Smart Grid Journey- Actions required

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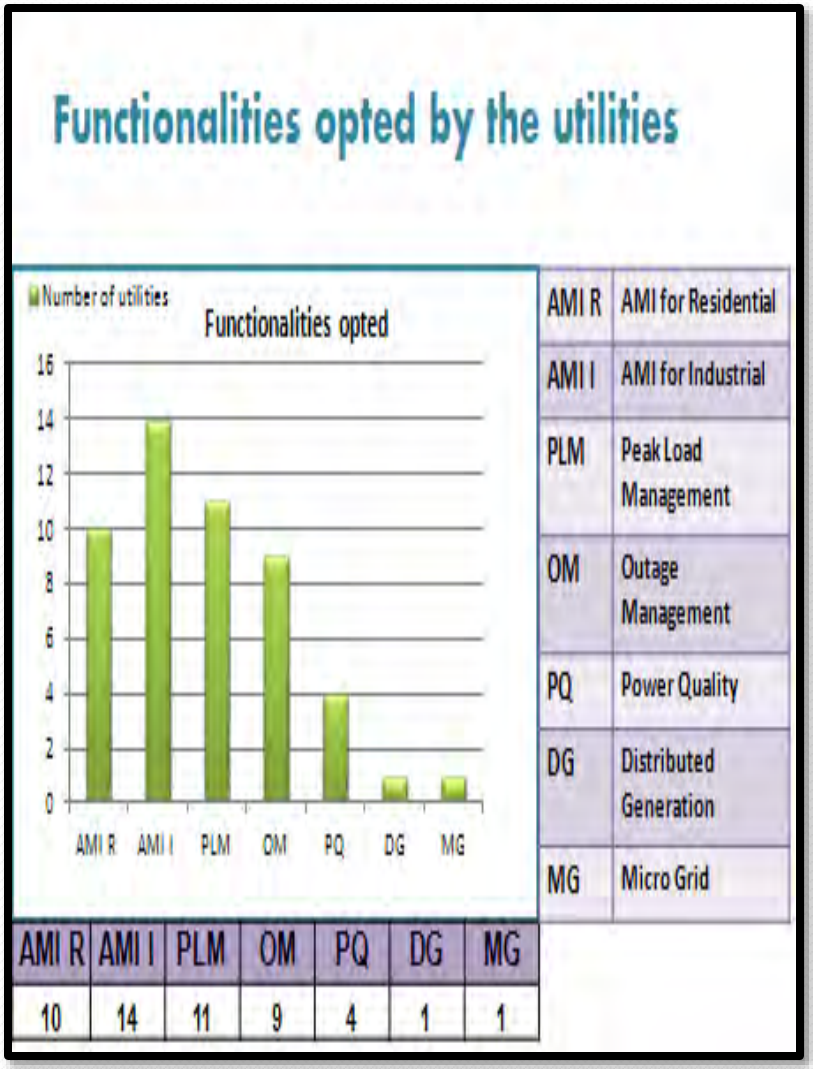
Drivers for Smart Grid In India

- **T&D loss reduction and efficiency improvements:** Transmission & Distribution network losses (including commercial) is around 27% ~ $ 20 billion/year revenue losses to utilities (smart metering, modernization of lines and substations, automation systems)
- **Access to energy for the masses:** About 300 million people do not have access to power. Govt intend to electrify 100% households in next 5 years (microgrids, rooftop solar, DER….)
- **Renewable integration to grid:** Central theme of 12th Five Year Plan (2012-17) is low carbon development. Several initiatives being taken to increase the share of renewable in energy mix.
- **Peak load management:** Demand response for high volume consumers and micro grids for groups of consumers with captive generation facilities that can island during peak hours; enhancement in energy efficiency and other demand side management programs
- **System improvements:** Reduction in outages/power cuts, improvements in reliability and quality of supply
- **Customer service:** Improved customer service and ***"prosumer enablement***"
- **Infrastructure for Electrc-mobility**: 7 million EVs expected by 2020

Pilots in Distribution



Objectives

- Reduction in T&D losses
- Reduction in load shedding
- Shifting of load to off peak hours
- Savings in Peak Power cost
- Reduction in Transformer failure
- Reduction in number of outages
- Enhanced Power Quality
- Improved access of power thru Renewables

Distribution Sector Problems

- ***High AT&C Losses***
- ***100% Metering Not Achieved***
- ***Overloaded & Old Sub-Transmission & Distribution Network***
- ***Electricity Access to all Rural Households***
- ***Poor Financial Position of Distribution Companies***
- ***Limited use of IT, Energy Auditing & Accounting***

T&D LOSSES OF VARIOUS COUNTRIES

(2012)

Country	T&D Losses (%age)
USA	6.73%
UK	8.26%
Japan	3.47%
Russia	12.59%
Australia	5.68%
India	23.65%
World Avg	**8.89%**

STATUS OF METERING IN INDIA

Category of consumers	No of Consumers (million)	%age of metering
Domestic	172.0	93%
Commercial	19.7	99%
Industrial	3.6	100%
Agriculture	19.1	29%
Others (PWD, street lighting, traction etc)	5.6	95%
Total	220.0	**87%**

11 KV feeders metering – 93%

DT metering - 35%

Strategy for making DISCOMS financially healthy

- Creating Profit Centers with full accountability;
- Handing over of local distribution to Panchayats/ Local Bodies/Franchisees/Users Associations, wherever necessary;
- Restructuring of power sector including corporatization/privatization distribution sector
- 100% metering of consumer, feeder and Distribution transformer
- Adoption of IT facilities
- To introduce competition in power sector through various means including Privatization.

Initiatives for Smart Grid and integration of Renewable Energy

- ***Finalized the Minimum Functional Specifications of Low Cost Single Phase Smart Meters as per Indian requirement. Based on these, Indian standards for single phase Smart Meter have been notified.***

- ***Regulations on technical standards for connectivity of the distributed generation resources to the grid at voltage level below 33 KV have been notified.***

- ***Amendment of the existing Regulation to include technical standards for connectivity of renewable to the grid at voltage level 33 KV and above have been notified.***

- ***Amendments in existing Metering Regulation to include metering for renewable energy plants connected at LT level have been notified .***

SG Action Points

- Delay in SG Pilots- Concept to Award & Execution
- Ownership of SG Pilots by DISCOMs
- Dedicated Resource allocation by DISCOMs
- Pilot Phase cannot continue for long [4-5 years]
- Autonomy to Discoms for suitable SG Projects
- India's needs Large & Wider Scale SG Deployment
- SG Projects to synergize with other GoI Schemes e.g. UDAY,IPDS,DDUGJY ,AMRUT etc.
- Fast Track SG Project Clearance – by Authorities
- Thrust for SG Projects- Catchy name to SG Scheme
- Smart Grids in Smart City – Clarity of Role ?

ROAD AHEAD-DISTRIBUTION

- 35 Million Smart Meters in 4 years
- Continuous monitoring of Distribution P
- Takeaways from Pilots – Success & Failures
- Integration of 40 GW Roof Top PV Solar Systems
- Assessing amenability to large scale deployment
- Technology selection for upscaling – communication, meters etc
- Amalgamation of evolving technology
- Evolution of Regulatory framework to support DSM/DR
- Consumer engagement initiatives to penetrate DR programs
- Testing of other functionalities like HAN, PEV, V2G etc.
- Creation of EV Charging Infrastructure

Road Ahead-Transmission

Integration of 175 GW of Renewable Energy

By 2022

Green Energy Corridors for Inter & Intra state Trans. Syste

Analytical Functions For WAMS:

- Vulnerability test on relay
- Linear State Estimator
- Supervised Zone-3 blocking to prevent unwanted tripping
- On line CT/ CVT parameter validation
- Emergency control schemes for controlling frequency and voltage instabilities
- Schemes for controlling angular instabilities i.e, out of step protection and adaptive islanding.

New Programmes/Initiatives of Govt.of India

- India committed [in COP 21 in Paris]40% of Electricity generation by 2030 will be from Renewables
- Make in India ,Digital India, Skill India
- 24x7 Power for All
- 100 Smart Cities
- 175 GW of Renewable Energy by 2022
- 100 GW Solar- 40 GW Roof Top PV on 20 million buildings
- National Mission on Electric Mobility-6-7 million EVs
- 35 million Smart Meters in 4 years

Please be prepared for Very Exciting & Challenging Times Ahead in Indian Power Sector

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Smart Grid Developments

14 Smart Grid pilot Projects sanctioned

Smart Grid Road Map for India released

Smart Grid Knowledge Portal launched

Specifications for single phase smart meters formulated & released by BIS in August 2015

Work on development of Smart Grid Standards has been underway through BIS

Model Smart Grid Regulations formulated & approved in June 2015

Interaction with International Smart Grid development & standardization organizations like ISGAN, IEEE, NEDO etc

Capacity Building exercise being undertaken for Utility representatives

STATUS OF DISTRIBUTION UTILITIES IN INDIA

- ELECTRICITY DEPARTMENTS(EDS) 11
- PRIVATE DISTRIBUTION COMPANIES 24
- CORPORATISED DISTRIBUTION COMPANIES 48
- TOTAL 83

DETAILS OF LOSSES OF DISTRIBUTION COMPANIES IN INDIA

YEAR	Loss without Subsidy (Rs in Crores)	Losses on subsidy received basis (Rs in Crores)
2011-12	102516	76738
2012-13	106659	70564
2013-14	98595	62462

DISCOMs have an accumulated losses of approx. Rs. 3.8 lakh Crore and outstanding debt of Approx. Rs. 4.3 Lakh crore (as on March, 2015) with interest rates up to 14-15%

Initiatives for Energy Efficiency

- Use of Energy Efficient Distribution Transformers
- **Domestic Efficient Lighting Programme (DELP)** to provide LED bulbs to domestic consumers with a target to replace 770 Million incandescent bulbs with LED bulbs by March, 2019.
- **Street Lighting National Programme (SLNP)** to replace 35 Million conventional street lights with smart and energy efficient LED street lights by March, 2019.
- Star Rating of Distribution transformers & Consumer Appliances (A.C, Refrigerator, fans etc.)
- Introduction to HVDS (High Voltage Distribution System) for reduction of theft and technical losses

Technological leap of PMU

- **Time synchronized sub-second data at low latency**
- **Dynamic behavior can be observed**
- **Accurate disturbance analysis**
- **Low latency**
- **(Directly provides the phase angles) State Measurements & not State Estimation (SE)**
- **Network data model validation**