmission Company) Share Capital : 5.58%

- Established in the year 2009

- A Super ESCO that seeks to unlock energy efficiency market in India, estimated to be at 12 billion US $ by way of innovative business and implementation models

EESL- Accolade

- Awarded by prestigious **“Best Company (Public Sector) Award”** by the Forbes India Leadership Awards (FILA) 2018.

- Awarded by prestigious **South Asia Procurement Innovation Award (SAPIA) 2017** – 5th South Asia Public Procurement Conference by World Bank , IFC, MIGA

- The World Bank Group President, Jim Yong Kim, in his opening remark appreciated EESL’s innovative business model and initiatives towards energy efficiency at **One Planet Summit** held in Paris, France in December 17

EESL – Realizing the Vision of New World

- Pay As You Save **(PAYS)** business model.
- **No upfront investment- Re-payment** *from* **savings – performance guaranteed** *and* **failures warrantied.**
- **Barriers of high first cost** *and* **comparative end use** overcome.
- **Aggregate demand** by including **incentives** for all stakeholders
- Putting out **large procurements** to **leverage economies** to **scale**
- Passing on the benefits to end users for more demand aggregation– **virtuous cycle.**
- **Flexible business model** in terms of performance period and accountability .
- **Encouraging** all sections of the **value chain** including **social, economic** and **environment**

EESL's Footprint in India

UJALA

36 States & UTs

AgDSM

2 States

SLNP

28 States & UTs

e-Vehicle

4 States & UTs

BEEP

7 States & UTs

Smart Meters

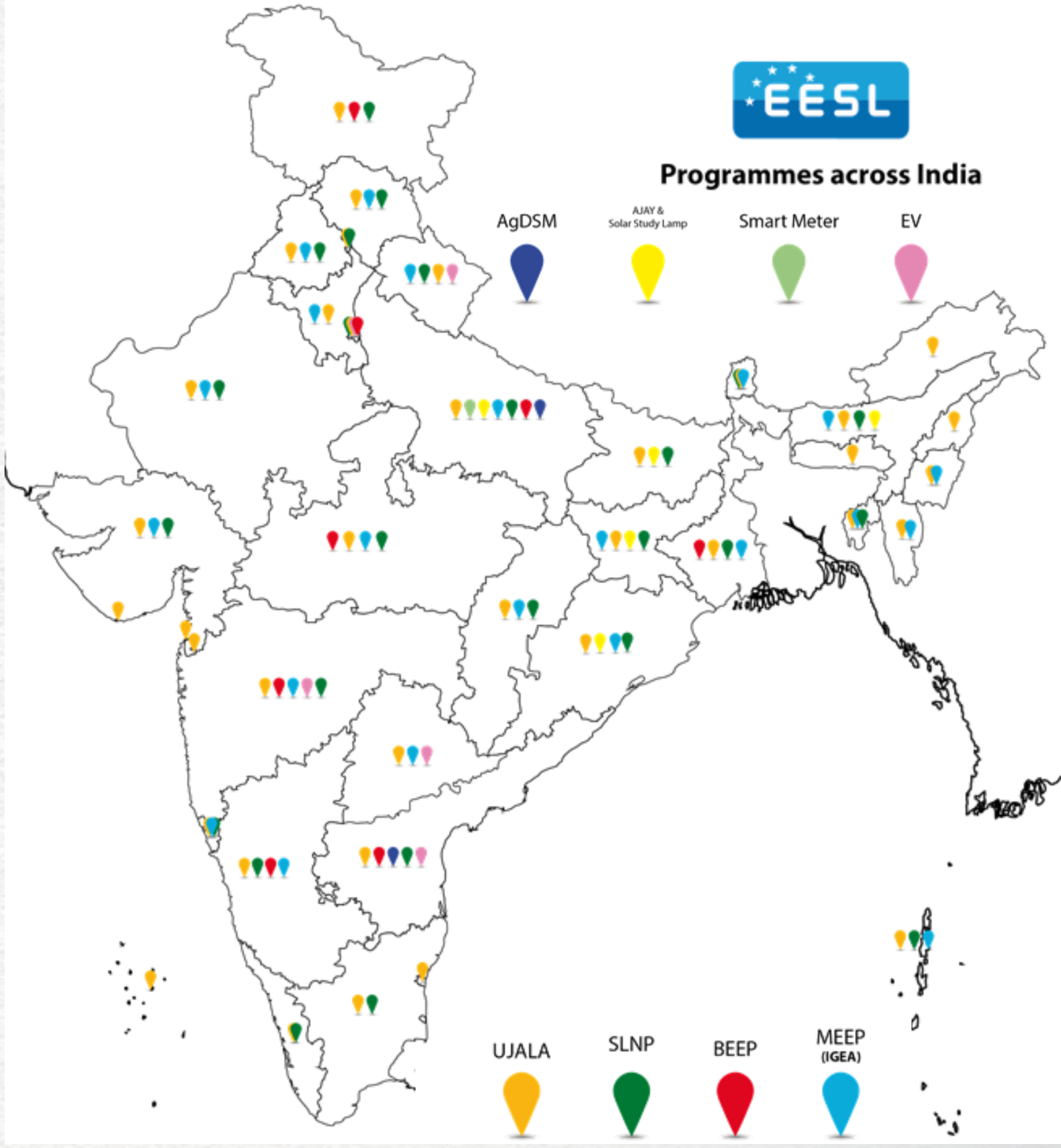
3 States & UTs

MEEP

25 States & UTs

AJAY

5 States



New Projects & Capital Investment Plan of EESL

S. No	Particulars	Cost ($ million)
1	SLNP - ESCO	610
2	MEEP	26
3	BEEP	262
4	Solar Substation	801
5	E-Vehicle	1147
6	Smart Meter	1318
7	NMRP - ESCO	40
8	SAATHI - ESCO	5
9	Other New Businesses	80
	TOTAL	4289

Year	UJALA (million)	Street Light (million)	Solar Capacity (MW)	Tri-gen (no. of units))
FY 2019	87.00	4	100	1
FY 2020	64.92	3	200	1
FY 2021	34.20	2	300	2
FY 2022	04.20	1	300	2
FY 2023	02.40	0.4	500	3

EESL plans to expand its existing lines of businesses and also in the process of adding new lines of business for its onshore and offshore activities. A summary of the total project cost, business wise, is summarized in the tables above

EESL Initiatives

UJALA

SLNP

E- Mobility

SMNP

BEEP

AgDSM

Decentralized Solar Plants

AJAY & SoUL

NMRP

Trigeneration

International Operations

National LED Lighting Programme

PM launches: Scheme for LED bulb distribution under Domestic Efficient Lighting Programme in Delhi

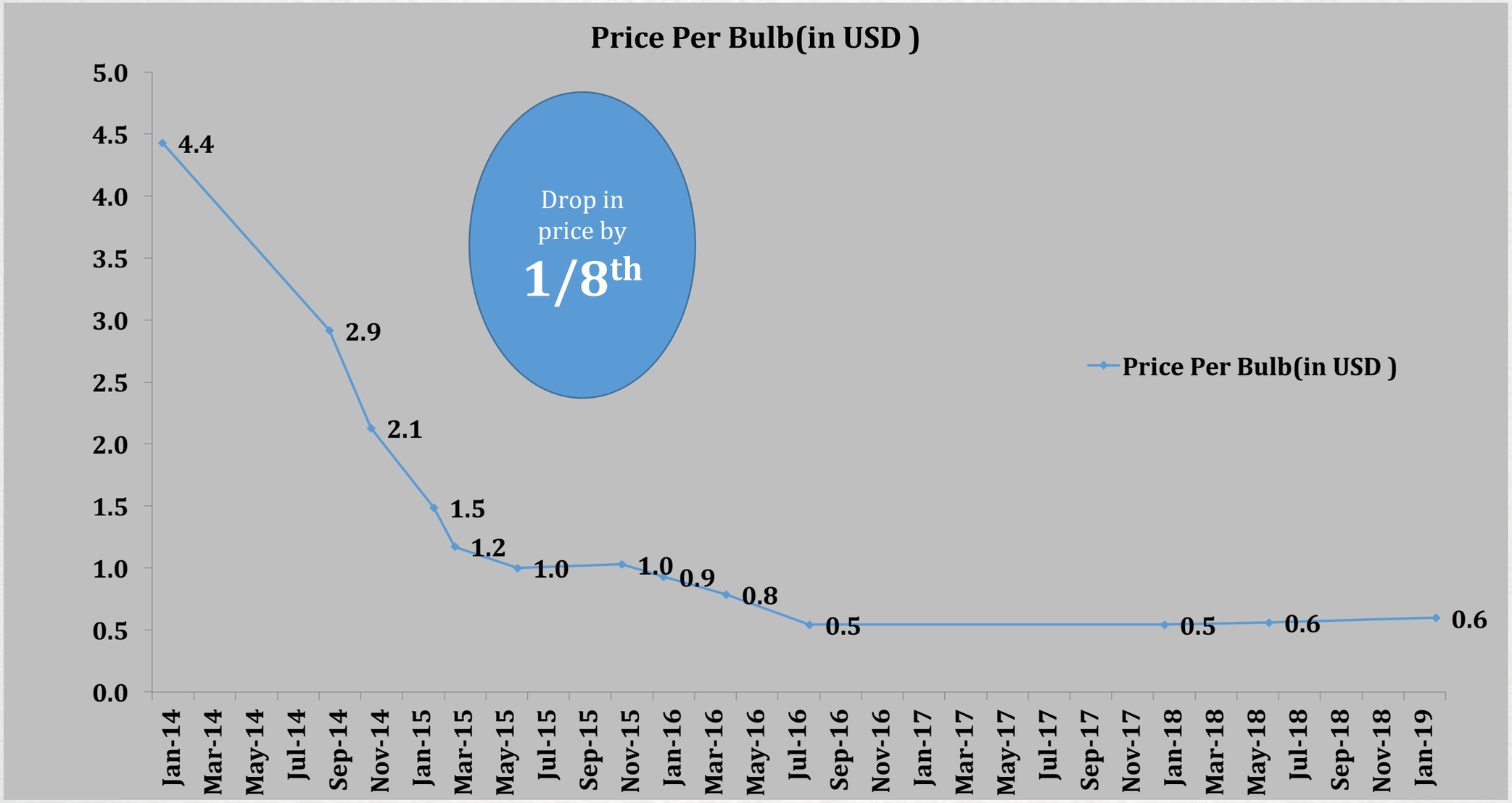
Programme has 2 components

- **UNNAT JYOTI BY AFFORDABLE LEDs FOR ALL (UJALA)** - Conversion of conventional domestic lights with LED bulbs
- **STREET LIGHTING NATIONAL PROGRAMME (SLNP)** - Conversion of conventional street lights with LED street lights

Unnat Jyoti By Affordable LEDs For All (UJALA)

- Hon'ble Prime Minister in **January 2015** launched the UJALA programme which aims to provide LED bulbs to domestic consumers (Target to replace **770 million incandescent bulbs** with LED bulbs
- From launch , EESL has distributed over **348 mn** LED bulbs till date resulting in estimated energy savings of **45 BU p.a** with avoided peak demand of **9100 MW** and estimated GHG reduction of **36.57 mn t CO_2 p.a**
- UJALA programme is worlds largest non-subsidy based LED lighting programme in the world
- Real time monitoring of sales, distribution of UJALA through dashboard on **www.ujala.gov.in**
- EESL has also distributed under UJALA
  - ✓ **7 mn LED tube lights** resulting in estimated energy savings of **305 Mus p.a** & avoided peak demand of **139 MW**
  - ✓ **2.2 million energy efficient fans** resulting in estimated energy savings of **207 Mus p.a &** avoided peak demand of **56 MW**

Demand Aggregation – Economies of Scale



Street Lighting National Programme (SLNP)

- Hon'ble Prime Minister in **January 2015** launched the SLNP with a target to replace **13.4 million** conventional Street Lights with smart and energy efficient LED street lights
- Till date, EESL has installed over **8.6 mn LED street lights** resulting in estimated energy savings of **5.8 Bus p.a** and with avoided peak demand of **965 MW**
- EESL has enrolled approx. 1500 **ULBs** and work is completed in **826 Urban Local Bodies**
- EESL replaces the conventional street lights with LEDs at its own costs (without any need for municipalities to invest) and the consequent reduction in energy and maintenance cost of the municipality is used to repay EESL over a period.
- The contracts that EESL enters into with municipalities are typically of **7 years duration** where we guarantee a minimum energy saving (of-typically 50%) and we also provide free replacements and maintenance of lights at no additional cost to the municipality.

National E-Mobility Programme

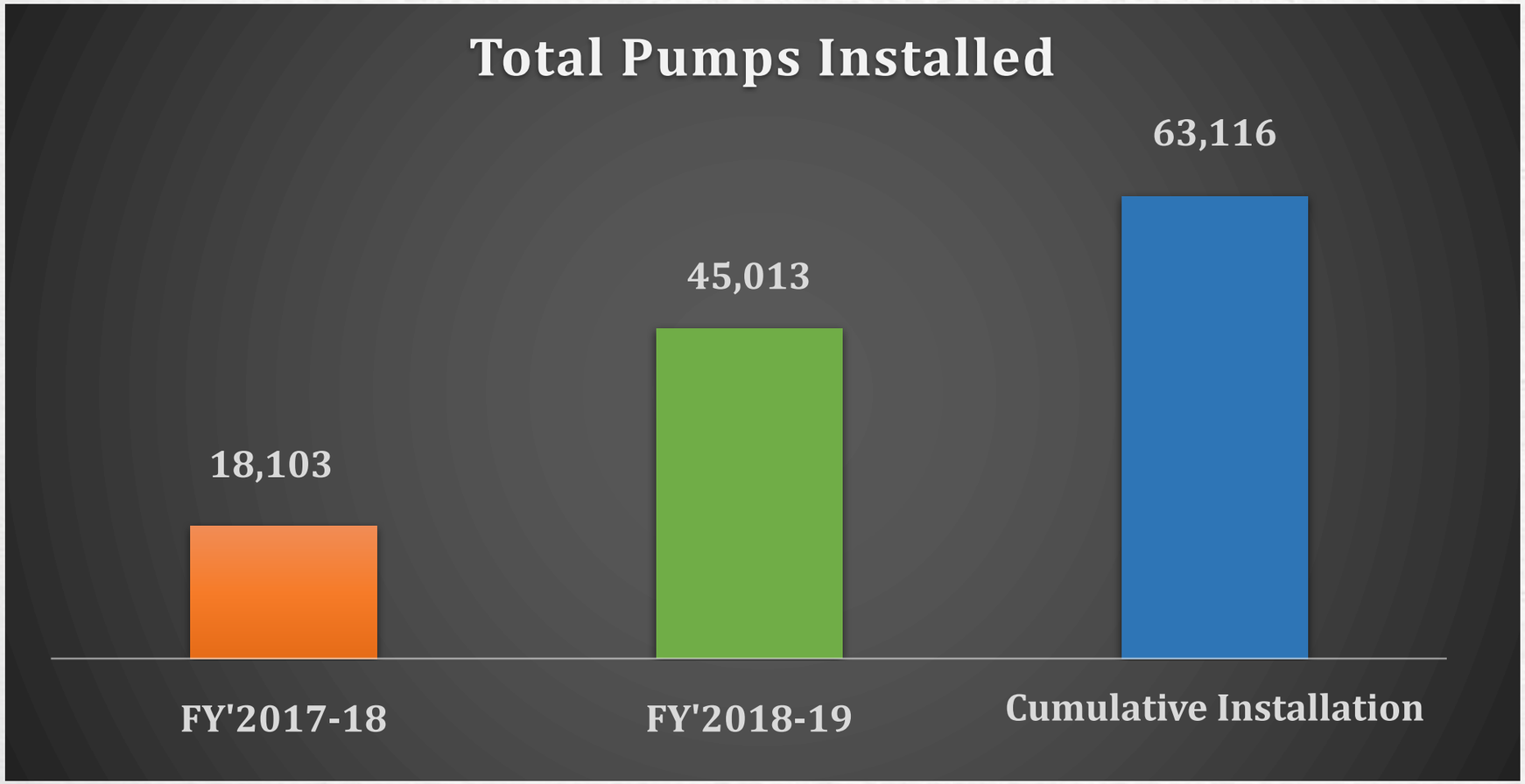
- Successful tender completed for procurement of **10,000 e-cars**
- Fast deployment of **10,000 e-cars in GOI departments and CPSUs.** Till date, 1500 e-cars have been deployed/under registration and 286 AC Chargers and 142 DC chargers have been commissioned.
- The **National E-Mobility Programme** was launched on **7th March 2018** by **Hon'ble Minister of Power, New and Renewable Energy.**
- MoU for 10,000 e-cars and 4,000 chargers signed with AP State Govt in 2018
- Planning and execution of E-Mobility programme in key states includes: Andhra Pradesh, Gujarat, Maharashtra, Rajasthan, Madhya Pradesh, Telangana, Uttar Pradesh, Uttarakhand etc.

Building Energy Efficiency Programme (BEEP)

- EESL is undertaking implementation of the Buildings Energy Efficiency Programme. EESL is driving a large-scale transformation to retrofit commercial buildings in India into energy efficient complexes.
- Government of India has issued mandate to implement this programme in all central Government buildings
- As on date EESL has completed retrofitting work in **10,207 buildings** including Railway Stations and Airports and is under progress in 611 buildings
- Energy Audits shows energy saving potential to the tune of up to 30-50% in these buildings. The major interventions in these buildings are in area of lighting and air-conditioning systems.

Agriculture Demand Side Management (AgDSM)

- EESL is implementing AgDSM Programme using upscaling methodology for replacing farmer's inefficient pump sets with new BEE 5 Star rated Pump sets in the State of Andhra Pradesh, India. Till date, over **62,000 no. of pumps** have been installed.



Total Pump Sets Installed

63,116 Nos

Energy Saved in Million Units (MU)

162 MUs

Decentralized Solar Plants

- Decentralized solar plants of 0.5 MW to 2 MW capacity on surplus land of rural substations – to feed agriculture consumers directly
- Reduces the line losses of DISCOMs, reduces subsidy burden
- PPA signed with MSEDCL at **4.1 US cent per unit** for 25 years for 200 MW under phase-1.
- 300 substations identified, for installation of Decentralised Solar Power Plants.
- Solar power plant of about 40 MWp cumulative capacity has been commissioned.
- Plans to scale up t0 1500 MW in states like UP, Jharkhand, Maharashtra etc.

AJAY and Solar Study Lamp

Atal Jyoti Yojana (AJAY):

- Installation of Solar Street Lighting Systems in the States where household Grid Power coverage is less than 50% as per 2011 census
- Lighting up the roads, streets, bus stops, market places and intersections in remote areas/ villages that do not have adequate Street Lights
- As on date **over 0.13 million Solar LED Street Lights** commissioned in 5 States i.e. UP, Bihar, Jharkhand, Odisha and Assam

7 million Solar Study Lamp (SoUL) Programme :

- As on date, **over 4.3 million Solar Study Lamps** distributed in 5 States i.e. UP, Bihar, Jharkhand, Assam, Odisha
- Total **7 million** Solar Study Lamps (SSLs) to be distributed

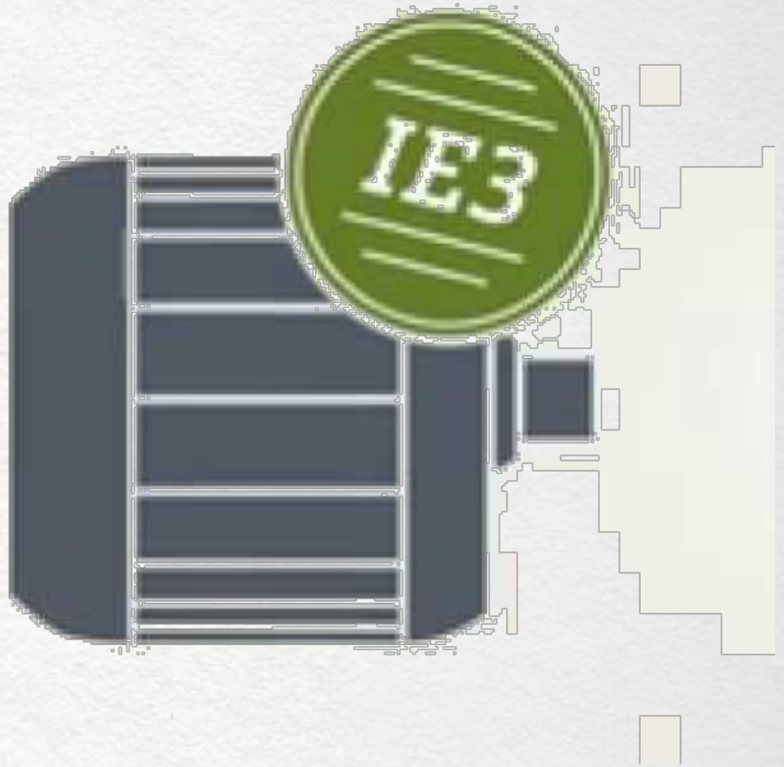
National Motor Replacement Programme(NMRP)

- NMRP is EESL's first of its kind programme for industrial sector and was conceptualized after due consultation with industries and other stakeholders. The program was launched in January 2018.

- The market assessment reveals potential of approx. 15 mn motors that can be replaced with efficient motor. Accordingly as a first phase, EESL did the procurement of 0.12 million numbers of motors ranging between 1.1 kW to 22 kW (4 pole, Foot mounting). EESL targeted large, medium and small industries.

- After successful pilot over 1 year and inputs from industries, vendors and other stakeholders it was proposed to increase our product portfolio to increase the penetration and flexibility for the industries to participate under NMRP:

  a) Product Range: 0.75 kW to 75 kW
  b) Poles: 2 pole, 4 pole, 6 pole
  c) Mounted: Foot or Flange mounted



Trigeneration

- Trigeneration is a technology where both heating and cooling is generated simultaneously along with power
- EESL's unique **Pay As You Save (PAYS)** business model, wherein there is **no upfront investment from the Client**
- **Repayments to be done from the savings**, which will play a vital role to shape adoption of CHP and Trigeneration on a large scale in India
- EESL shall **guarantee the performance** with Service Level Agreements (SLA's)
- EESL shall offer an integrated turnkey solution – provide **end to end service and maintenance**.

As on date:

- Project in progress at Mahindra & Mahindra, JJ and BJ Hospital(Maharashtra)
- MoUs for availability of natural gas signed with M/s GAIL Gas Ltd and various subsidiaries of GAIL like MGL(Mahanagar Gas Ltd.),MNGL(Maharashtra Natural Gas Ltd.), IGL(Indraprastha Gas Ltd.), CASTROL & IGS(India Gas Solutions)
- MoU signed with Govt. of Maharashtra for implementing Trigeneration Projects in Maharashtra

CONTAINERISED

INSTALLED ENERGY SOLUTION

Smart Meter National Programme (SMNP)

- Awarded LoAs for procurement of **10 million** smart meters.
- Separate system integrators RFP for integration of SM
- Issued LoAs for supply of 1 mn prepaid meters for the state of Uttar Pradesh
- MoUs for smart meters signed with states of Andhra Pradesh, Uttar Pradesh, Haryana, Bihar, NDMC-Delhi, Telangana and for prepaid meters with the states of Uttar Pradesh and Tripura.
- Till date, **0.19 million** smart meters have been installed in the state of Uttar Pradesh and NDMC area, New Delhi.
- NDMC becomes the first utility to have all their consumers with smart meters without any upfront investment from NDMC

International Operations - UK

- Investment of **£55 million** in acquisition of Combined Heat & Power (CHP) asset – **Edina Power Services Ltd.**, leading CHP integrator in UK and Ireland
- Revenue: £100m; 200+ Staff; 8 offices; 500+ installations
- £208m of potential in CHP based ESCO market in UK
- 11.5 GW potential of Tri-generation in India & 70 GW by 2022.
- Edina received “The Queen’s Award” in September 2018 for 2nd time in 4 years
- Acquisition worth £5.6 million of 7 Building Energy Efficiency Contracts. Revenues: £700 k per annum
- Investment of £1.5 million in a 58MW Battery Storage plant for Toronto Hydro – largest in North America

UK Operations

High Commission of India, London lit up with energy efficient Façade lighting by EESL

Combined Heating and Power unit in Edina's manufacturing facility

Battery Storage plant in the premise of Toronto Hydro, Canada

International Operations – Other Countries

Asia (Bangladesh):

- Installed 520 LED Street Lights with CCMS under pilot project at Tungipara Municipal Corporation (TMC)
- Supplied 52,500 LED bulbs (9W) to TMC under UJALA scheme .
- Installing 500 no's solar LED street lights at Cox bazar.
- Submitted proposal for installation of 1 lac LED Street lights under Indian LOC (approx. $ 25 m). Approved by ERD, Bangladesh and HCI Dhaka. The proposal is under Consideration of LGD, Bangladesh.
- Submitted a concept paper for UJALA under ESCO mode to SREDA, Bangladesh.

Maldives

- Signed a strategic MoU with Government of Maldives for implementation of Energy Efficiency initiatives
- Deputed 2 resources in Ministry of Environment & Energy to advise and support government in Energy Efficiency
- Installing 2,500 LED street lights along with CCMS and distributing 2 lakh LED bulbs.
- Association with the Maldives tourism industry planned to to push Energy Efficiency

The first streetlight in Maldives was installed and inaugurated by H.E. Minister of Environment & Energy, Government of Maldives and H.E. Indian Ambassador on 31st March 2019

International Operations – Other Countries

- **SE Asia (Vietnam / Thailand)**
  - Feasibility study completed for EVN's National Programme on DELP with UNEP assistance ($46,000).
  - Study on EE in Thai Auto Parts Industry is under progress with GGGI assistance (125,000 $)
  - Projects under discussion: DELP for 1.6 mn bulbs in Vietnam with partial support from UNEP.
- **SE Asia (Myanmar)**
  - Pilot projects on LED lighting (Domestic & Street) under financial assistance of MEA ($1.2 mn) including for parliament building submitted to Embassy of India, Yangoon
  - Our first overseas project - installed 3800 Energy Efficient LED street lights at Nay Pyi Taw.

International Operations – Other Countries

Saudi Arabia

- EESL has signed MoU with National Energy Service Company of Saudi Arabia for providing Consultancy services
- EESL is sharing technical knowledge and experience with NESCO for rolling out LED Street Light projects in Saudi Arabia. Princess Al-Jawhara Street, Riyadh became the first lane to be lit with LEDs under the consultancy project

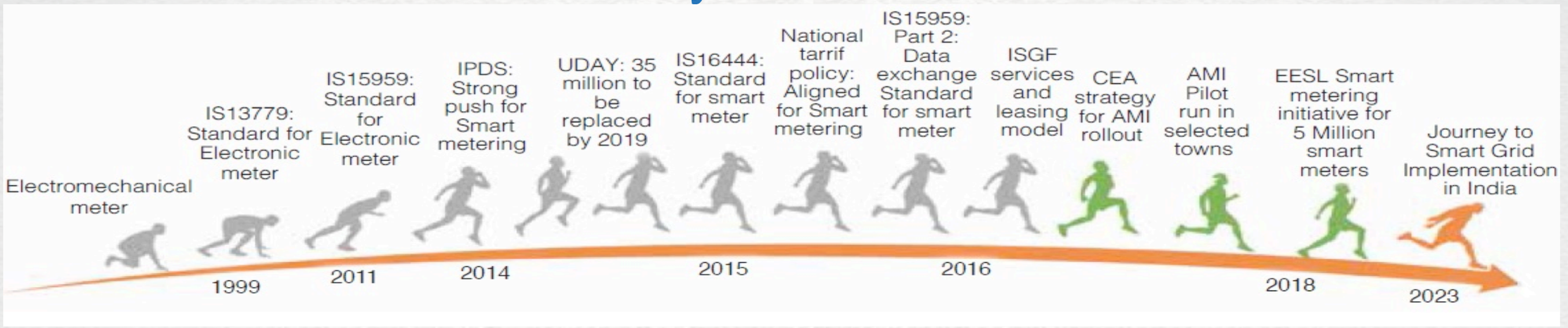
SE Asia (Malaysia)

- EESL has signed an agreement with Green Growth Asia for supply of 3 million LED bulbs in the state of Melaka in Malaysia ($ 3.9m)
- EESL has commercially supplied 1200 No's, 20W LED Tube lights & 600 No's of 9W LED bulbs to the Indian High Commission in Malaysia in Dec 2017.


Princess Al-Jawhara Street, Riyadh

PART I - ABOUT SMART METER NATIONAL PROGRAMME

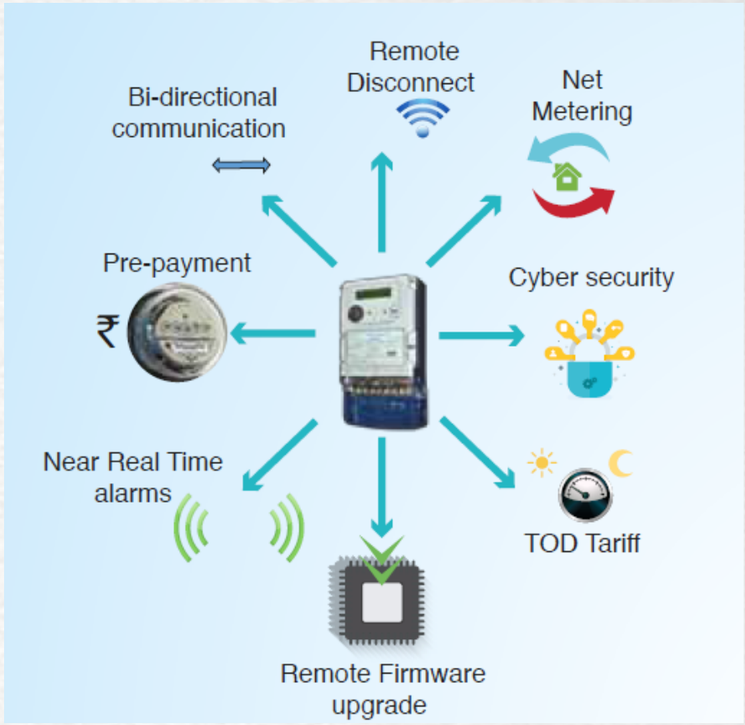
India - Smart Meter Journey

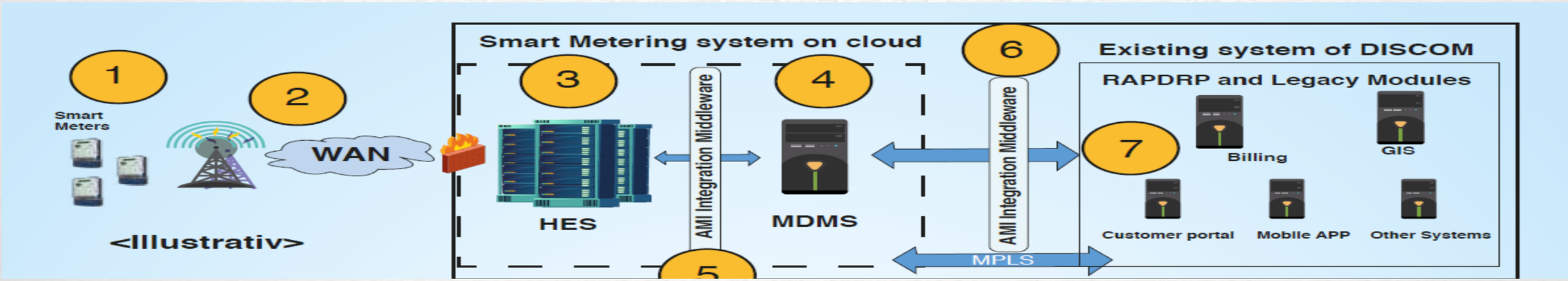


- **1999-** Move from an electro-mechanical to an electronic meter.
- **2011 -** Standards for electronic meters 1S 13779 & IS 15959
- **2014 –** Integrated Power Development Scheme (IPDS) – Laid stress on strengthening of sub transmission & Distribution networks. Stress on 100% metering of Distribution Transformers, feeders & consumers in urban areas, IT enablement etc.
- **2015-** Standard IS6444 for SM & 1S 15959 for data exchange .
- **2015-** National Tariff Policy target to replace 35 mn SM
- **2017-** Central Electricity Authority - Strategy for SM roll out
- **2018-** EESL rolls out initiative for 50 mn smart meters in UP , Haryana, NDMC etc.
- **2019-** 100 % implementation completed in NDMC, fresh demand from new states like Bihar, AP etc.

Smart Meter – Basic Elements

- **Smart Meter –** Simple “Watt Hour” electronic meter having 2 way real time communication capacity , connect & disconnect switches, remote alarms , remote firmware upgrade.
- It collects information about energy usage at various intervals in real time, transmits data over communication networks to Utility and receives back information like price signals from utility and conveys it back to the Consumer.
- **Communication Network** – Advanced network that supports two way communication from SM to DISCOM & vice versa e.g. fixed radio frequency , fibre optics, GPRS (cellular networks) etc.
- **Head End System** –Software application hosted over cloud designed for communicating and receiving data from Smart Meter at a predefined frequency.
- **Meter Data Management System (MDMS)** – Host that receives, stores and analyze meter data , provides determinants to DISCOM for generation of Bills





How Smart Pre-payment Metering works?

Smart Meter

Meter is installed in Prepayment Mode

Sends reading Everyday

Send Connect / Disconnect Command

Supply Disconnected

Supply Connected

HES

Initiates Connect / Disconnect Command

MDM S

Notify MDM

Prepayment System

Welcome Credit is offered

Receives reading and deduct the account balance as per tariff

As long as account balance is more than minimum required amount meter remains ON supply

Once account balance goes below minimum required amount

Once account balance again goes above minimum required amount

Consumer

Consumer Recharge Account

Mobile App / Web Portal

EESL Model

1	Aggregated the demand to procure 5 million smart meters thereby ‘commoditizing’ smart meters
2	Deliberated with stakeholders (MoP, CEA, NSGM, Distribution Companies, Meter Manufacturers, Communication Service Providers, System Integrators, Testing Labs etc.) for understanding on-ground situation
3	Formulated a financial model based on BOOT concept thereby reducing financial burden on Distribution Companies
4	Selected GPRS as the communication technology resulting in fast deployment, interoperability and reduced CAPEX
5	Developed a Cloud-based technical architecture for seamless expansion and reducing CAPEX
6	Floated 2 separate tenders (for smart meters and system integration) for increasing participation of System Integrators in smart metering projects
7	Clearly defined SLAs for meter manufacturers and system integrator

Our Methodology

- EESL invest Upfront, Zero CAPEX required from Utilities.
- AMI project implementation on BOOT model.
- IT Infra on Cloud for fast deployment and reduction in CAPEX.
- Multiple Meter Supplier to speed up deliveries.
- Major portion of Savings vest with DISCOMs/ Utilities.
- EESL recovers actual cost with nominal RoE and PMC.

Case Study- New Delhi Municipal Council

- Described as Lutyens Delhi.
- Seat of Government of India – Presidents House, PMO, Indian Parliament, Central Secretariat etc.
- Spread over 42.7 sq. km.
- 48% Green area , Smart city.
- 50,000 electricity consumers.
- AT & Loss – 12.63%.

Parameter	Value
Improvement in Billing Efficiency after smart metering (conservative)	1%
Additional revenue due to billing efficiency improvement per annum	Rs. 110 mn
Savings in meter reading cost per annum	Rs. 11.4 mn
Total savings per annum	Rs. 124 mn
Savings per consumer per month	Rs. 208 / $ 3
EESL monthly charges	Rs. 95 / $1.2

Case Study- New Delhi Municipal Council

GOVERNMENT OF INDIA
MINISTRY OF POWER

EESL ENERGY EFFICIENCY SERVICES LIMITED
A JV of PSUs under the Ministry of Power

Metering electricity in a SMART WAY

NDMC's 311 mobile application enables the consumers to access various services at the tap of a finger. Adding to this round-the-clock convenience, a tab on **'Smart Meters'** has been added to the app's home screen. Consumers can now benefit from complete clarity about their energy habits and consumption by accessing detailed and personalised insights through this convenient and easy-to-use app.

Open a world of possibilities by downloading our app 'NDMC 311'

HERE IS A STEP-BY-STEP GUIDE

1. Login as a registered user or follow these steps if you're a new user:
   a. Step 1 – Fill in your details
   b. Step 2 – Log in using the consumer number.
2. View details on home screen 'Welcome to NDMC Smart Meter Project' about the project
3. Login to the main page and enter your consumer and meter numbers
4. Access the functionalities:
   a. **My Profile:** Shows the user's profile
   b. **Today's Details:** Provides latest consumption and instantaneous reading
   c. **Consumption Pattern:** Your consumption pattern for the last 7, 15 and 30 days.
   d. **Complaints:** register complaints for quick resolution
   e. **Manage Accounts:** If you have more than one meter at your premises. You can check the details by putting the consumer and meter number as mentioned in 'step 6'
   f. **Load pattern:** Shows the load pattern of the household
   g. **FAQ:** Provides answer to all the basic and frequently asked questions
   h. **Energy Saving Tips:** A quick guide on saving energy in our day-to-day life
   i. **Contact Us:** To contact the relevant department, in case of any issue
5. There will also be pop up which will enable the users to view and pay their bills

You are now just a finger tap away from accessing the following information anytime, anywhere:

- Consumption pattern
- Daily consumption details
- Registration of complaints
- Bill payment
- Energy saving tips and more

Download NDMC 311 mobile app and become a truly digitalised energy consumer.

Benefits to Consumers

- Consumer get real time and **accurate bill** for their electricity consumption . End to estimated bills
- **Greater control over electricity usage**. Consumers can track their electricity usage and accordingly alter their habits – Time of Day / Time of Use Tariff
- **Ensure energy and monetary savings**
- New Value added services. & Versatile Payment Options
- AMI functionalities **improve customer satisfaction level** for providing accurate billing due to automation, real time consumption information, automatic outage detection

Benefits to Utility

Saving to DISCOMs

Billing Efficiency Improvement, AT&C Reduction ~ 5-10%

Flattening of Load Curve.

Optimum power purchase

Lower Sales outstanding

Fixed Charges Gain

70% Consumers with higher consumption than sanctioned load – additional revenue for Utilities

Prepaid Smart Metering Facility

Flexibility of using Smart Meter in Prepaid mode using the existing mobile prepaid infrastructure – enhanced cash flow

No Upfront Cost to Utility

'Pay As You Save'. Utility only pays service charges without any Capital expenditure

DISCOMs Improved Financials

Demand Aggregation reducing the CAPEX. Smart costs 40% lesser and prices will go down

Benefits to Society

- Energy Efficiency – Leads to abatement of GHG & Other Local Pollutants like SOX , NOX etc.
- Fillip to Clean renewable energy under net metering mode.
- **Access to clean energy to masses**
- **In India 250 million Smart Meters to be replaced, help manufacturing, generate employment**
- More energy saved would help in serving the unserved poor population in a power deficit country.

Thank You

For more information contact –

Mr. Vineet Taneja, Deputy General Manager, vtaneja @eesl.co.in

www.eeslindia.org