



# Good practices in AT&C loss reduction

Field level experience sharing

09<sup>th</sup> January 2018

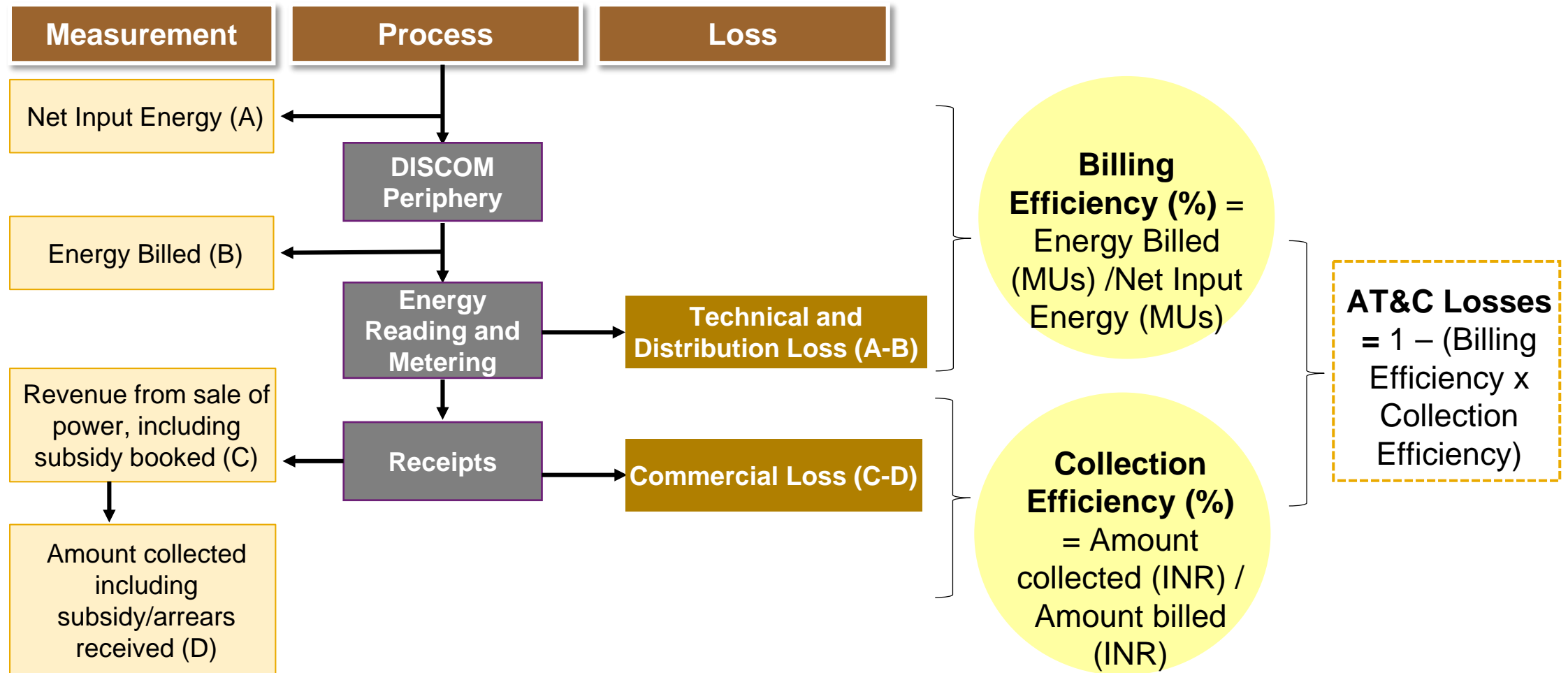
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# Structure of the discussion

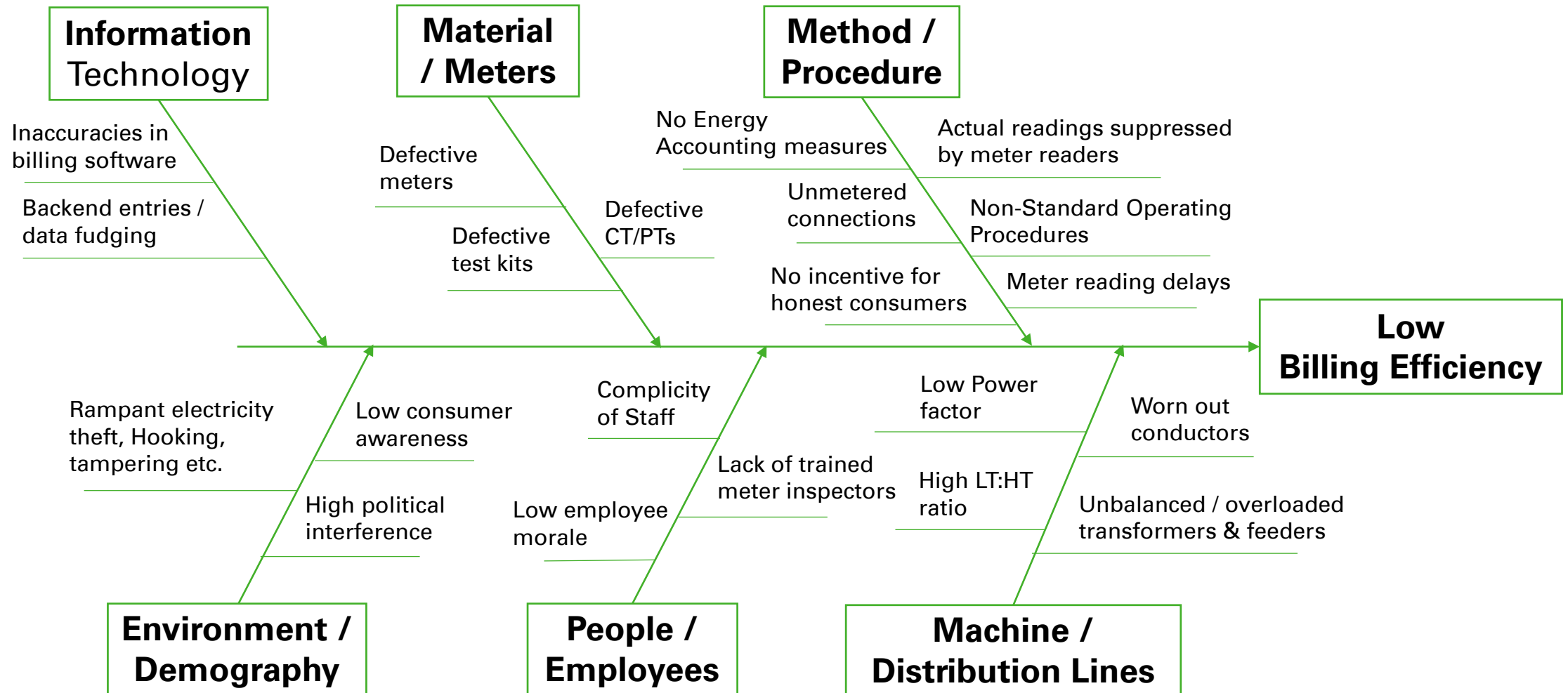
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<b>1</b>	<b>Fishbone – identifying the cause and effect of the losses</b>
<b>2</b>	<b>How some of these typical issues have been dealt in the field</b>
<b>3</b>	<b>Some illustrative steps</b>
<b>4</b>	<b>Typical norms for losses</b>
<b>5</b>	<b>Field level experience sharing</b>

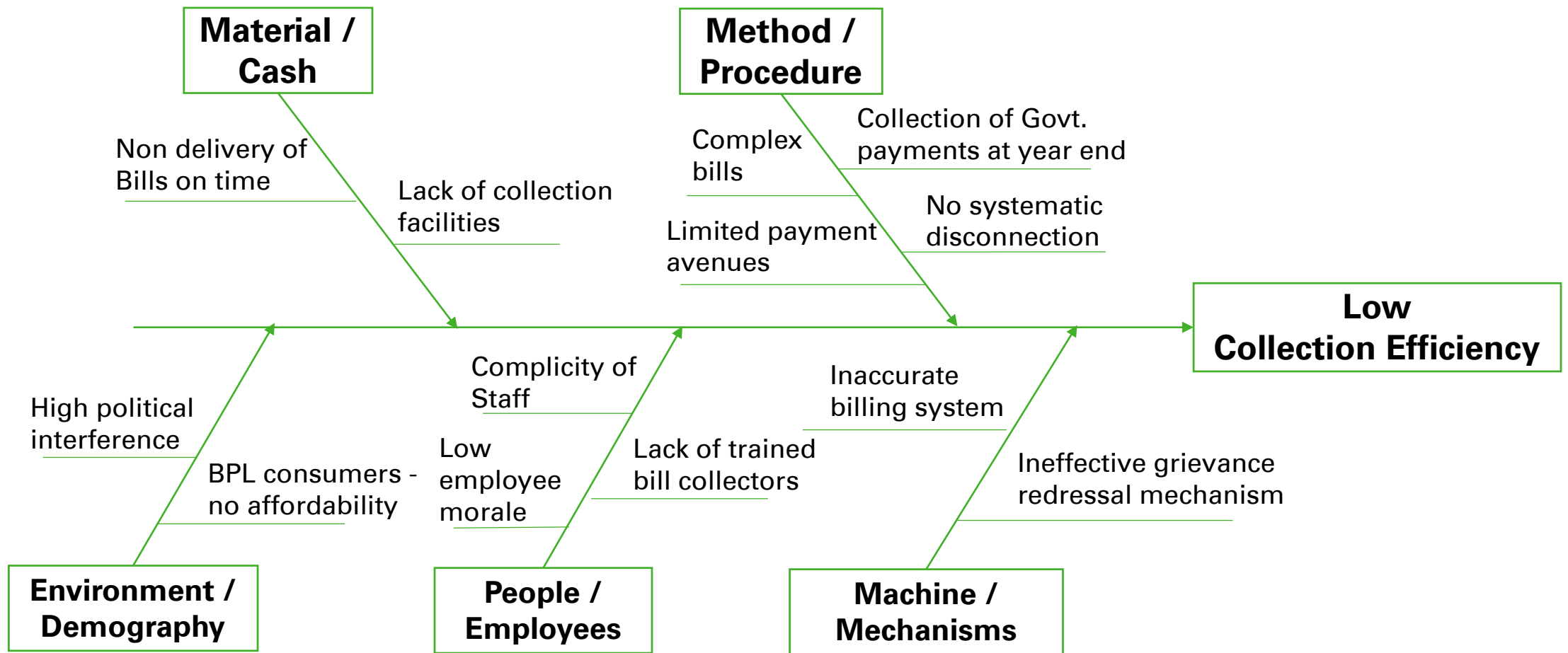
# AT&C loss calculation methodology



# Root causes for low Billing Efficiency



# Root causes for low Collection Efficiency



# Typical technical issues and remedies

- Establish new substations
- Reduce length of LT lines as much as possible

Long T&D network

- Reconfiguration of lines

Unbalanced loading in Feeders

- Shunt Compensation

Power Factor

- Conductor Up-gradation
- Feeder Bifurcation

Conductors sizing

- Shifting/Additional Distribution Transformers at Load Centres

DTs not located at Load Centre

- Relocation/Optimal Sizing of Transformers

Transformer Sizing and Selection

# Illustrative steps taken- at field level

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## 11 kV lines

- Double jumper-ing at cut points
- Monthly Tree clearance on a fixed day (say second Saturday)
- Installing capacitors at 11 kV Consumers with low PF
- Bifurcating feeder rather than enhancing the conductor size
- Standardization of conductor sizes
- Installing 33/11 kV s/s at load centres

## LT lines

- Quarterly Tree clearance
- Reduce service cable length
- Installing capacitors at High Value LT Consumers

## Distribution Transformer

- Loading up to 80% of capacity
- Ensure Load balancing for Zero current in neutral
- Ensure neutral earthing properly
- Copper L Clamps with lugs at LT Bushing terminals

# Typical commercial issues and remedies

- Leads to incorrect reading due to wrong multiplication factor of PT/CT.
- Online billing of high value consumers

## Meter testing

- Special inspection drives to correctly map all services to the Billing System
- DTR codification to be mapped with billing database.

## Unmapped Customers

- Surprise checking using analytical tools
- Remote meter reading and billing
- Installation of bar code Stickers /RFID chips

## Meter readers taking incorrect readings

- Effective vigilance
- Special anti-theft for targeted connection checking
- Use online tamper detection tools

## Tampering of Meters and Service Lines

- Coffee Shop Reading
- Online meter reading for high value consumers
- Revamping the meter reading processes

## Possible Meter Reader collusion

- New Service Connection (NSC) Application to be maintained at all Customer Service Centers

## Registration of New Service Connections



# Illustrative steps taken - meter related

## Single Phase Meters

- Single phase meter used up to 5 KW load only
- Meter body hermetically sealed and internal parts visible from out side
- Electronic meters in a pilfer proof box with port facility, to facilitate downloading of parameters
- Sealing of meter terminal block and pilfer-proof box

## Three-phase whole current meter

- 3Ph WC used for services up to 15 KW only
- Electronic meters in a pilfer-proof box with facility for downloading of parameters
- Sealing of meter terminal block and pilfer-proof box
- Meter checked once in a year

## HT Tri-vector Meter

- HV side metering for all loads above 37 KW
- Using high accuracy CTs (0.2 Class) and PTs
- Reducing the length of Potential secondary leads to to reduce voltage drop
- Meter, PTs, CTs provided in a pilfer-proof cubical and to be sealed by a higher cadre specified officer

## Three-phase LT meter with CTs

- Used for services up to 40 KW only
- Electronic meters in a pilfer-proof box with separate chambers for meter and CTs. Port facility, to facilitate downloading of parameters
- Meter checked once in six months
- Using high accuracy CTs (0.2 class)
- Cut out fuses provided prior the box (out side)

# Illustrative steps taken - meter reading

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## Single-phase services

- Tagging with Distribution Transformers
- Spot billing introduced with hand-held devices by downloading the readings through probe
- Exception list generated for repeated door-lock, reading not furnished, high-consumption, low consumption.
- Exceptions cases attended and reported within 15 days
- Services with DL and RNF to be provisionally billed based on previous three bills' average

## Three phase services

- Spot billing by officer
- Remote meter reading
- Reasons to be recorded for high-consumption and low consumption
- Voltage and Currents are measured in case of manual readings
- Introduction of kVAh billing

# Illustrative steps taken - Revenue collection

Demographic areas	Initiatives taken
Urban and Semi-urban	<ul style="list-style-type: none"><li>• Meter-reading and billing on same day</li><li>• Consumers reminded two days prior to bill due-date</li><li>• Defaulting consumers disconnected on the following day of due-date and conducting site inspection within three days by section officer / Line inspector</li></ul>
Rural	<ul style="list-style-type: none"><li>• Defaulting consumers' list generated monthly for 50% of services connections and sent to section officers to attend and report back within 15 days.</li></ul>
All	<ul style="list-style-type: none"><li>• Last 10 days of the month ear-marked for revenue collection through special drives by pooling up all staff</li><li>• Pre-paid metering for all Government services and offered to other consumers</li><li>• Expanding the payment modes - Online payment, payment through banks, payment through KIOSKS facilitated. In rural areas, staff to be deputed once in a month for collection at spot.</li></ul>

# Illustrative steps taken to prevent theft

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- Using Aerial Bunched Cables (ABC) in LT lines for theft prone areas.
- All HT-metered services checked once in six months by a special-wing formed for theft detection.
- 100 surprise check readings per month by an officer. These readings were crossed checked at site with the previous readings.
- Surprise raids / Night raids conducted frequently along with the special police squad.
- Mass inspection of connections for one day in a month in each division by pooling up all the Assistant Divisional Engineers, Section-Officers, Sub Engineers and Line Inspectors in the division.
- New connection provided within 48 hours of request registration.

# Some more steps helped reducing the losses

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- Replacing defective and old meters and installing meters at unmetered connections
- Data analytics driven sample checking
- Regular cross checking of multiplication factors in CT PT meters
- Introduction of Customer Information System
- Improving the billing accuracy
- Introduction of Grievance redressal cells – over the counter or over the phone resolution for billing related issues
- Energy Accounting and proper energy balancing.
- Involving village level SHG for collection and theft tracking and reporting
- Encouraging non cash mode of payments



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