



TATA POWER-DDL

TATA POWER DELHI DISTRIBUTION LIMITED

A Tata Power and Delhi Government Joint Venture

Reduction of AT&C Losses

A Successful Journey ...

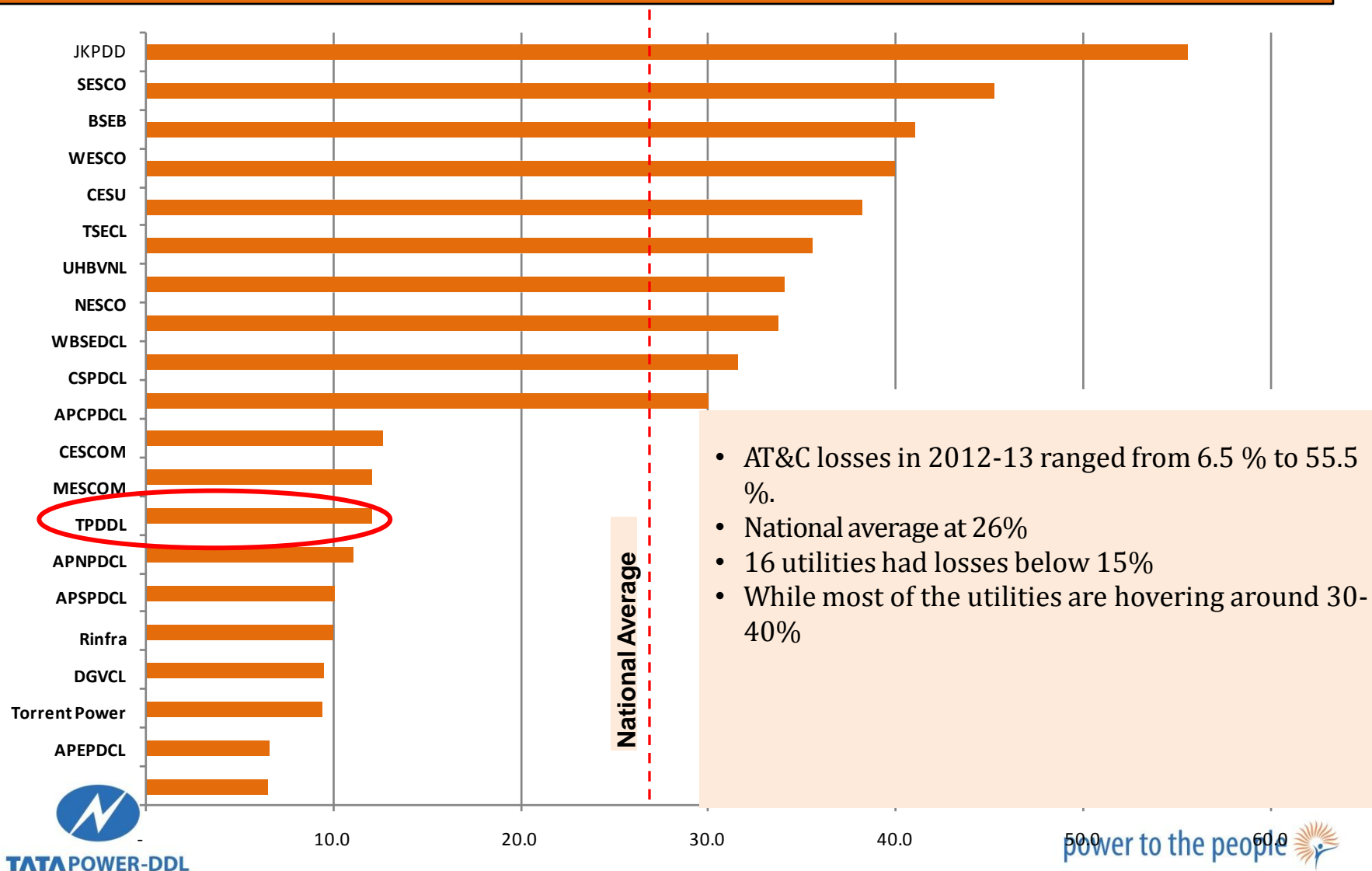
Praveer Sinha

CEO & ED, TPDDL

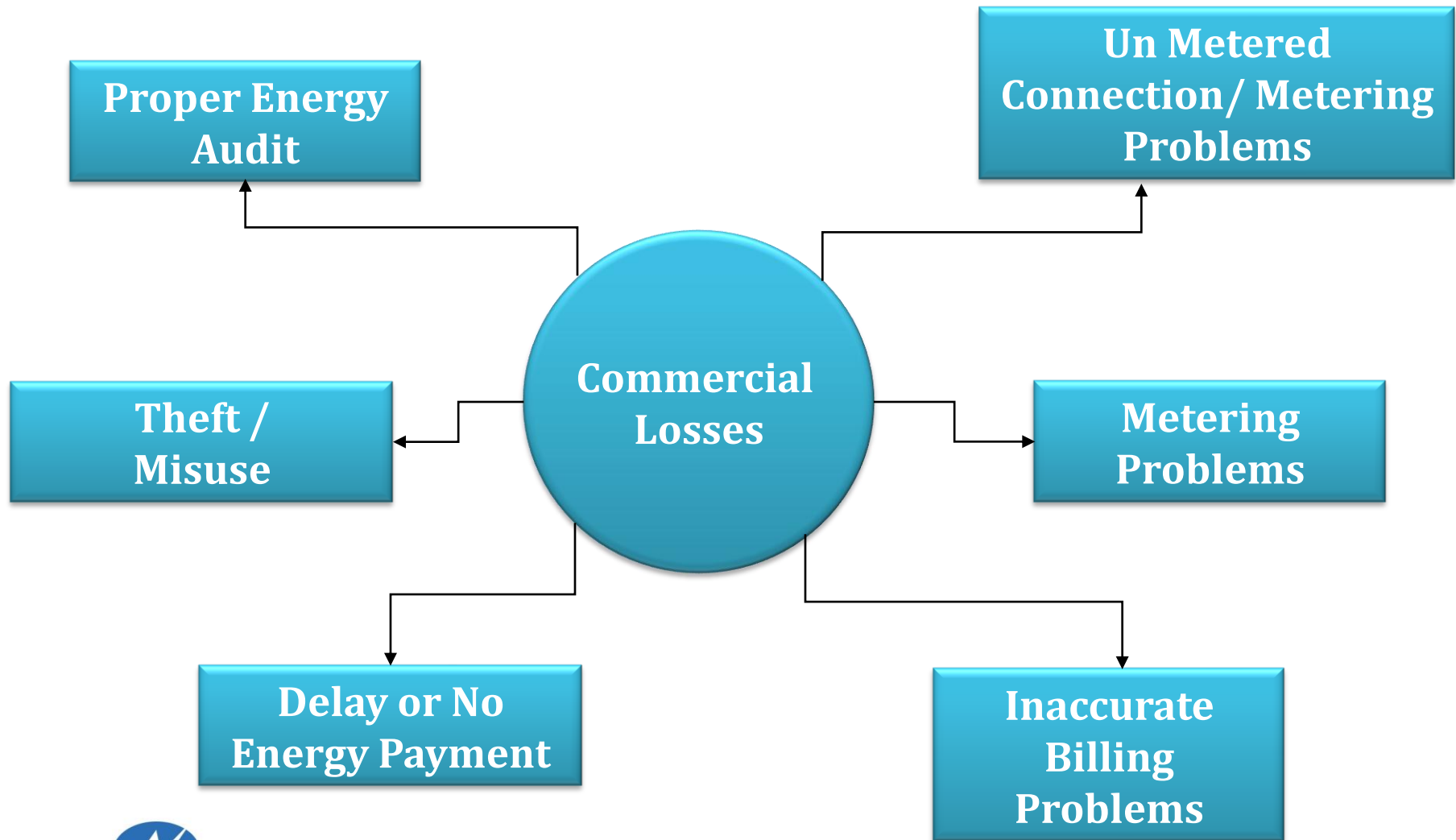
power to the people 

State Wise AT&C Losses – FY13

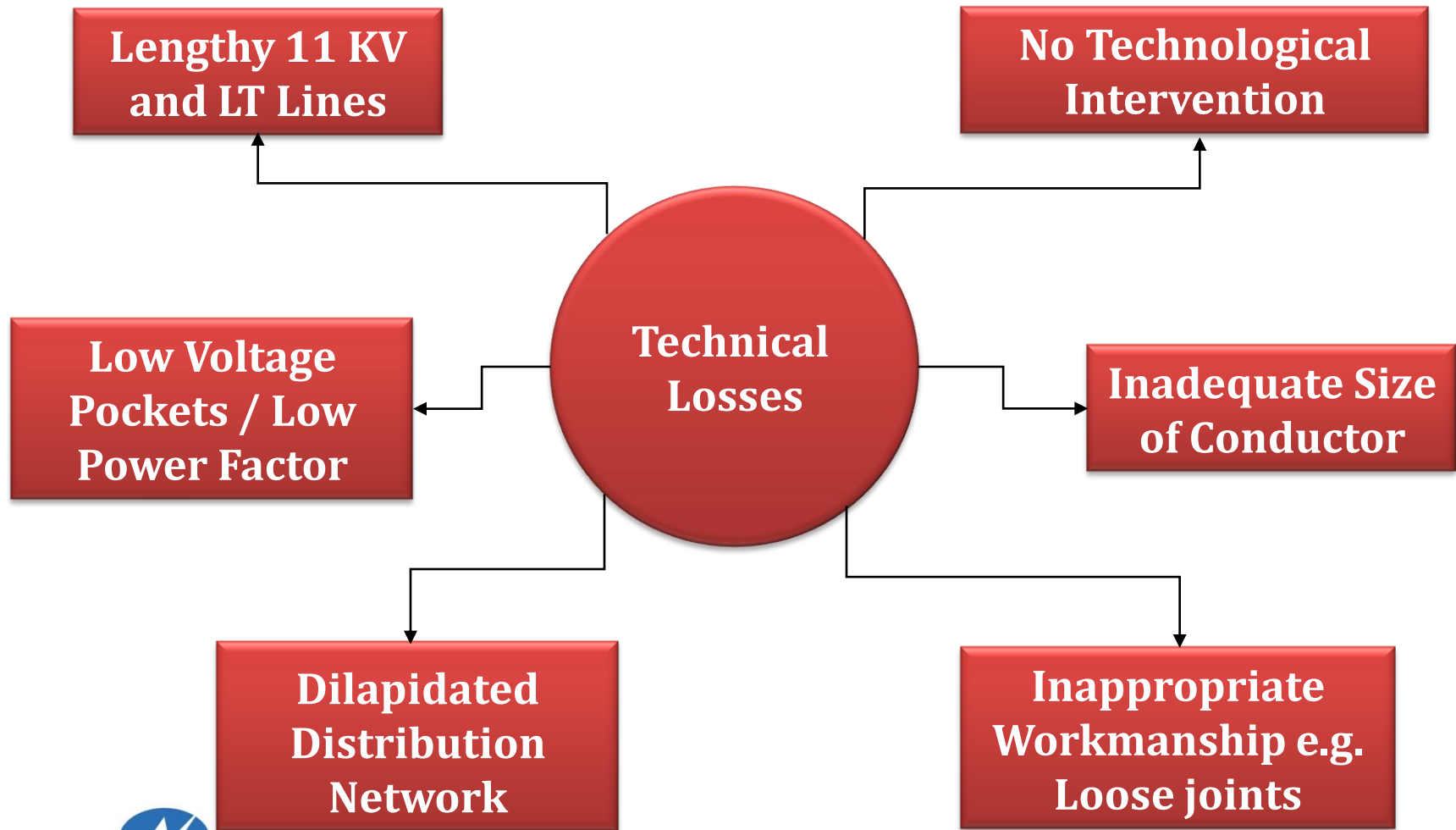
Top 10 and Bottom 10 Utilities in terms of AT&C Losses



AT&C Losses – Key Reasons

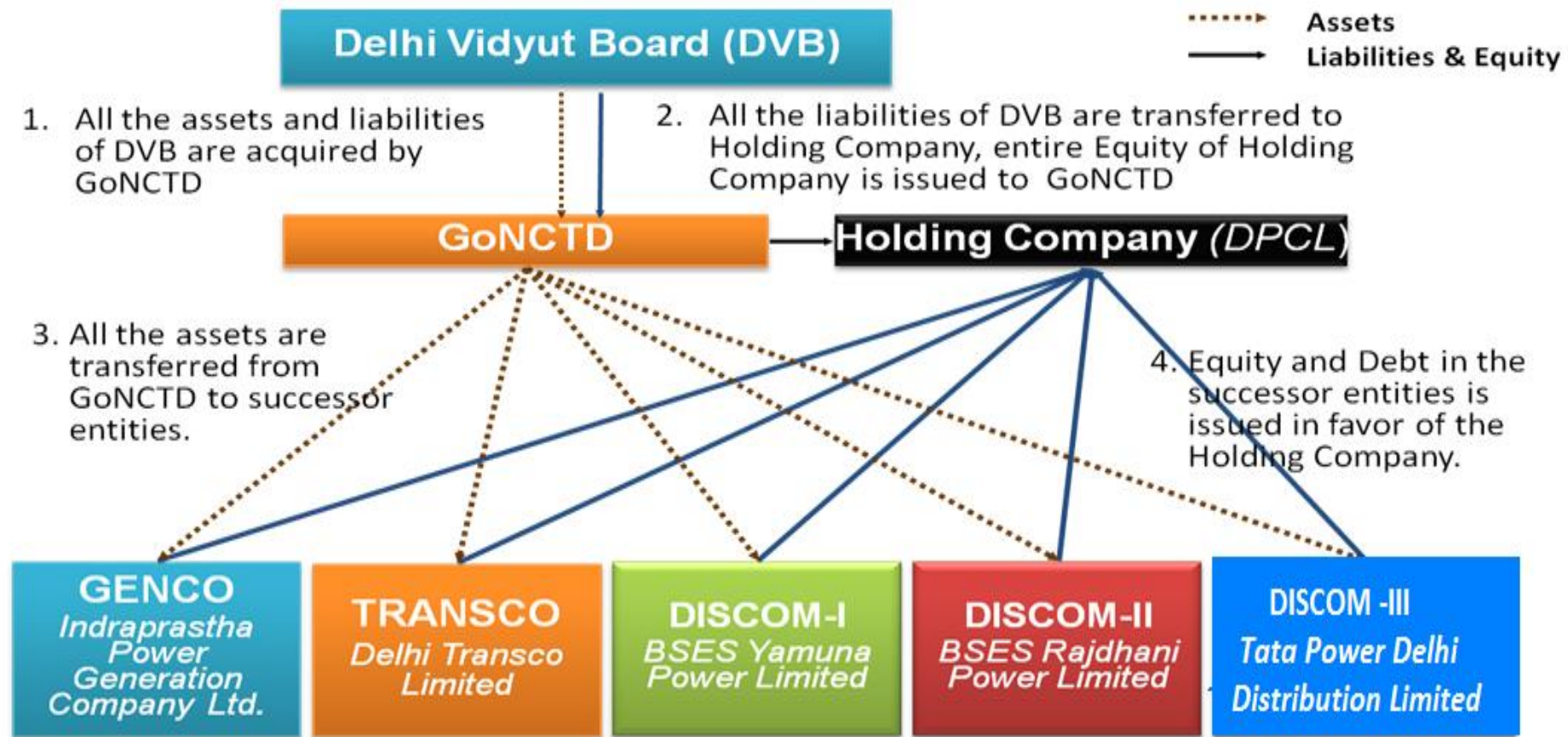


AT&C Losses – Key Reasons



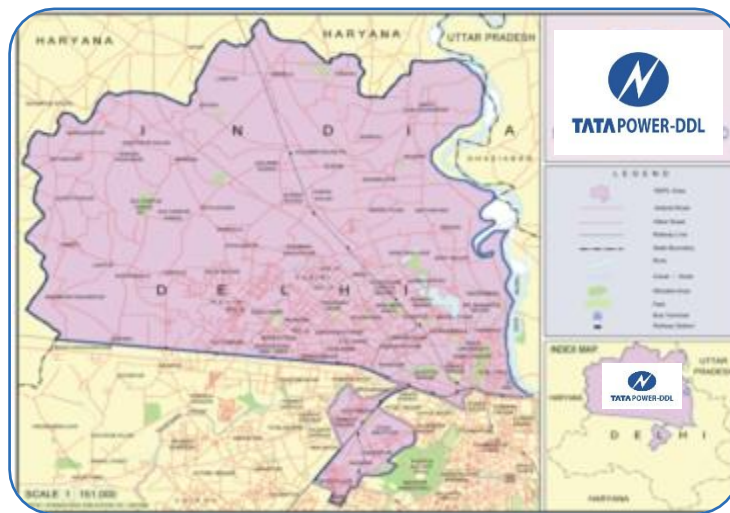
Transformation Case Study at TPDDL

Delhi Reform Model



- Asset valuation was done in Business Valuation Method
- License-based Regulated business for 25 years.
- Guaranteed 16% RoE on meeting AT&C Targets.
- Tariff set by regulator on cost plus RoE basis.

About TPDDL



Joint Venture of Tata Power Company and Govt. of NCT of Delhi (51: 49)

Licensed for distribution of power in North and North West Delhi

Parameter	FY '14
Turnover	INR 5979 Cr
Peak Load	1508 MW till Mar'14 1704 MW till Aug'14
Annual energy requirement	8041 MUs
Total registered consumers	13.89 Lacs
Number of employees	3527
Area	510 Sq Kms
Population serviced in Network area (approx)	6 Million
Number of consumers per Sq.Km	2725



Certifications : ISO 9001, 14001, 27001 ; SA 8000 ; OHSAS 18001
UN Global Compact Reporting



Operational Excellence: Performance Snapshot

Parameter	Unit	Jul-02	Mar 14	% Change
Operational Performance				
AT&C Losses	%	53.1	10.5	80%
System Reliability – ASAI -Availability Index	%	70	99.5	42%
Transformer Failure Rate	%	11	0.55	95%
Peak Load	MW	930	1508	62%
Length of Network	Ckt. Km	6750	10979	63%
Street Light Functionality	%	40	99.57	149%
Consumer Related Performance				
New Connection Energization Time	Days	51.8	6	88%
Meter Replacement Time	Days	25	6	76%
Provisional Billing	%	15	2	87%
Defective Bills	%	6	0.2	97%
Bill Complaint Resolution	Days	45	6	87%
Mean Time to Repair Faults	Hours	11	1.34	88%
Call Center Performance - Service Level	%	-	91	
Payment Collection Avenues	Nos.	20	5377	26785%
Consumer Satisfaction Index	%	-	88	
Financial Performance				
Capex Incurred -Distribution (Cumulative)	Rs. Cr.	1210	4843	300%
Revenue (Annualized for FY 03 and FY14)	Rs. Cr.	1156.3	5979.0	417%
Others				
Consumers	Lacs	7	13.89	98%
Employees	Nos.	5,600	3,527	37%

TPDDL In July 2002

BURGEONING LOSSES

Losses range from 53% to 60% (approx. 10 crores/day)

DILAPIDATED NETWORK

(Approx. 10000 No Supply complaints/day)

DISSATISFIED CONSUMER BASE

(backlog of 1,00,000 billing complaints & 20000 new connections)

LARGE UNSKILLED WORKFORCE

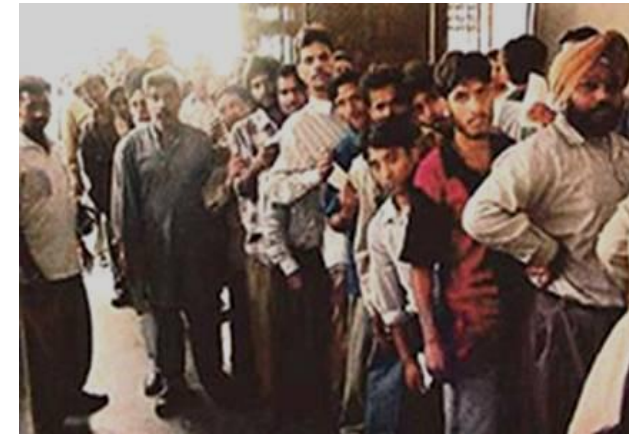
(5638 employees with little Skills set)

ABSENCE OF MANAGEMENT SYSTEM

(HR, Finance, Governance)

POOR DOCUMENTATION

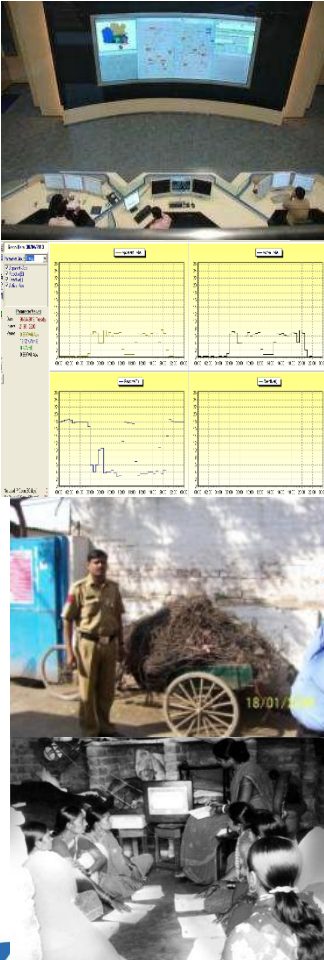
(50% records were erroneous)



Strategy for AT&C Loss Reduction



Key Strategies



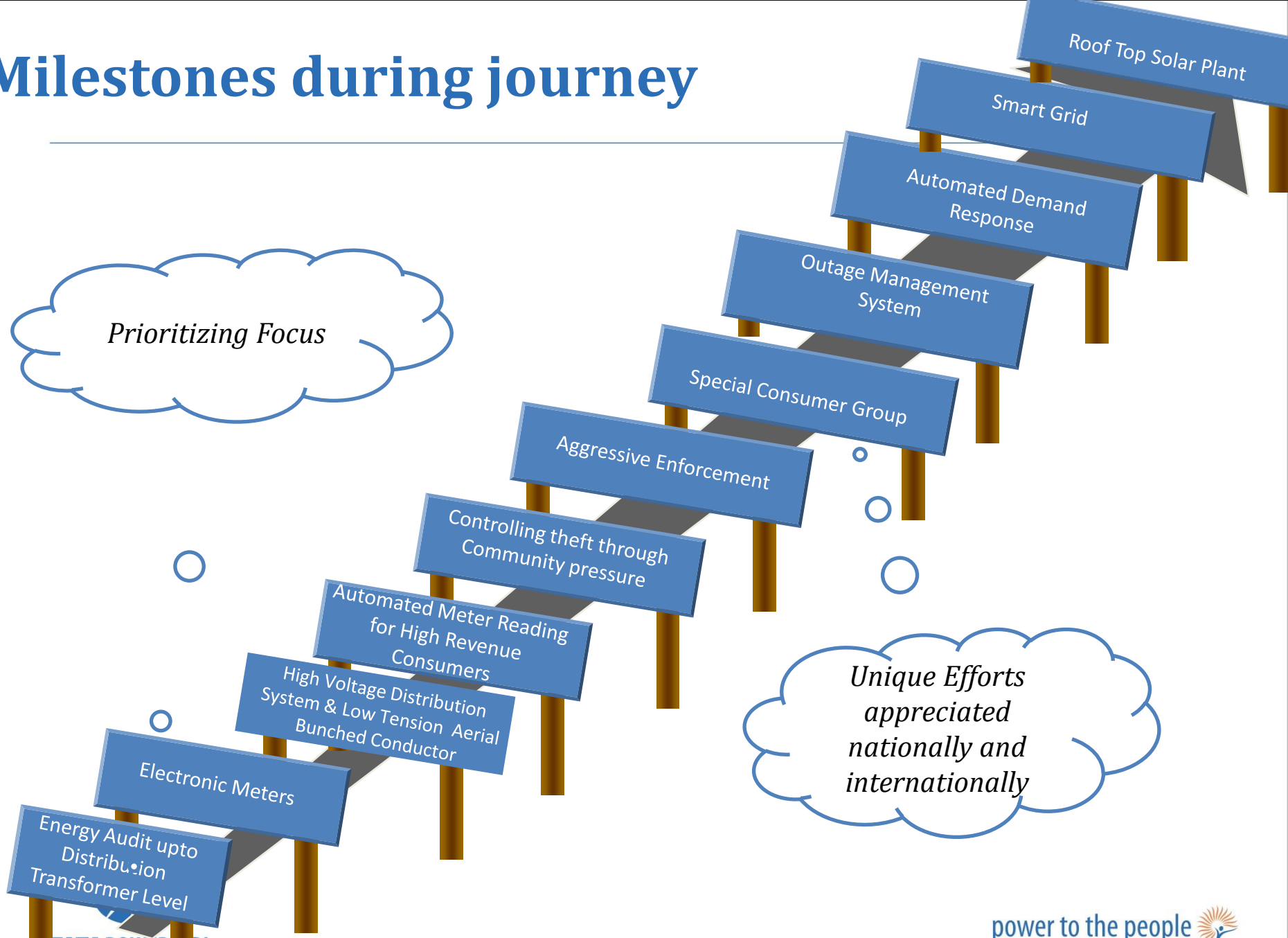
Technology Upgradation

Data Analytics

Strong Enforcement

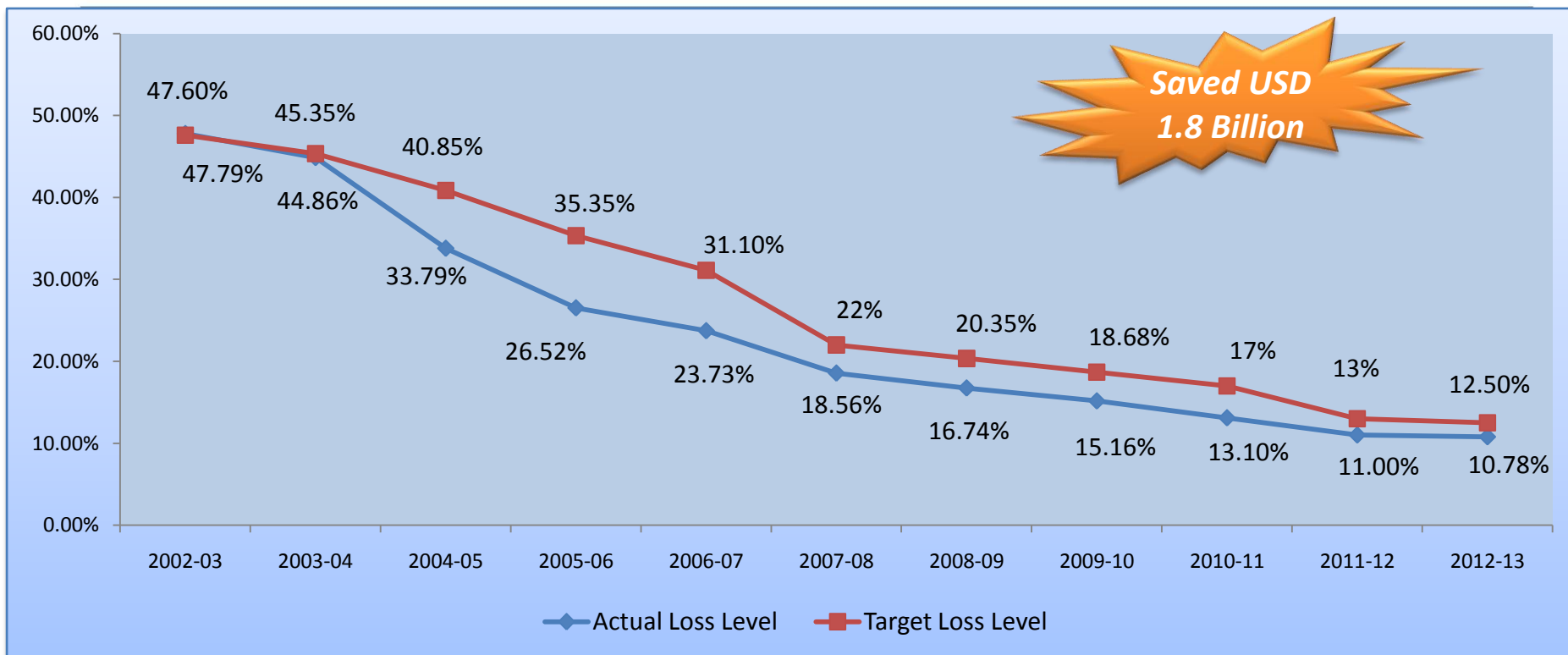
Social Intervention

Milestones during journey



Front runner in Technology Implementation to improve efficiency and consumer service delivery

Milestones during journey



Consistently Loss Reduction Exceeding Targets

- **Saved over USD 1.8 Billion for Govt. in 11 years; facilitated development of other infrastructure; lower taxes**
- **Repaid USD 100 Million loan to Govt.**
- **Paid Dividends to Govt. and Tata Power for four years (FY 2005-06 to FY 2008-09)**
- **Amongst lowest Tariffs in the country with highest availability and reliability of power**
- **1:2 Bonus Shares Issued in FY '09**

Technology Upgradation

DT Metering

Import/Export points

100 % electronic metering in grids

ABT compliant at 66/33 kV

ABT compliant

DTL Metering

TPDDL Grids

TPDDL Metering

11 kV bus

HV Consumers

LT Consumers

DT

SL1

SL2

SL3

SL4

SL 3 & 4

- AMR installed on 3948 DTs and 208 HVDS meters
- All meter's data uploaded in AMRDA Server
- Peak kVA report generation
- DT meter Phase wise report generation Phasor Analysis
- Physical Site verification for all DT Meters

Installation of Latest Circuit Breaker



Installation of Latest RMU



Before : Old Switch Gears



After : New Ring Main Units

Revamped Substations



Before



After

Network Revamping



Before



After

Technology Interventions



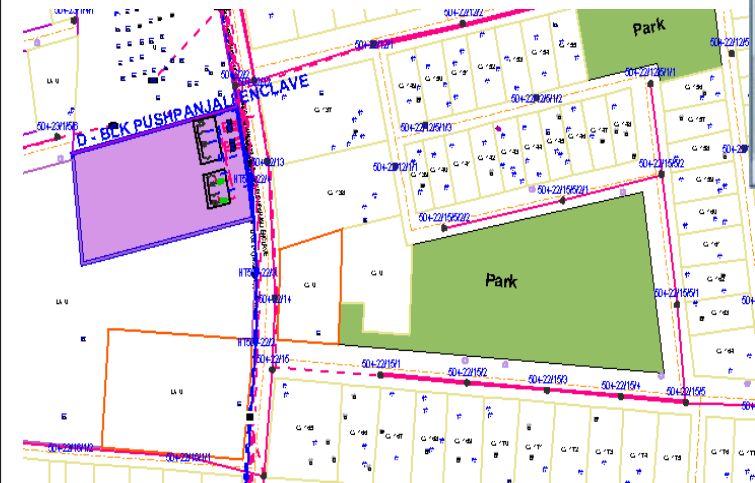
Unmanned Grids



SCADA



Monitoring of total load through SCADA

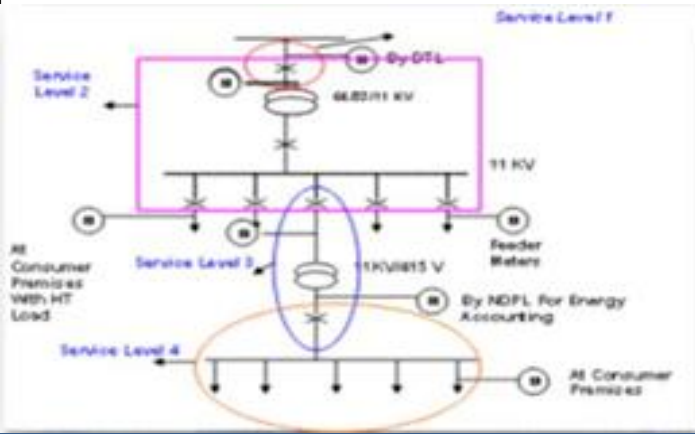


GIS

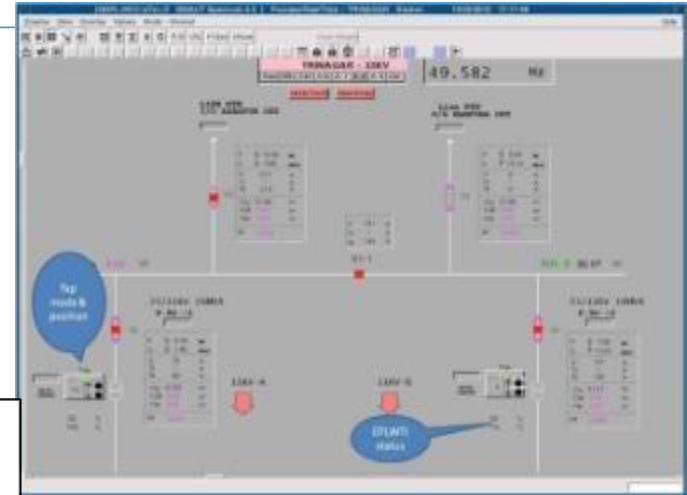


OMS

Technology Interventions



DT Level Metering



Cap on Tap

NDPL is the only utility in India to have 100% 'Automatic Voltage Regulation'



Tap operations increased drastically

High maintenance cost and Equipment Breakdown /

Cost ~ 2 Cr per year

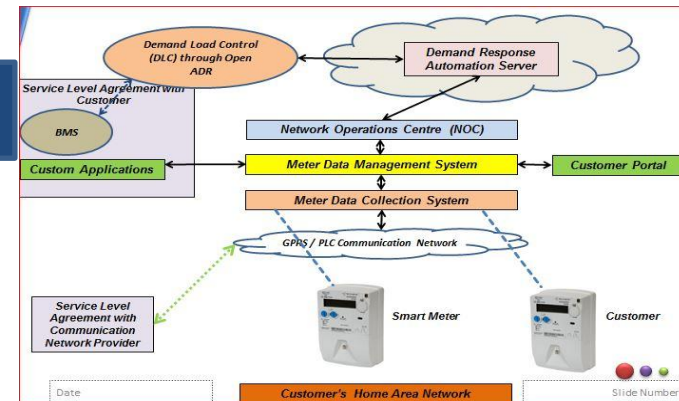
There was a potential threat of under-utilization of Capacitor Banks meant for reactive power compensation under the ABT regime

Cost ~ 4.5 Cr per Year

100% Automatic Voltage Regulation



Integrated Call Center with BCM

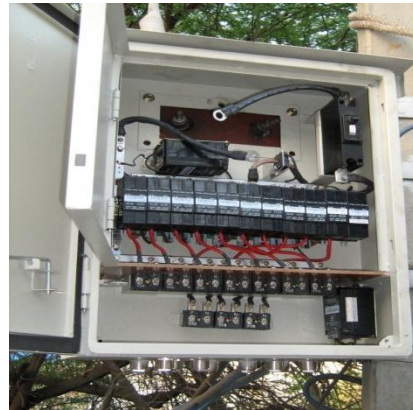


Smart Grid Pilot Architecture

Use of New Metering Technologies



Electronic Metering



Split Metering



Group Metering



Advanced Data downloading through AMR & AMI



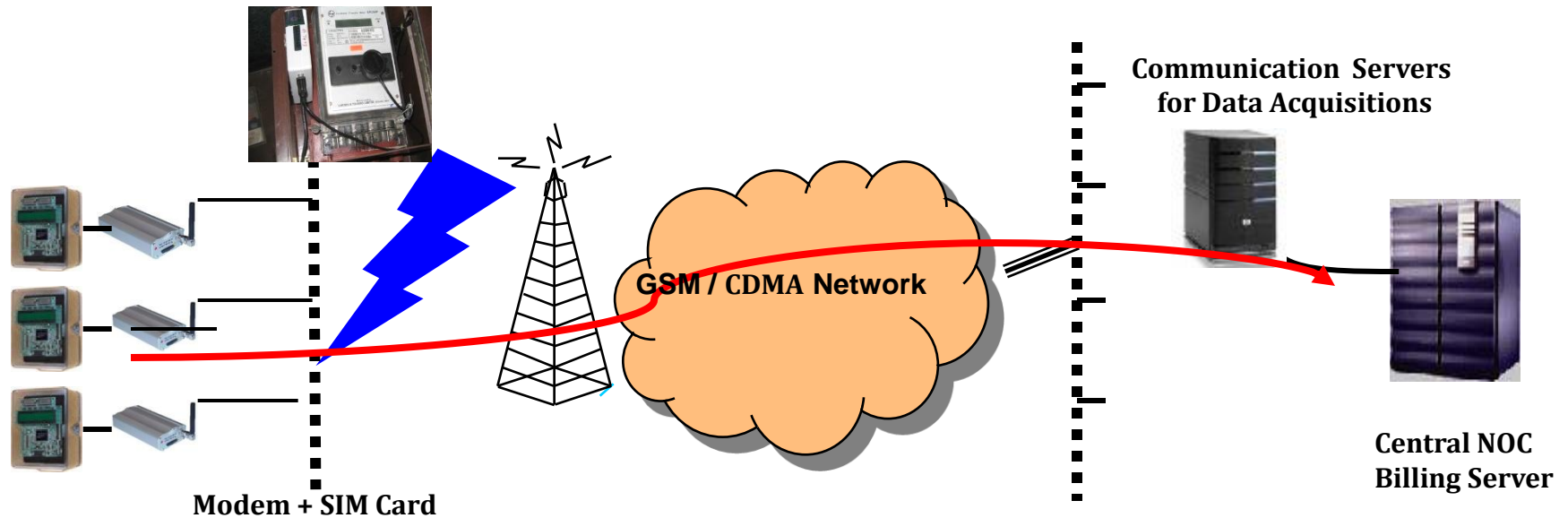
Pre-Paid Metering



SMART Meter

Data Analytics

AMR Architecture – TPDDL



First Indian utility to implement AMR for all connections above 11 KW



Approx. 55,000 LT-CT, HT and DT meters contributing 70% to TPDDL's revenue



Indigenously developed AMRDA carries out seamless reading and analysis

AMRDA Software - In-house Developed

NDPL - AUTOMATION - AMR & DA - Version 1.0 - Home Page [sunil.mittal - 5/2/2008] - Microsoft Internet Explorer provided by NOR

File Edit View Favorites Tools Help

Address http://ndplamrappsvr/amrdainterfaces/includes/frmMenu.aspx

NDPL **AMRDA**

Scheduler > Query Builder > Reports > Analysis > Email > Masters > Help

Introduction

The AMRDA system reads the consumer meters remotely, as per a defined (configurable) schedule, consolidate the meter data from manufacturer specific format to uniform XML format, analyze the data, and send email notifications to concerned user groups, about occurrence of (rule based) exceptions.

The system is able to collect billing, events, profile and instantaneous data from the meters as per approved meter data format document. The system will generate alert notifications for the user departments and management, based on the defined exceptions.

The AMRDA System is a host driven, multi-level network system consisting of an Application Server, Database Server, Communication Server and CFW Interface, with built-in flexibility and expandability.

Connected to radio modem

HT Meter (11KV)

Transformer

240 V

Residential (H1)

Commercial (H2)

Industrial (H3)

Data Concentrator (With GSM / tel. line Modem)

Special

- Can read Multiple meters at a time
- In build expandability
- Uniform data format across all meter manufacturers

Benefits

- Speed up the process of reading collection
- Enhanced vigilance on consumer
- Faster decision making in case of meter tampering
- Revenue spread over the month due to billing scheduling

Features

- Escalate exceptions through mail
- Run user defined & stored queries
- Pass on the reading data automatically to the BBS & DEBS.

WELCOME SUNIL.MITTAL TO AMRDA SYSTEM. LAST LOGIN AT 22/2/2008 17:53::32

Done Local intranet

start I... N... N... U... A... A... U... 1... S... D... N... 3:48 PM

Data Analysis

Report Viewer

Tamper

Sl. No	Event Name	Occurrence Date & Time	Duration (DD HH MM)	RV(V)	YV(V)	BV(V)	RI(A)	YI(A)	BI(A)	RPF	YPF	BPF	FwdkWh	FwdkVAh	Ac.R (A)	Ac.YI (A)	Ac.BI (A)
1	Current Open T Phase	11/04/2014 05:11	0 1 4	243.67	243.67	243.67	0.419	0.000	0.000	-0.417	-0.530	-0.400	12037.50	12092.10	0.419	0.000	-0.417
2	Low PF B Phase	09/04/2014 15:00	1 15 39	248.27	245.97	248.27	0.059	0.000	0.000	-0.426	-0.950	0.640	11902.50	12037.10	0.599	0.300	-0.428

Sequential Storage for Events Off

Sl. No	Event Name	Occurrence Date & Time	Duration (DD HH MM)	RV(V)	YV(V)	BV(V)	RI(A)	YI(A)	BI(A)	RPF	YPF	BPF	FwdkWh	FwdkVAh	Ac.R (A)	Ac.YI (A)	Ac.BI (A)
1	Current Open T Phase	11/04/2014 05:33	0 0 32	245.97	243.67	243.67	0.419	0.000	0.000	-0.412	-0.530	-0.400	12037.20	12091.80	0.419	0.000	-0.412
2	Current Open T Phase	11/04/2014 05:04	0 0 24	250.57	248.27	248.27	0.424	0.000	0.000	-0.395	-0.550	-0.310	12038.70	12091.30	0.424	0.000	-0.395

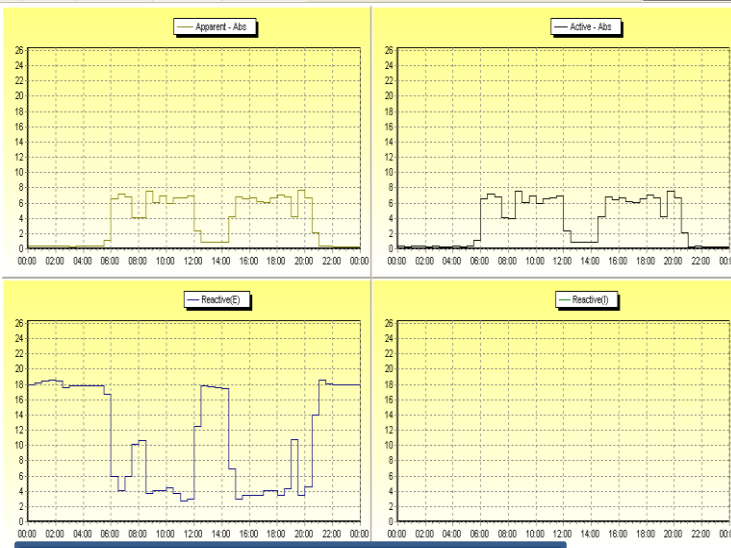
Tamper Review Study

Graph Date: 30/04/2013

Parameter Group: [Select]

Apparent - Abs
 Reactive(E)
 Active - Abs

Date: 30/04/2013, Tuesday
 Interval: 21:30 - 22:00
 Values: 0.36 KVAh Abs, 18.12 KVAh(E), 0 KVAh(I), 0.36 KWh Abs



Load survey analysis

Analysis Report

- Consumption
- Max Demand
- Cumulative MD
- Cumulative Energies

Previous Billing

- Energy
- Consumption
- Max Demand

Tamper

- Power Failure
- Event ON
- Event OFF
- Cumulative Tamper

Other

- Load Survey
- Instantaneous
- Daily Energies
- Transaction
- Meter Setting
- Daily Details
- Daily LS Demand

Trends

- Energy
- Arg. Voltage
- Arg. Current
- PF

Meter Details

Meter Type	PT Ratio	CT Ratio	CT Tapping	Meter Collection	Meter Version	Meter Class	Manufacturer Code	API Version	Anomaly
K(T)3ph-4W	1.00	40.00	5	Mains	NTB6T00	0.5	L&T	2.00.12.00	A00000000000

Static Phasor

Meter Unit Code: 52304640
 Customer ID: Frequency: 50.04 Hz
 Meter Version: NTB6T00
 CT Ratio: 40
 PT Ratio: 1
 V Sequence: FORWARD
 I Sequence: ---

	R-Phase	Y-Phase	B-Phase	Total/Avg
Voltage (V)	249.850	248.100	248.960	
Current (A)	17.113	0.000	-17.117	
kW	2.287	0.168	-2.874	0.381
kVAr	-3.571	0.246	-3.673	-6.998
kVA	4.241	0.298	4.218	7.008
PF	-0.539	*	-0.491	-0.854
Angle	302.608	55.698	240.579	

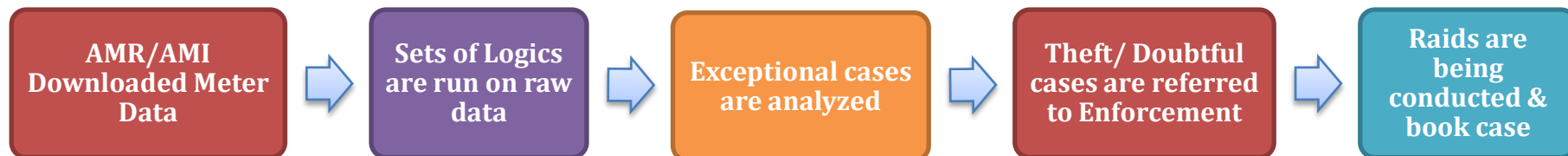
Note: Static Phasor is plotted in 12 O' clock

Analysis of meter phase balancing



Theft Reduction-Detection Process in AMR/AMI

THEFT DETECTION IN AMR/AMI CONSUMERS



AMR/AMI Logics:

Identifying Suspected Cases based on Data Analysis (High Revenue Consumer)

VOLTAGE RELATED

- ❖ VOLTAGE FAILURE
- ❖ NEUTRAL DISTURBANCE
- ❖ POWER FAILURE

CURRENT RELATED

- ❖ CURRENT REVERSAL
- ❖ CT OPEN
- ❖ LOAD UNBALANCE/ CT SHORT

OTHERS

- ❖ LOW POWER FACTOR
- ❖ NVM FAILURE
- ❖ POOR BATTERY
- ❖ DROP IN CONSUMPTION
- ❖ CT OVERLOAD
- ❖ MAGNET
- ❖ MANUAL RESET
- ❖ METER CONSTANTS CHANGE

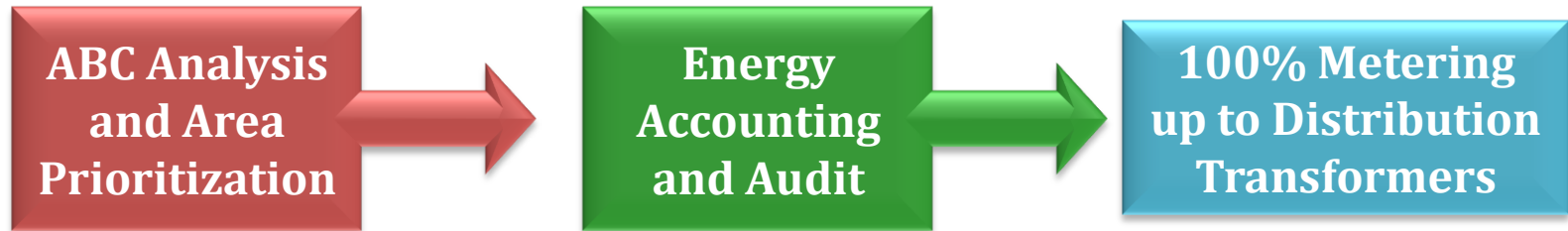
Assessment of Technical Loss

S No	Particulars	% Loss
1	Technical Loss in the Sub Transmission Network	0.91
2	Technical Loss in HT Network	1.86
3	Technical Loss in LT Network	3.28
4	Technical Loss in Service Cables	0.03
5	Distributed losses at various Voltage Level	0.38
	Total	6.46

Undertook a study with IIT to identify actual Technical Loss Level through network up-dation. load flow analysis, simulation tools, Loading analysis, categorization of consumer on cable size, analysis of occurrences of hot spots, cable faults etc.,

Power Theft Control

Scientific Approach – Energy Audit



Using Energy Audit as a tool to pinpoint areas of high loss...
100% Feeder / DT / Consumer Metering & Indexing

Identifying Focus Area
– Mapping Resource Vs Priority

Monthly Review of Actual AT&C Loss Level VS Target (Area Wise)
On Track / Slow Track / Back Track Performing Zones / Districts

Knowledge and Learning sessions conducted –
sharing of best practices among the zones

Surveillance to Keep Power Theft Away...

Theft Deterrent Electrical Network

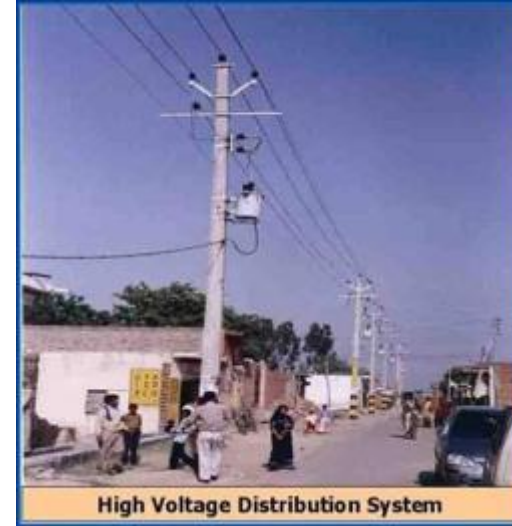


Before Revamp

**High Loss
High Resistance**

**HVDS
Installation**

HVDS for Reduction of Technical & Commercial losses, failures due to illegal tapping & for enhanced safety.



High Voltage Distribution System

After Revamp



**High Loss
Low Resistance**

**LTABC
Installation**

LT ABC Conductors for immediate reduction...



Vigilance Against Theft Strengthened



Constitution of Special Court

Assistance of Police Force / CISF during Enforcement Activities

Payment of Energy Bills through website

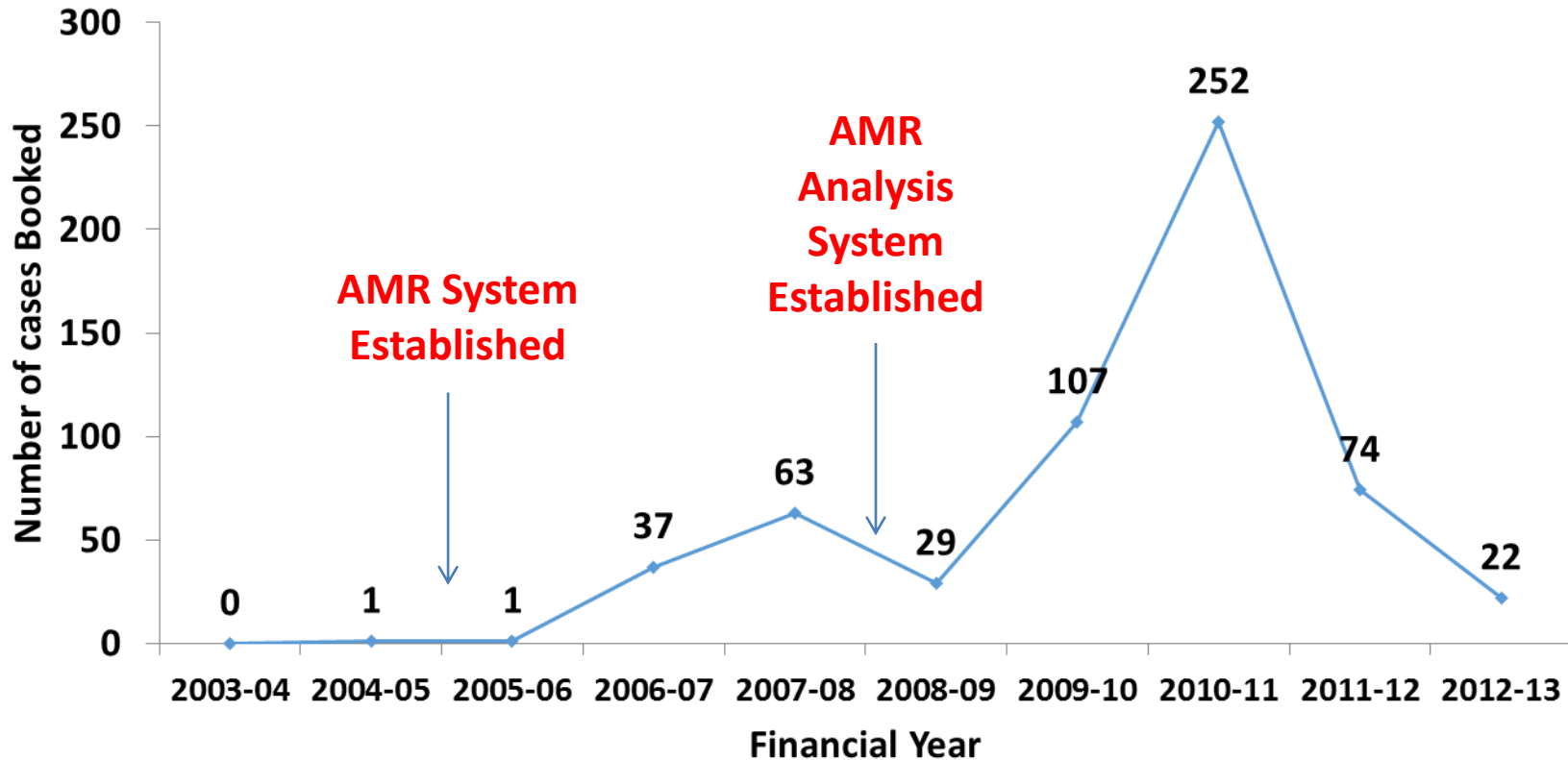
Relocation of JJ Clusters to new resettlement Colonies

Amnesty schemes for settlement of old disputed cases

Awareness Campaign Against Theft....

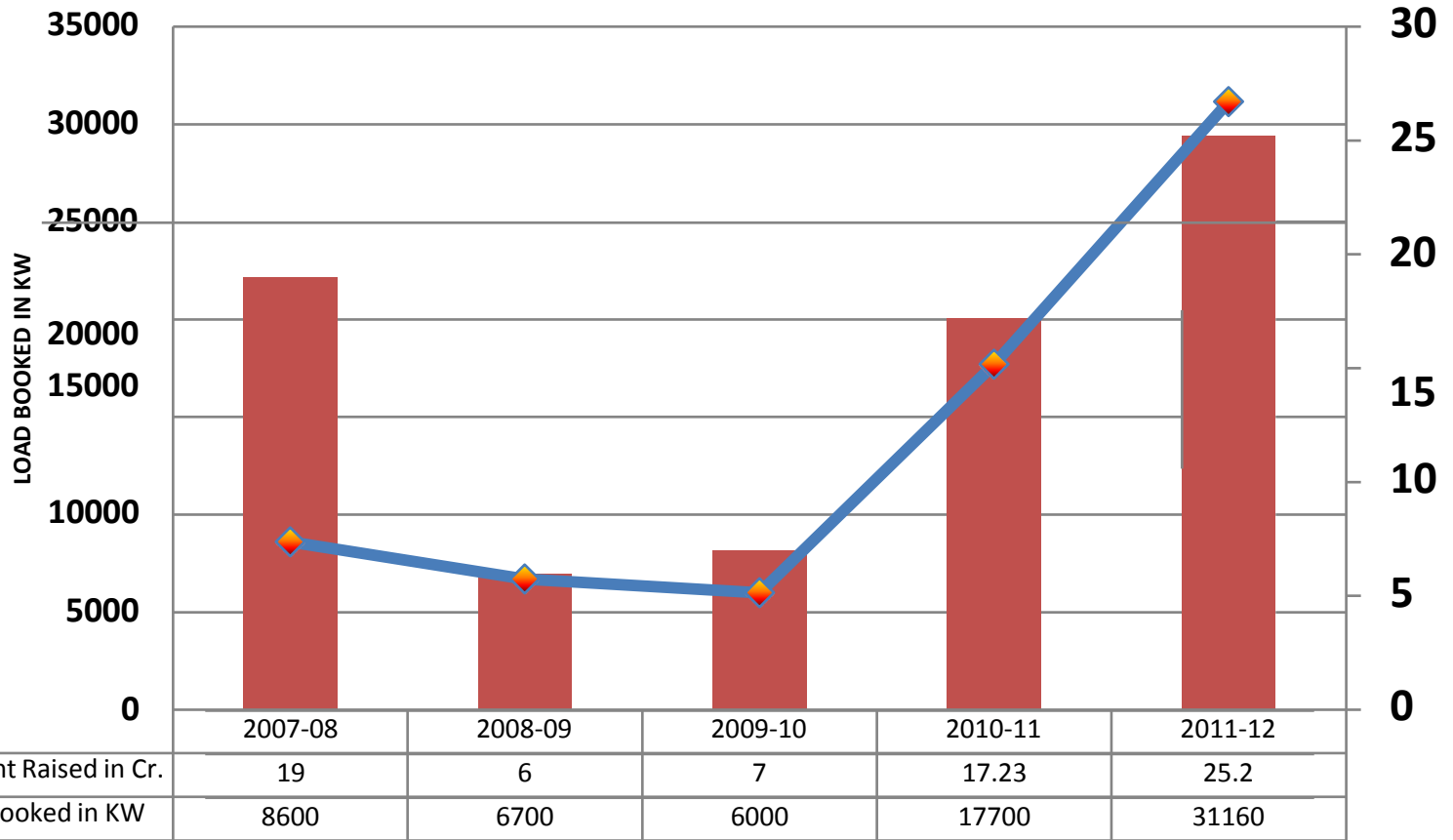


Cases booked on the basis of electronic Data Analysis



Establishment of a Intelligent AMR ANALYSIS SYSTEM is crucial for getting maximum benefits from AMR Investment. TPDDL has in-house developed Data Analysis System which has provisions to detect more than 30 types of tampering and meter malfunctioning.

Load & Revenue Booked: AMR Theft



Engaging with community

Innovative Business Case

Special Consumer Group



CS Group

Formation of Special Consumer Segment

- ❖ Making **Metering & Billing affordable**
 - Reducing the cost of new connection
 - Offering door step customized services.
 - Advocated for Re. 1 subsidy in electricity charges for consumer ≤ 200 U.
- ❖ **CS initiative's** for people residing in 223 JJ Clusters for:
 - Improving socio economic condition
 - Building the capacity to pay
 - Building long term Relationship with family member of different age group.

Special Consumer Group



Corporate Sustainability Group



TATAPOWER-DDL

Initiatives

- **Entrepreneurship:** Franchisee from within JJ clusters
- **Employment :**Through BA's
- **Support:** Drug De-addiction , Mobile dispensary
- **Employability :**Adult Literacy, Vocational Training, Neighborhood Electrician Program, Beauty Culture
- **Education:** Scholarships

Generating Smiles



pc

More than 1.5 lacs consumers brought into billing net; AT&C reduction by 4%

Creating Win - Win Situation



LIC Policy - TPDDL Offered Free Life Insurance Policy to Consumers in JJ Colonies in May 2008.


Various Metering Arrangements at JJ Cluster Areas

Instant Connections, Spot Billing

**विजली का मीटर लगाओ
रोशनी के साथ जीवन सुरक्षा भी पाओ**

**झुग्गी-झोपड़ीवासियों के लिए
एक लाख रुपये का जीवन बीमा मुफ्त**

एनडीपीएल की इस पहल के अन्तर्गत प्रत्येक गैर मीटर कनेक्शन पर एक लाख रुपये की मुफ्त जीवन बीमा पॉलिसी प्रदान की जायेगी, जिससे आपका अधिका सुरक्षित एवं जीवन टैफन हो सकेगा।



NDPL

जीवन बीमा मुफ्त

एनडीपीएल की इस पहल के अन्तर्गत प्रत्येक गैर मीटर कनेक्शन पर एक लाख रुपये की मुफ्त जीवन बीमा पॉलिसी प्रदान की जायेगी, जिससे आपका अधिका सुरक्षित एवं जीवन टैफन हो सकेगा।

NDPL

NDPL provides free life insurance to consumers

NDPL provides free life insurance to consumers in JJ colonies. The scheme is being offered to all consumers who do not have a metered connection. The insurance policy is worth Rs. 1,00,000 and is provided free of cost. The scheme is being offered to all consumers who do not have a metered connection. The insurance policy is worth Rs. 1,00,000 and is provided free of cost. The scheme is being offered to all consumers who do not have a metered connection. The insurance policy is worth Rs. 1,00,000 and is provided free of cost.



47/12/2008

Care for Community

3 pronged strategy adopted for CSR

- Philanthropic - *giving back to the society*
- Compensatory – *empowering and enriching quality of life*
- Business Oriented – *creating a win-win situation*



Adult Literacy Center



Support to MS patients



Drug De-Addiction Camp



Health Camp



Energy Conservation



Nukkad Natak

Care for Community

Affirmative Action



Education
*Sponsoring
students*

Employment
Job opportunities

Employability
*Vocational
Training, Support
to ITIs*

Entrepreneurship
*Beautician
courses, Franchis
ees*



***TPDDL is the
recipient of Jury
Awards and Serious
Adoption Award for
AA among TATA
Group Companies***

Care of Community - Education

- **Education Support at Govt. Schools**
Scholarships to Class X – XII students;
1165 beneficiaries till FY 14
- **Adult Literacy Centers**
Enhanced to 161 in FY 14
10200 beneficiaries till FY 14
- **Tutorial Classes**
Underprivileged Students of Class I – X;
925 beneficiaries till FY 14



Care of Community - Employability

- **Support for ITI / Diploma / Degree**
Scholarship scheme for SC / ST beneficiaries;
523 beneficiaries till FY 14
- **Vocational Training Centers**
Skill based training to youths from JJ Cluster
and BA employees;
4414 beneficiaries till FY 14



Care of Community - Entrepreneurship

- **Positive discrimination for SC / ST candidates in campus recruitment**

19% of TPDDL workforce comprise of SC / ST employees

- **Promoting indirect employment of SC / ST employees by Business Associates (BA)**

23% of BA workforce comprise of SC / ST employees

Results Yield from PPP Model

Challenges addressed

High AT&C losses

- Incentive to overachieve Targets
- Penalty for not achieving Targets
- Solutions need to be sustainable requiring long term approach
- High Capex Involved in Technology Interventions-HVDS, SCADA, AMR
- Effective Enforcement by follow up in Courts
- Flexibility for Settlements (out of Courts)

Lack of Service Orientation

- Public Tolerance is high with Electricity Boards & less with private players
- High Expectations from private players push performance

Reliability of Supply: Needs huge Capex to modernize Networks

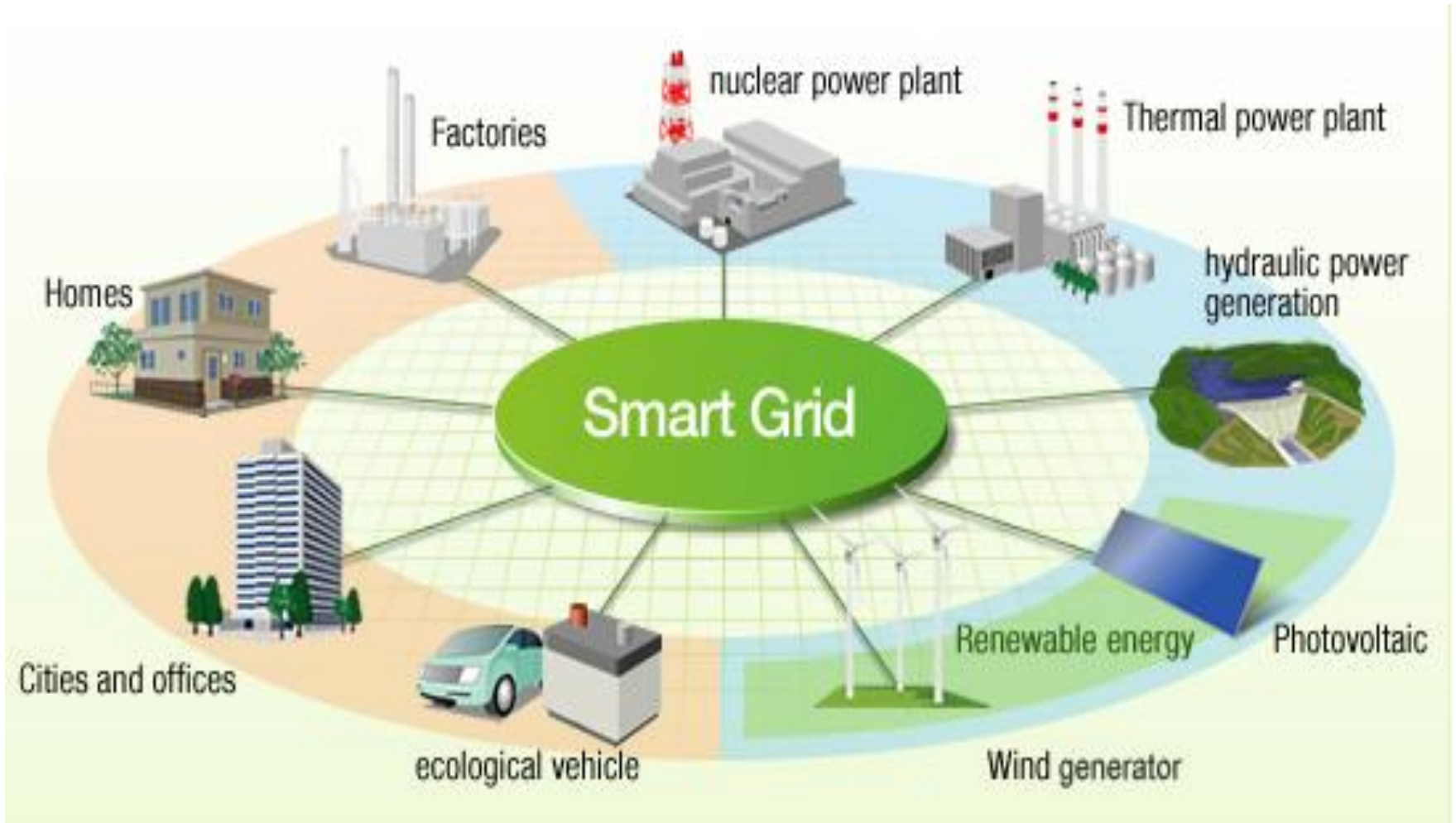
Regulation: Issue of Regulators autonomy can be a problem when public sector is to be regulated

Pressure to perform: Subsidies are easy way out for SEBs but not for private players

MAKING INDIA PROUD



Vision Towards Smart Utility



Thank You