# Smart Grid Development in India

**Vivek Goel**
**Chief Engineer ( Distribution Planning & Technology )**
**Central Electricity Authority**

**November 2019**

# Present status of Indian Power Sector

| | |
|---|---|
| Installed Capacity | 360.5 GW (31.07.2019) |
| Gross Electricity Generation | 1374 BU (2018-19) |
| Per capita consumption (in kWh) | ~1250* (2018-19) |
| % AT&C Losses | ~18.39% (2018-19) |
| Peak Demand Met (in GW) | 183 GW (June 2019) |

* Provisional

# Fuelwise Generation Installed Capacity in India

(As on 31-07-2019)

| Fuel | Installed Capacity (MW) | % Share in Total IC |
|---|---|---|
| Coal | 195809 | 54.32% |
| Gas | 24937 | 6.92% |
| Lignite | 6260 | 1.73% |
| Diesel | 638 | 0.18% |
| **Thermal -Total** | 227644 | 63.15% |
| **Hydro** | 45399 | 12.59% |
| **Nuclear** | 6780 | 1.88% |
| **RES** | 80633 | 21.37% |
| Total | 3,60,456 | 100.00% |

# Power Supply Position

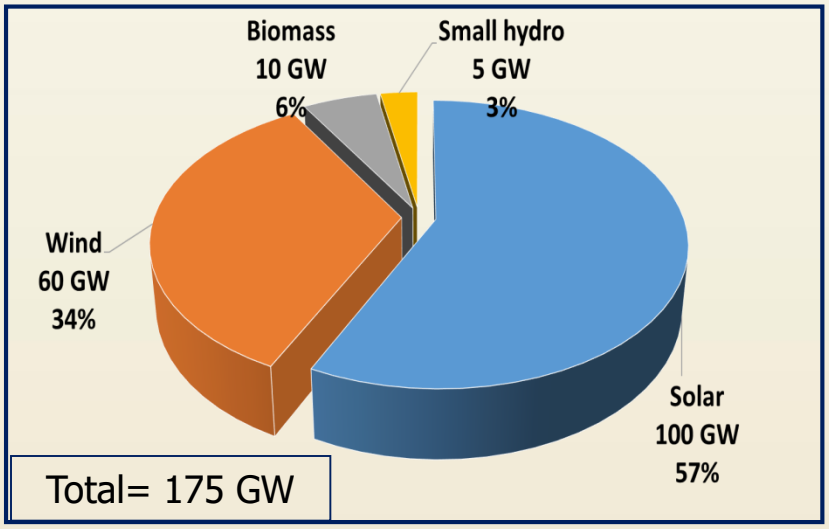
**( as per CEA report)**

| | 2017-18 | 2018-19 | 2019-20 (April-Sep 2019) |
|---|---|---|---|
| Energy Requirement (BU) | 1213.33 | 1274.56 | 687.10 |
| Energy Supplied (BU) | 1204.69 | 1267.20 | 683.39 |
| Shortage % | -0.7% | -0.6% | -0.5% |
| Peak Demand GW | 164.07 | 177.02 | 183.8 |
| Peak Met GW | 160.75 | 175.52 | 182.5 |
| Shortage % | -2.0% | -0.8% | -0.7% |

# DEMAND PROJECTION ( 19th EPS)

| Year | Peak Demand (GW) | Installed Capacity (GW) | Energy Requirement (BU) |
|---|---|---|---|
| 2021-22 | 225.7 | 479 | 1,566 |
| 2026-27 | 298.8 | 619 | 2,047 |

# RES CONTRIBUTION IN TOTAL ENERGY REQUIREMENT DURING 2017-22




| Scenario | RES IC by 2022 (GW) | RES Energy Contribution (BU) in Total Energy requirement |
|---|---|---|
| I | 175 | 327 (20.8%) |

## India's Intended Nationally Determined Contribution (INDC)-

**40 % cumulative power installed capacity should be from non-fossil fuels by 2030.**

| Year | Likely IC (GW) | Likely IC of Fossil Fuel (GW) | Likely IC of Non-Fossil Fuel (GW) | % of Non-Fossil Fuel in IC |
|---|---|---|---|---|
| March 2022 | 479 | 243 | 236 | 49.3% |
| March 2027 | 619 | 264 | 355 | 57.4% |

# THRUST AREAS IN DISTRIBUTION

- 24x7 RELIABLE, QUALITY & AFFORDABLE POWER TO ALL
- 100% HOUSEHOLDS ELECTRIFICATION-Already Achieved
- REDUCTION OF AT&C LOSSES BELOW 10%
- FINANCIALLY VIABLE DISCOMS
- IMPROVEMENT IN SUB-TRAN. AND DIST.NETWORK
- 100% METERING, BILLING & COLLECTION
- ADOPTION OF IT FACILITIES IN DISTRIBUTION
  (Smart Grid, GIS Mapping , SCADA, AMR, RMUs etc.)
- MORE CONSUMER SATISFACTION
- EFFECTIVE CONSUMER GRIEVANCES REDRESSAL

# GOI SCHEMES/PROGRAMS FOR DEVELOPMENT OF DISTRIBUTION SYSTEM

- **24x7 Power For All:** A joint initiative of GOI with States to provide 24x7 power supply to All consumers
- **IPDS:** Launched in 2014 for providing funding for augmentation of distribution system in urban areas. Earlier RAPDRP scheme subsumed in this scheme.
- **DDUGJY** : Launched in 2014 for electrification of villages, augmentation of distribution system in rural areas and feeder segregation etc. Earlier RGGVY scheme subsumed in this scheme. 100% villages have been electrified in May 2018 under the scheme.
- **SAUBHAGAYA :** Launched in 2018 for providing funding for 100% household electrification by Dec 2018
- **UDAY :** Launched in 2015 for Operational and Financial Turnaround of Power Distribution Companies (DISCOMs)
- **NSGM:** Launched in 2015 for development of smart Grid in the country.30% funding is being provided for smart grid projects

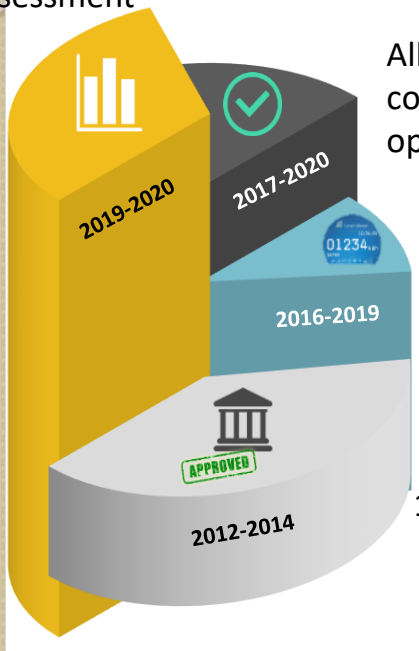
# Introduction of Smart Grid in India Initiatives

Journey So far -

- **2008-09: R-APDRP – Introduction of IT in distribution sector -basic building blocks of Smart Grids**
- **2011: India Smart Grid Task Force(ISTF) and India Smart Grid Forum (ISGF)**
- **2012: approval of Smart Grid Pilot Projects**
- **2015 : National Smart Grid Mission approved for development of smart grid in the country**
- **2015: Model Smart Grid Regulations approved by Forum of Regulators**
- **2015: Standards for Smart Meters (IS 16444) issued by Bureau of Indian Standards**
- **2016: Central Electricity Authority issued Functional requirement of Advanced Metering Infrastructure (AMI) including specifications of smart meters**
- **2018: A Standard Bidding Document (SBD) is prepared by NSGM for Smart Grid projects which may be used by the utilities for tendering smart grid projects**

# Smart Grid Pilot Projects

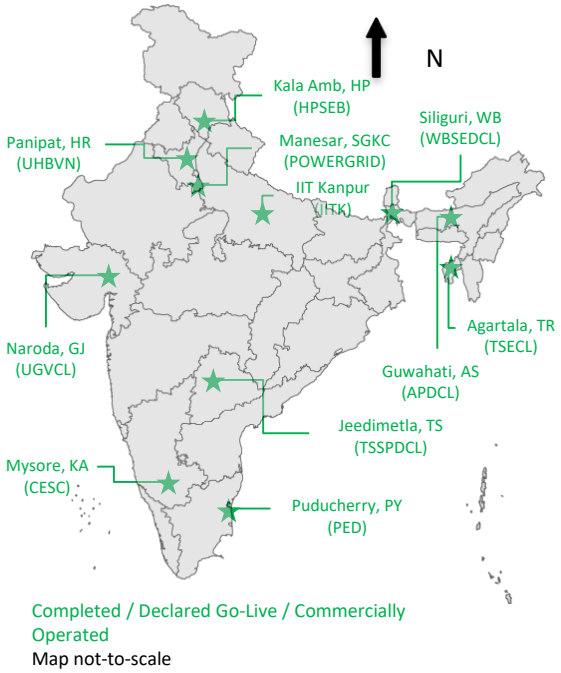
Impact assessment




All pilots declared go-live / completed / commercially operated

~1.6 lakh Smart Meters installed

11 pilots including SGKC




- New generation communication technology with improved performance based on RF mesh developed as an evolution of Technology deployed at CESC, Mysore
- PLC technology was used in Tripura SG Pilot

# Experience of Smart Grid projects

**Functionalities implemented** :

- Remote meter data reading
- Remote connect /disconnect
- Tamper detection and reporting
- Real-time load monitoring /Load Curtailment
- Net metering
- Pre paid Metering
- On line Consumer Grievance Redressal
- Integration with existing metering billing software

**Benefits achieved:**

- Improvement in revenue collection by ~20% by remote connect / disconnect function
- Improved Billing efficiency
- Feeder wise AT&C losses reduced from >20% to ~ 10%.
- Extra revenue from contract demand (CD) violation
- A short Pay back period

# Smart meter installed across India

| S.no. | Discom | No. of Smart Meters installed |
|---|---|---|
| 1 | Smart Grid Pilot Projects | 1.6 Lakh |
| 2 | Indore-MPPKVVCL | 0.9 Lakh |
| 3 | NDMC, Delhi- EESL | 0.75 Lakh |
| 4 | UP & Haryana- EESL | 7 Lakhs |
| 5 | Tata Power Delhi | 2 Lakh |
| | Total | **12.0 Lakhs** |

# SMART METERING PLAN

- **There is a plan to replace all the existing consumer meters about 250 Million by Smart meters in next 3 years in India**
- **Central Government is already supporting States for adoption of smart meters through schemes like National Smart Grid Mission , IPDS etc.** Rs 830 Crores **under IPDS and Rs** 270 Crores **Grant under NSGM have been approved.**
- **Opex Model is being preferred for implementation of smart metering projects for avoiding Capital Cost by Discoms.**
- **Use of Cloud is being preferred over own data center**

# Challenges in Smart Meter Deployment in the Country

- High meter/AMI costs
- Upfront Capex investment a challenge for utility
- Utilities not having any proven case – low confidence level
- Low utility skill/ initiative to implement the project
- Information Asymmetry on benefits of data analytics
- Regulatory issues

# Smart Metering –OPEX Model

- To avoid the capital cost on smart metering projects, Utilities may explore/adopt any of financial model available in the market for financing the smart metering projects in the country like self financing BOOT modal of EESL /funding under IPDS or NSGM etc
- Recently, about 50 lakh smart meters ( 5 Million meters) are being deployed by EESL in Uttar Pradesh and Haryana under self-financing model in which capital cost is being provided by EESL and the recovery is based on per node per month cost based on some pre defined parameters like 95% metering etc
- The self financing OPEX modals has made the Smart Metering project feasible as most of the state utilities are not in a position for such rollouts due to their financial constraints.
- Now, all the enablers including standards and financial modals for implementing smart metering in the country are in place in India.

# THANK YOU