



# Smart Metering – Concern, Challenges, & benefits... Indian context

Vivek Pathak  
+919799394943

## Indian Context... Utility Concern



- ✓ ***Growing Normal energy demand***
- ✓ ***The demand is likely to grow at a pace more than envisaged because of growing economy.***
- ✓ ***Long Load shedding hours***
- ✓ ***Deficit at the end of the 11th Plan and perhaps even after 12th Plan may remain considering our track record in meeting targets***
- ✓ ***Consumers lack of visibility to manage energy consumption.***
- ✓ ***Long meter reading, Billing, Collection cycle.***

# Indian Context... Utility Concern



- ✓ **Consumer reliability and quality.**
- ✓ **quick action on break downs outages.**
- ✓ **Aging utility work force**
- ✓ **Lack of skilled Manpower**
- ✓ **Work force technology savvy?**
- ✓ **Motivation factor**
  - Enabling real time communication between consumers and utility
- ✓ **Aging infrastructure**
  - Meeting increased demand without adding infrastructure.
- ✓ **Implement renewable energy sources.**
- ✓ **Reduce environmental impacts...**  
particularly carbon emissions

# Consumer expectation...

Payment  
Convenience

Quick  
Grievance  
Redressal

Consumer  
Relationship

Correct  
measurement/  
Billing

Easy  
Mechanism  
of Attribute  
Change

Daily Meter  
Reading  
information

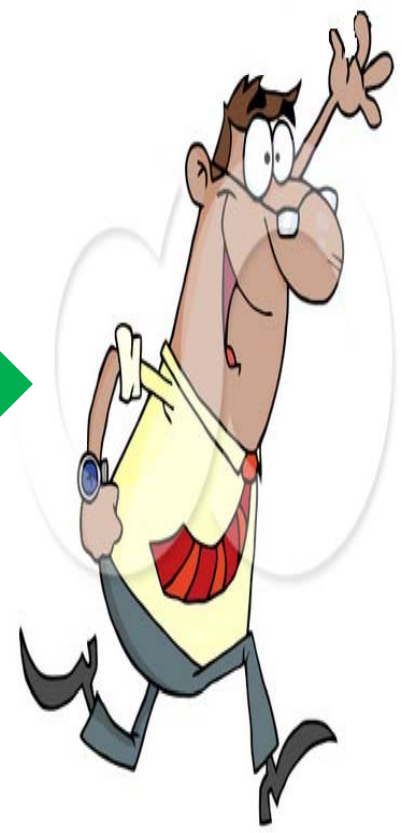
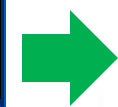
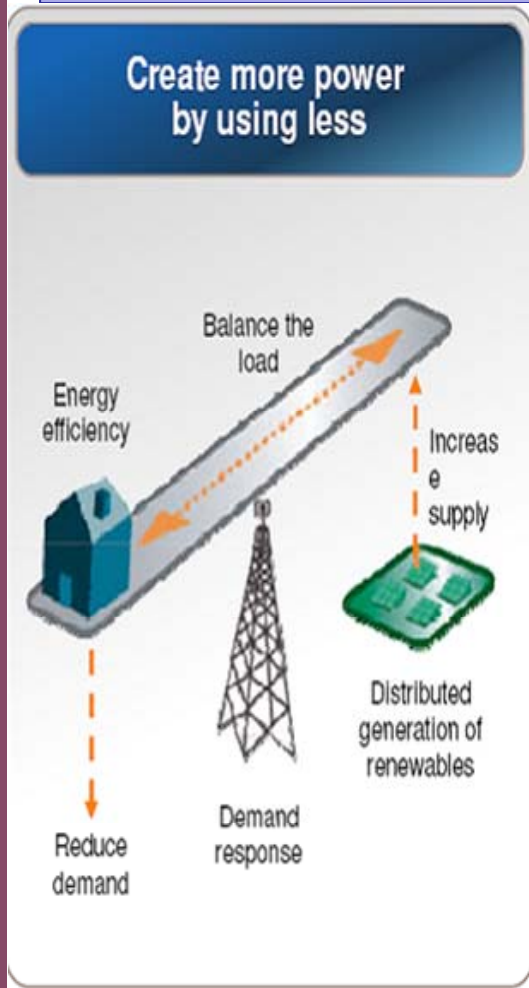
Faster Fault  
Removal

Reconnect/  
Disconnect

Reliable &  
Quality Power



# What is the solution....



**The innovative solution to accommodate this Paradigm shift :“Smart Metering”**

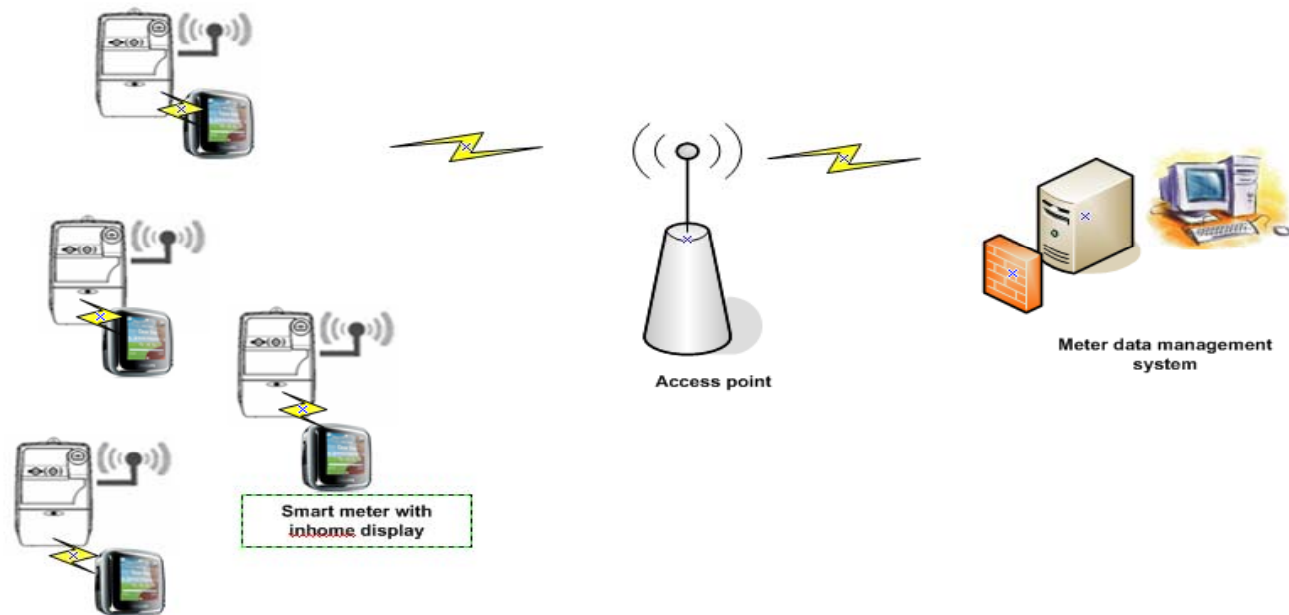
## Smart Metering by definition

- Infrastructure of metering systems
- Automates most of the metering centred repetitive activities
- Collects IP wise granular consumption data to deploy dynamic pricing mechanisms
- New payment and customer service options
- Control of electrical load control within the home and or businesses to improve system diversity

The **communications hardware** , **software**, **associated system** and **data management software** that creates a network between advanced meters and utility business systems which allows collection and distribution of information to customers and the utility.

# Smart Metering Components

- Advance Smart Meter
- In Home display
- Suitable two way communication system
- Network management system (NMS)
- Meter Data Management (MDM)



# Smart Sensing and Control = Smart Meter

**“Smart Meter” The intelligent end-point for AMI and SmartGrid**

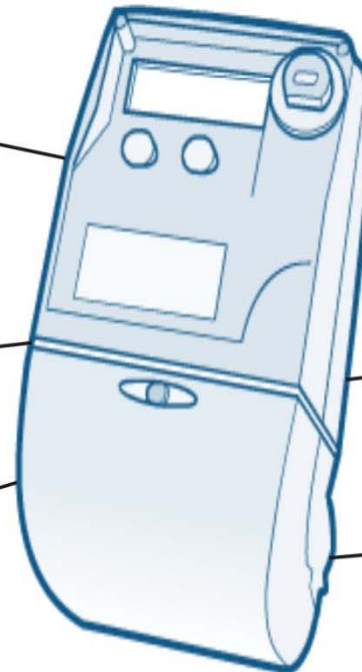
## **Home Area Network (HAN).**

A communication system for conveying real time price, load cost and control of load within customer's property

## **Interval data recording**

For flexible settlement

## **Service Connect/ Disconnect switch**



## **Local Area Network (LAN)**

For data exchange between utility and end-point.

## **Remote firmware upgrade**

## **Utility Managed Load Control**

# Smart Metering Components – Advance Smart Meter

- Electronic meter with
  - *Two way communication,*
  - *Time differentiated registers*
  - *Price based demand*
  - *Connect / Disconnect Switch*
  - *load Control,*
  - *interface with In-Home devices.*
- AMI / Smart Metering with various communication technology.
- Power outage detection, monitoring voltage and theft detection



# Smart Metering Components: In-Home Display

- A device which details the usage data in a graphical and user friendly manner.
- The inhome display device can be connected to a meter to create a Home Area Network via
  - Zigbee communication device
  - Hardwire connection between the meter and IHD

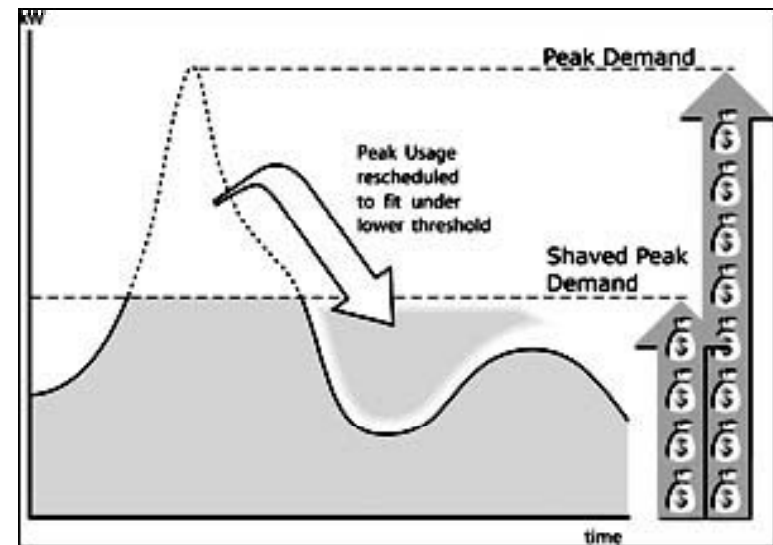


## Smart Metering Components :Network Management System

- NMS is a combination of Hardware and Software used to monitor and administer a network.
- This NMS needs to be linked to the ERP system
- What this system needs to do?
  - Manage connect/ disconnect
  - Manage alarm, events and other notifications

## Main Drivers # 1: India ...

- Demand supply gap of 13 %.
- To Flatten demand for optimal utilization & reduced losses.
- Reduce Peak for better grid stability.
- Making use of low prices
- Visibility of Demand & Supply



## Main Drivers # 2: India ...

### *Reducing Energy losses.*

→ Accurate measurement

→ Automatic daily energy audit to identify un-metered connections

→ Instant alarm in case of meter tamper detection

→ Reduced line losses due to reduced maximum demand

→ Reduced line losses due to reduced reactive power flow

*Energy loss today = 40%*

→ Smart metering operations has the potential to reduce most non-technical losses (~30%)

→ Monetary benefits out of 30% loss reduction should pay for the price of Smart Grid deployment over 5 years, besides numerous other benefits not considered here.

## Main Drivers # 3: India ...

Eliminate unscheduled load shedding by dynamic load control



Smart metering has the feature to utilise the power system in line to the availability. Which means, rather than “black out”, the customers still gets partial electricity as they get from their “inverters”.



Inverters are inefficient. Typically an inverter returns only half of what it takes.

Removing inverters would relieve the power companies from inefficiency and capital expenditure for customers.

Inverters uses Lead batteries which needs replacement every 3 years causing serious environmental issues.

**Every consumer should have Power to cater Essential Load sacrificing Desirable Load.**

## More drivers...India

- Reliability monitoring because of:-
  - Economic expansion.
  - Rising population growth.
  - Increasing affluence leading to high consumption.
- Increasing digital world require quality power
- System automation
- Consumer involvement
- To provide low cost energy service.
- Consumer satisfaction.

# Major challenges with Smart metering deployment in India....



**Huge geographical area with difficult terrain & varying temperature conditions**

**Dedicated prioritized Data communication channel for Utility Operations by NSP.**

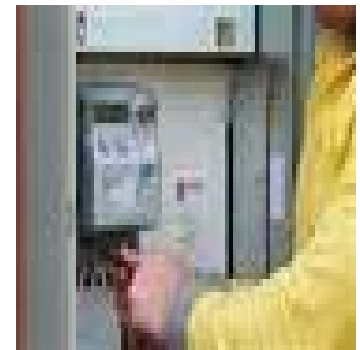
**Regulatory frame-work which rewards for un-interrupted quality services.**

**Customer participation on efficiency improvement programs.**

**Lack of experience gaining exercises like pilots/ customer behavior**

**Slow decision making & Implementation/ Utility will for delivery**

# Major challenges with Smart metering deployment in India....



Location of meters inside the house difficult for communication /Replacement

Home/Local area Communication through concrete walls.

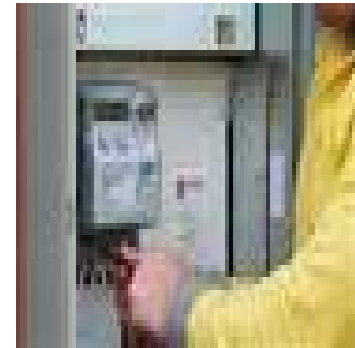
Specific communication protocol

Varying expectations/requirements from utility to utility

Standardization of different parameter requirement across different consumers & utilities.

Different communication modes available like Zigbee, WiFi, LPR etc.

# Major challenges with Smart metering deployment in India....



**Systematic planned approach.**

**Lack of work force for mass deployment/Ageing work force.**

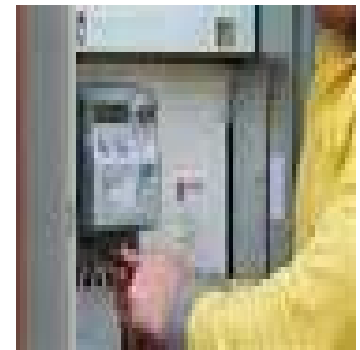
**End to end understanding/knowledge of deployment architecture**

**Now technology will play a major part- Technology savvy work force.**

**Interoperability :- control commands & other data formats should be interoperable with AMI infrastructure**

**Project Finance: A fresh investment would be required at all levels. Benefit would accrue only after successful turn.**

# Major challenges with Smart metering deployment in India....



**Educating consumer for change of scenario.**

**Agreement of consumer for change management.**

**Utility trade Unions Concurrence**

**Management of Terabytes of data - Half hourly data of low end consumers will be collected .**

**Privacy of data collected.**

**Acceptance of Different TOU tariff to Low end consumer.**

**Change of mindset – Thinking unconventional/data centric approach**

## Benefits of Smart Metering...

- Elimination of manual meter reading costs
- Customer satisfaction because of elimination of meter reading related issues and call center traffic.
- Utilities can have innovative TOD price offers to suit consumers' needs.
- Improved cash flow.
- Interval wise data collection helps to detect supply faults and respond them more quickly – Faster outage detection and proactive restoration
- Daily energy balancing for each DT
- Transformer load management
- RC/DC from remote location without going to site.

## More Benefits....

- Reduces safety incidents due to fewer field trips
- Enables environmental improvement
  - Decreased greenhouse gas emissions
  - Improved energy efficiency
  - Reduced field trips and vehicle emissions
- Aids in outage detection
- Identifies metered accounts not being billed and meter malfunctions
- Simplifies rate changes
- Provides potential new revenue from value-added products, services
- Reduces congestion in power lines – balanced distribution load management

**SECURE**



**Thank You**