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India Smart Grid Forum

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DISTRIBUTION UTILITY MEET DUM2022

AMI ROLLOUT PLANS AND CHALLENGES FOR DISCOMs

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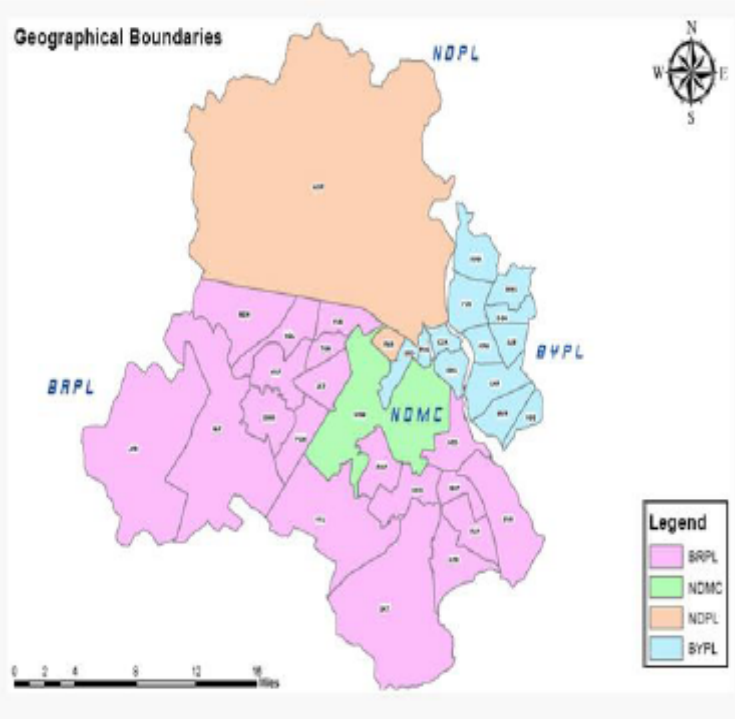
Sr. VP, Network Operation

BSES Rajdhani Power Ltd.

BSES illuminates iconic landmarks of Delhi

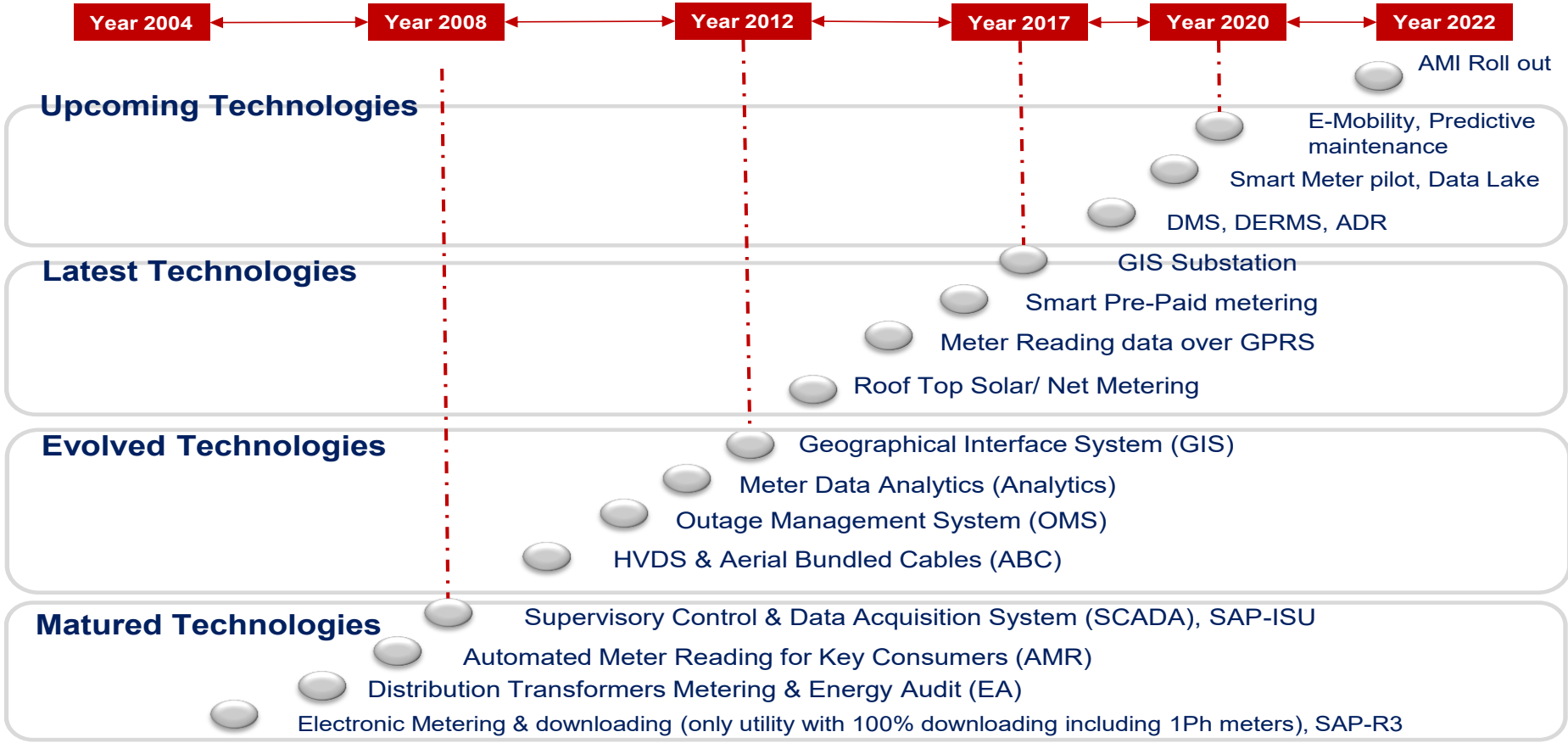
BSES Discoms Profile



Parameter	BRPL	BYPL
Distribution Area (Sq. km.)	691	160
Customers (Lakh)	28.7	18.3
Peak Demand (MW)	3,114	1,662
Sales (MU)	11,486	6,171
Revenue – Sale of Power (Rs Cr)	9,669	5,078
AT&C Loss (%) *	7.67	7.27

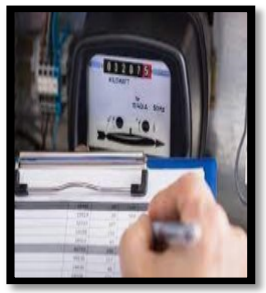
Peak Load of BRPL grown to ~ 2.5 times of 2002 demand

Technology Journey



Technological innovation has been a regular feature

AMR Technology – Journey at BRPL



2002

Manual Meter Reading

CMRI Introduced

Jul'02

GSM Technology
Dual-band 900 / 1800 MHz or
900 / 1900 MHz GSM

Oct'04

CDMA Technology
Compliant with S-95 A/B &CDMA2000 1xRTT

Apr'08

GPRS Technology
GPRS FDD LTE CAT 1 DL: MAX 10.2 Mbps; UI

Aug'17

NBIoT Technology
NB-IoT Standard: 3GPP release 13 or above

Oct'21

Smart Metering Mandate

- **MoP Directives**
  - **MoP issued notification on dated 23rd May 2022,**
    - UT and electrical Division with AT&C losses above 15% (urban) & 25% (rural) – Smart prepaid meters to be installed for Govt. offices, industrial & commercial consumers by 31st Dec' 2023. Provided that these areas DT Smart Metering , by 31st March, 2023;
    - Smart meters to be installed for balance areas DT by Dec'2023
    - All feeders shall be metered with AMR by 31st December, 2022; All feeders shall be made communicable under NFMS by 31st Dec'22
    - All other areas shall be metered with smart meters, with prepayment mode, by 31st March, 2025:
- **CEA Notification**
  - Notification issued on dated 23rd December'2019 for all new consumers with prepaid smart meters.

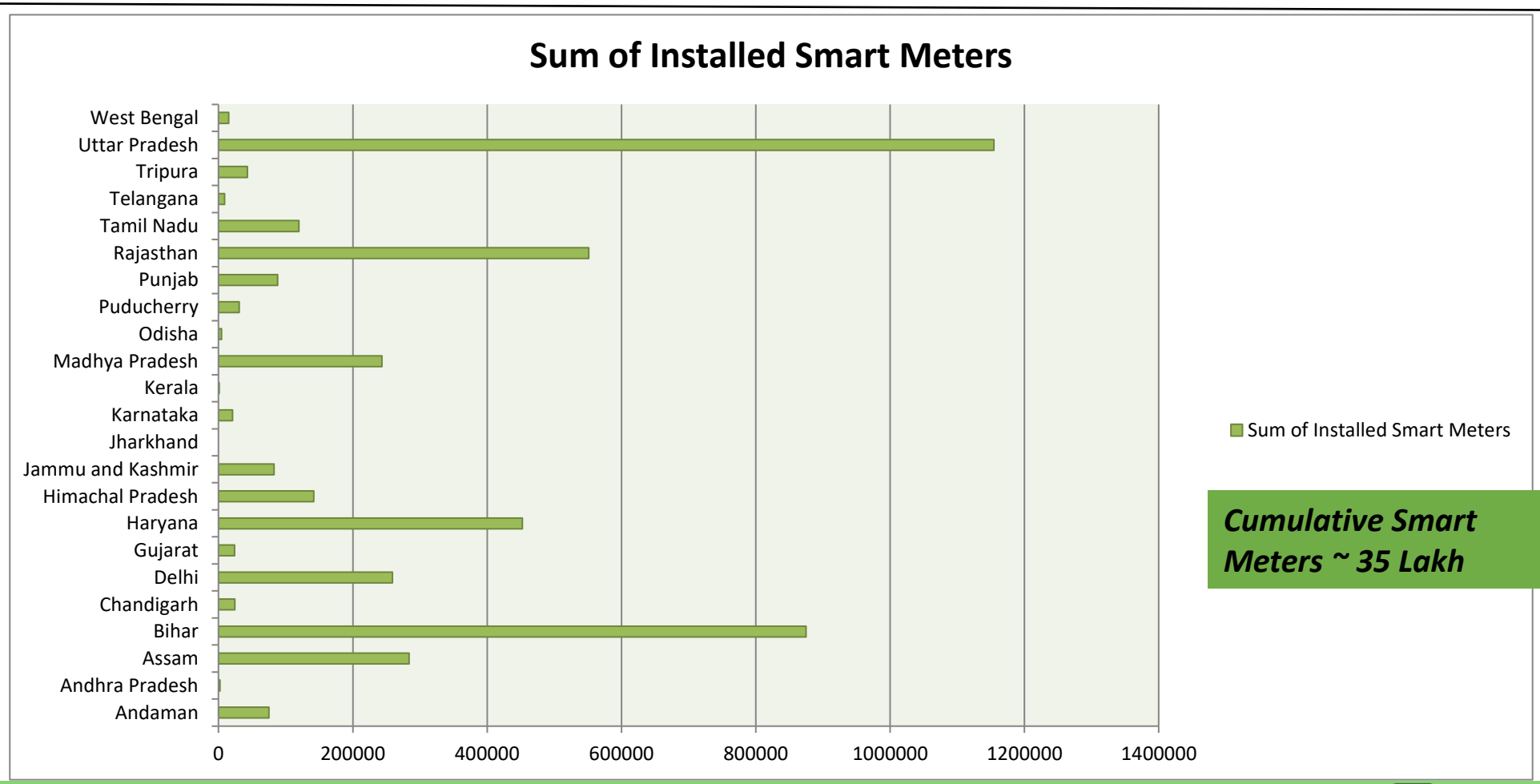
Introduction of AMI

Advanced metering infrastructure (AMI) is a composite technology composed of several elements: Smart meters, two-way communications and data repository (meter data management). Jointly, they support all phases of the meter data life cycle — from data acquisition to final provisioning of energy consumption information to end customers or an IT application (such as revenue protection, demand response or outage management).

- ***Utility Benefits*** –
  - Loss Reduction / Energy accounting
  - Shortening of Cash to Cash Cycle
  - Stopping “Estimated Bills” & “Billing Disputes”
  - Cost optimization
  - Quicker outage restoration
  - Early failure detection for assets
  - Network planning and Demand Response
  - Load Forecasting, EV and Renewable
  - New Tariff Design
  - Contribution to Environment

- ***Customer Benefits*** –
  - Giving consumer better understanding/control on their spent
  - Estimated energy with slab crossover prediction
  - Prior intimations on New Offers and Scheduled Outage
  - Flexibility of billing mode
  - Contribution to environment
  - Peer comparison
  - Improved Customer satisfaction

Smart Metering in India (upto June'22)



Cumulative Smart Meters ~ 35 Lakh

Metering Standards

There are two major standards that a Metering Solution has to comply to in the Indian market

IS 16444 (Part 1 & Part 2) – AC static direct connected watt-hour smart meter class 1 and 2 and CT operated Smart Meters – Specification.

- This is the standard that defines the hardware and the functional requirement of a smart meter.

IS 15959 – Data exchange for electricity meter -Reading, tariff and load control -Companion specification

- This is the standard that defines how the data is sent across the communication network from the meter to the backend systems.

- These standards comply to the parent standard of DLMS –Device Language Message Specification. In India the DLMS/COSEM standard is used.
- CEA guideline specifications
- MoP Standard Bidding Document (Technical and commercial) version 4

AMI – Need of Interoperability

Meter	Different Meter Makes /types communicante to one HES
Protocol	IES62056-21 DLMS-COSEM, Modbus, LwM2M, PACT, ANSCI C12, IEC 1107, IEC62056-31-EurIdis
Mediation Device	DCU, Gateway, Inbuilt Module
Comm. Device	Ethernet, Cellular (3G-4G), RF, NB-IoT, PLC

Smart Metering Project – Objective Mapping

Business Value Realization

- T&D Loss Reduction
- Early Revenue realization
- Near Real-Time Theft / Tamper detection
- Improved Energy Auditing
- Consumer engagement and enhanced services

Network Optimization

- Load Balancing
- Effective Outage Management
- Reactive Energy Monitoring and Optimization
- Asset Optimization and Early failure detection

SAFETY

Demand Curve Management

- Demand Response
- Demand Side Management
- Load Management
- Predictive and Load Forecasting

Future of Energy

- Distributed Energy Management
- (EV, Renewables, upcoming Technologies)
- Integration with Home (smart) Automation for Customer Engagement

BSES's Objective for Smart Metering is far more than Reading / Billing

Digital enablement thru Smart meters by BSES

Base Case End-Use Applications

- Remote Meter Reading
- Pre-payment
- Theft Analytics
- Regulatory Compliance
- Safety

Smart Meter is a key component of a digital Utility

Future End-Use Applications

- Consumer engagement & empowerment
- Automated Network Operations
- Demand Response
- Outage Management
- Network Planning
- DERMS

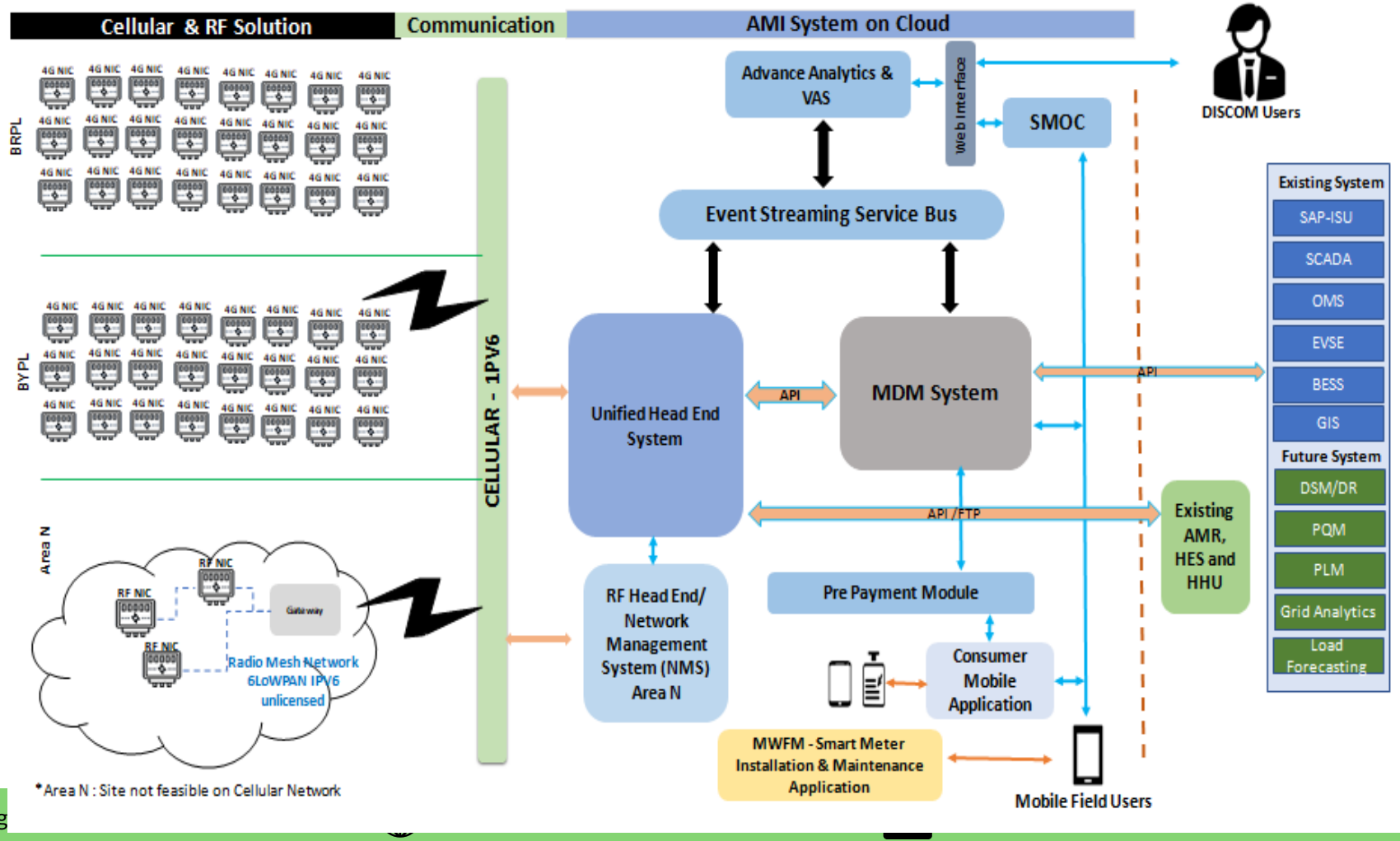
Advanced Analytics

- Load forecasting
- DSM planning
- AI / ML / Blockchain

- Last mile situational awareness and control enabled by Smart Meters
- Smart Metering needs to be accompanied by revamp of utility IT-OT systems for realizing full potential
- Smart Meters expected to provide efficient and optimum solution for “Consumers and Network”

Smart Metering expected to open avenues and flexibility in future

Overall AMI Landscape (BSES Proposed)



BSES AMI RFP

- **Total Solution to be procured into 2 parts:**
  - ***Smart Meter Supply***: CAPEX intensive Meters with deferred payments.
  - ***AMI Solution***: Critical AMI IT implementation with partial upfront on Milestone and OPEX mode. Labour intensive Meter installation to be paid upfront on milestone.

Key Features

- ***Smart Meters Specs*** : Power Quality parameters and 10 Years warrantee.
- ***Communication–*** Hybrid Communication technology, mix of RF/ Cellular and PLC based on Communication Survey
- ***AMI Solution –*** Detailed Spec and Line item for Pre Paid Module, Analytics, Consumer App and SMOC with DBMS based on functional and data size. SMOC is fulcrum of Deployment and Operations.
- ***Digital Grid Approach –*** Enterprise Service Bus based architecture to integrate Smart Grid Modules and utility level BI / DA layer. Full Supervision and visibility through management dashboards at SMOC.
- ***Payment Security –*** All deferred CAPEX payments are secured with irrevocable L/C and pari passu charge on assets.

Flexibility in Ownership, Control and takeover of Project implementation and Operation Contracts

Consumer Service at Core Approach to serve & get paid

Enterprise Layer for value addition
BI and DA layer with big data processing

Getting ready for Future Challenges

Consumer Engagement and TOD Tariff

- TOD tariff well stitched with effective Consumer Engagement on ground regulated and monitored through unique BSES SMOC structure.

Demand Response Management

- Utilize AMI capabilities for better implementation of DSM.

Promoting Renewal energy sources and Micro Grid with AMI

- Cluster Micro Grids to be planned and executed through Enterprise Service Bus of BSES AMI Solution. This will pave the way for Optimized Mix of Solar Panel and Battery storage to cater EV Charging Load.

Load Forecasting, Network Augmentations and Peak load management

- Handling EV charging load and peak load through advanced load forecasting utilizing BI/DA layer in AMI solution with add – on High Performance computing.
- Network Augmentation and enhancements to cater increased load.

Budgetary Provisions and CAPEX Support

- Support for CAPEX funding and Regulatory adjustments would ensure unique digital utility in national capital. Would pave the way for Capacity Building of other DISCOMs.

Key Challenges – Smart Metering Program

01

Communication Technology

- Up coming technologies and their results
- Maturity and Scalability
- Private vs Public Network

02

Cyber Security

- Venerability assessment by independent agencies
- IT policies and guidelines
- Data privacy issues

03

Interoperability

- At Hardware End
- System & Software integration

04

Processes

- Timely update & document new processes
- Change Management

05

Commercial

- Huge capital investments
- Early retirement costs of existing meters

06

Data Storage

- Plan for massive data
- Continuous improvement in data usage

07

Chip Shortage

- Chip shortage due to ongoing political situation
- Escalation in electronic component prices

08

External Factors

- Regulatory support
- Customer acceptance
- Political support

Host Utilities

TATA POWER

TP CENTRAL ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)

TATA POWER-DDL

TP NORTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)

Co-Host Utilities

TP WESTERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)

TP SOUTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)

BSES Rajdhani Power Limited

BSES Yamuna Power Limited

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THANK YOU

Organizer

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