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India SMART UTILITY Week 2024

Session: Integrating Utilities for Tomorrow (Water) Advance Metering, Operational Efficiency and Revenue strategies during smart utilities integration

Presented By

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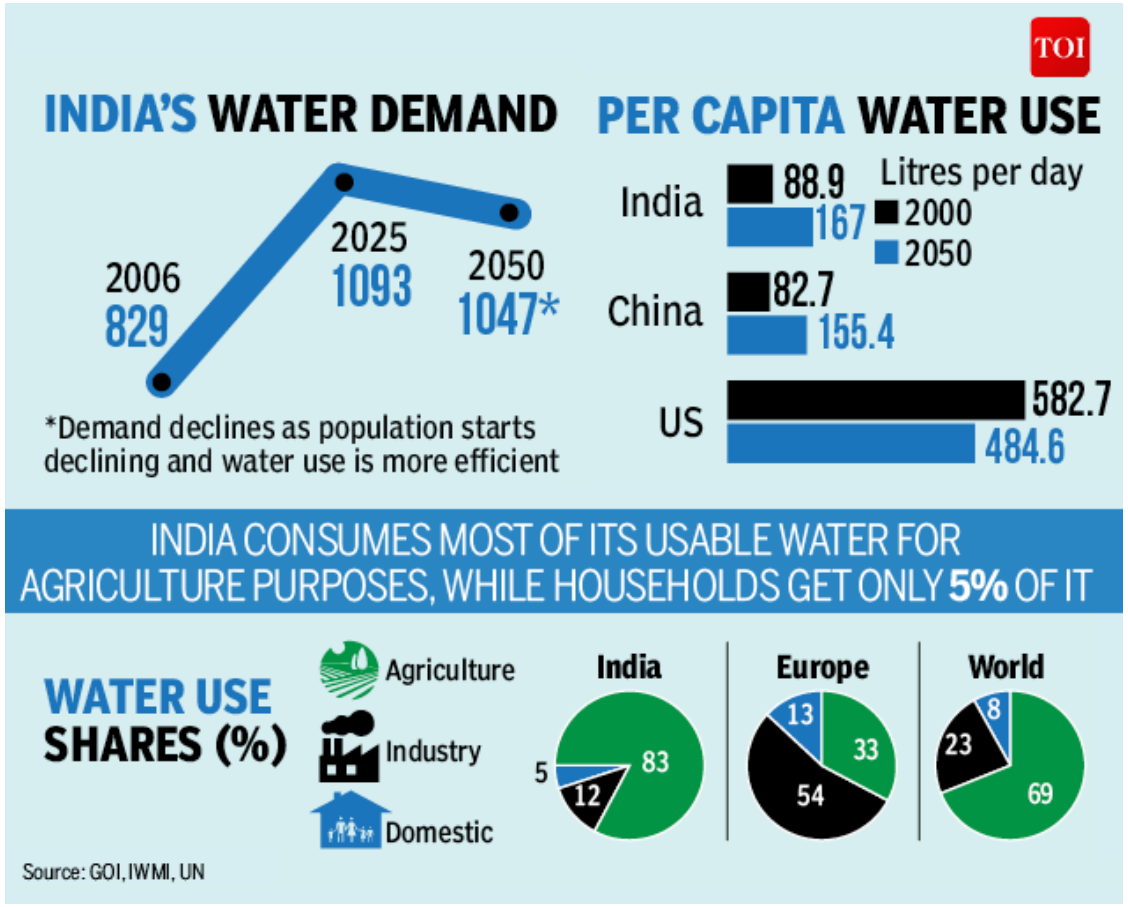
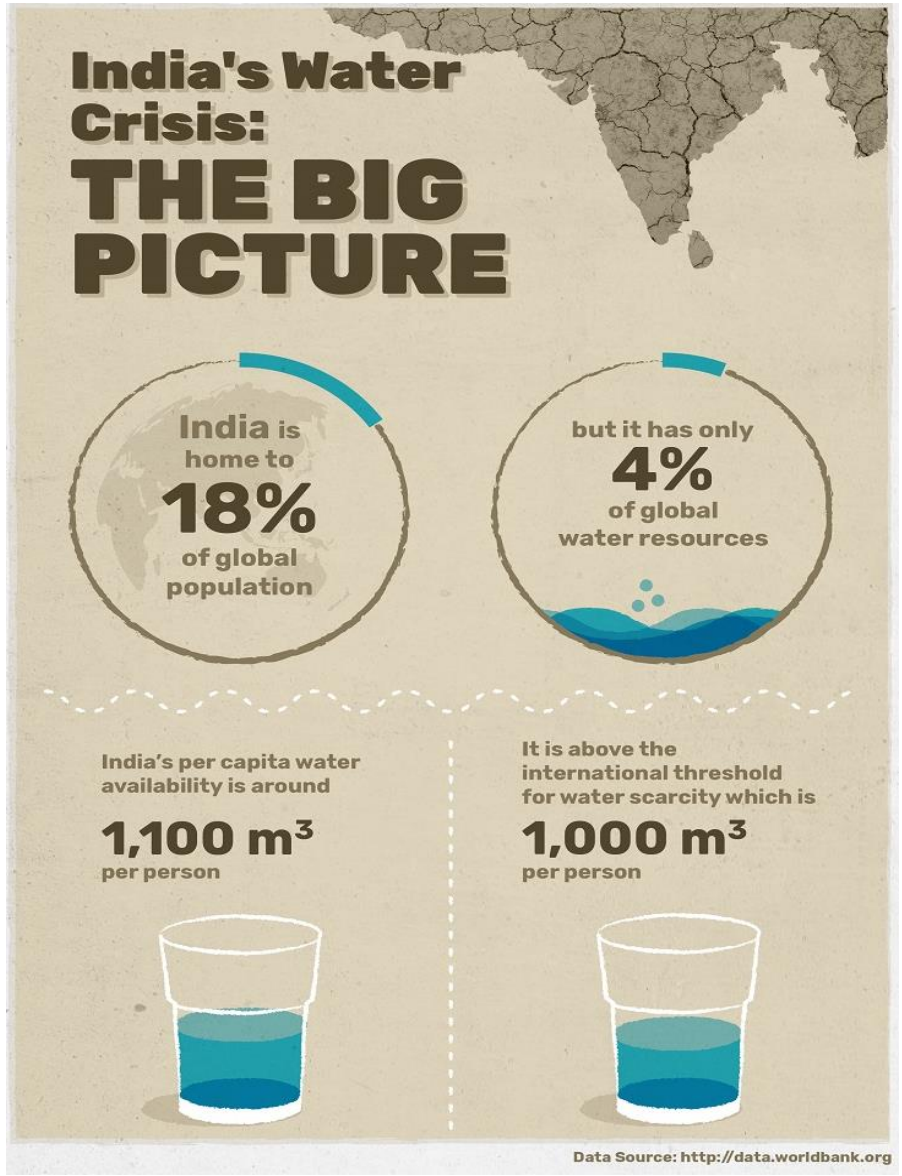
INTRODUCTION – WATER SCENARIO IN INDIA





- A 2016 report by Water Aid estimated 76 million people in India have no access to a safe water supply.
- The Asian Development Bank has forecast that by 2030, India will have a water deficit of 50 per cent.

THE INDIA WATER SUPPLY STORY

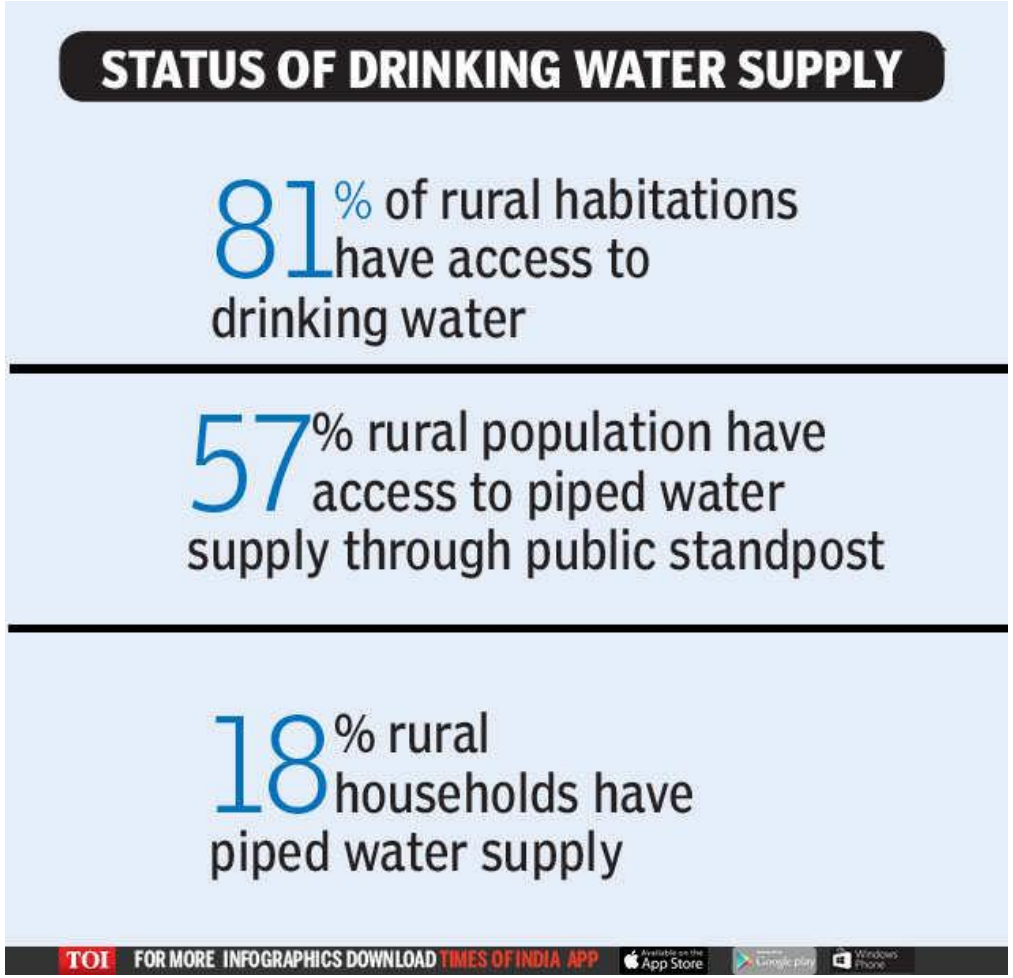
TABLE 4 Performance indicators for water supply

S. No.	Indicator	Benchmark
1	Coverage of water supply connections	100%
2	Per capita supply of water	135 lpcd (cities)
3	Extent of non-revenue water	20%
4	Extent of metering	100%
5	Continuity of water supplied	24 hrs
6	Efficiency in redressal of customer complaints	80%
7	Quality of water supplied	100%
8	Cost recovery	100%
9	Efficiency in collection of water charges	90%

Source: Ministry of Housing and Urban Affairs (MoHUA), Government of India

Urban story

Rural story



- Per capita water supply grossly varies from 40 liters per capita per day (lpcd) to 200 lpcd.
- Rural people in India spend at least Rs.100 each year for the treatment of water related diseases. According to the Government of India, this adds up to USD 810 million (approx.) annually.

MAJOR AREAS OF CONCERN

- **High Levels of Revenue Losses –** NRW, Physical losses due to poor health of pipes network, pilferage
- **Aging Water Infrastructure -** The average service life of a water main or sewer line pipe is 50 years. Currently about 30 percent of the pipes are between 40 and 80 years old and about 10 percent of the pipes are more than 80 years old.
- **Insufficient Infrastructure Funding -** Major problem is insufficient funding for line repair and replacement projects. State and Central funding can cover some of the project costs, but ultimately it leads to a rate increase for users.
- **Digital interventions in Urban Water Supply and sewerage** – NRW reduction/ leak detection, asset mapping and real-time monitoring.
- **Digital interventions in Rural Water Supply** – asset mapping
- **Digital interventions across Water Resources** – Monitoring health of dams/ reservoir, groundwater monitoring, aquifer mapping, flood forecasting, river water quality monitoring system through automation (SCADA, IoT).

MAJOR AREAS OF CONCERN

PROBLEM STATEMENT					
Sl. No.	**DEFINITION OF THE PROBLEM**	**IMPACT FINANCIAL**	**IMPACT QUALITY**	**IMPACT SYSTEM RELIABILITY**	**IMPACT OTHERS**
1.	Increasing trend in salinity and conductivity in River source of Raw water	Less Consumption in KL by all customers	Adverse impact on supply of water due to high % of salinity	NA	Intake channel cleaning, stored good quality of water at pre settling pond
2.	Area prone to Severe Cyclone resulting in storm surge and loss and damage to property.	Equipment, Building , boundary wall broken and needs huge investment for restoring all items on time.	Quality may disorder due to natural calamity	System reliability reduced	Less supply of water to all customers due to plant non availability because of power supply.
3.	Negligible automation at Old WTP	Manual control and management , inefficiencies of Manpower can be reduced	Lack of real time online possible	System reliability cannot be accessed	Losses are more due to manual control
4.	Limited use of AMI meter in meter reading	Accuracy and reliability of data in absence of automation	Lack of online and real time data	Meter reading is fully manual	Less revenue due to erratic reading of water meters
5.	Billing software not integrated in SAP	Calculation efficiency low. Manual calculation & data analytics	Manual Bill generation	Manpower dependent process	Mismatch of actual and manual-variance

FOCAL POINT

Considering the interlinked challenges

- Educate the local level authority to prioritize development of water as a resource at par with governance & development
- Population growth, increased per capita water demand due to rising standards of living, and climate change are the results of accumulated decisions.
- Capacity limitations of the network or network management, whether physical, professional, or financial. Engineering constraints like leaks, pressure problems, and a network stretched beyond capacity.

Way forward

- **Increased resilience**: Digital solutions, such as a dense network of sensors, intelligent equipment, real-time source-to-tap digital twin, and data analytics and advanced simulation tools, enable a utility to be better prepared to their changing environment
- Improve utility operations and financials – have a positive impact on the utility workforce.
- Digital solutions include systems integration across data siloes, which improves cross-department collaboration

DEMAND DRIVERS - DIGITAL INTERVENTIONS

Key drivers for digital interventions

Need for improving efficiency to mitigate water scarcity

The average performance of the major Urban Local Bodies (ULBs) against the national service-level benchmarks is indicated in the table

Parameter	National benchmark	Average performance of ULBs
Metered Water Connection	100%	13%
Non-Revenue Water	20%	> 33%-53%
Continuity of supply	24 hours	3 hours
Cost recovery	100%	39%
Tariff Collection Efficiency	90%	59%

Increasing maturity level of end-users

With increased standard of living and increased disposable income, urban end-users are demanding better service levels. There is a shift in focus from infrastructure creation to service delivery, and this has resulted in increased adoption of digital solutions

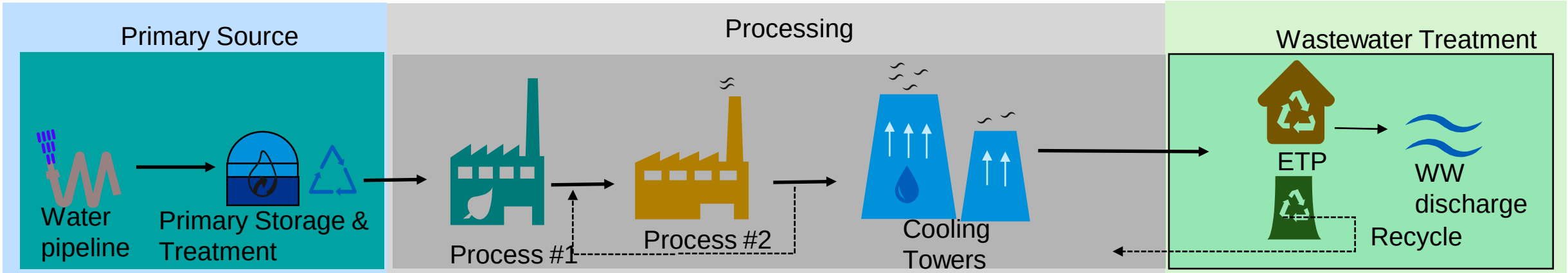
Regulatory push

National Green Tribunal, in a recent order, has directed states to develop a technology-based online monitoring system, preferably IoT enabled platform, to monitor the performance of sewage infrastructure, with flexibility of integrating upcoming and planned sewage treatment plants

AMRUT 2.0 – functional water tap connections in all urban households and in all statutory towns. Universal coverage of sewerage services in 500 AMRUT cities

- **Reducing non-revenue water to below 20%,**
- **Recycling of treated wastewater to meet at least 20% of total city demand,**
- **24 x 7 water supply through piped water supply connections**
- **Mandatory preparation of GIS-based master plans of cities**
- **Implementation of the Mission is targeted to be paperless,** with all activities – from planning, to implementation, to monitoring – will be through a technology platform.

DIGITAL INTERVENTIONS – WATER SUPPLY



Key solutions

Instrumentation for real-time monitoring of water quality, flow, pressure, temperature, water levels at inlet, processing units and outlets

- Groundwater monitoring telemetry system involving flowmeters and piezometers
- Automatic chemical or chlorine dosing for primary treatment
- Sensors and centralized dashboard (online monitoring system) for water audit and monitoring water footprint in processing units
- Data analytics and visualization
- Leak detection - sensors, applications, data analytics
- Online monitoring of effluent discharge
- Filtration technologies, monitoring system for wastewater reuse within premises

DIGITIZATION & INNOVATION

Automation

- System operation through automation to reduce manual intervention.
- Automatic Pump Operation as per Line Pressure/ will stop or run as water stock in storage
- Automation of Filter Backwash System

Digitization

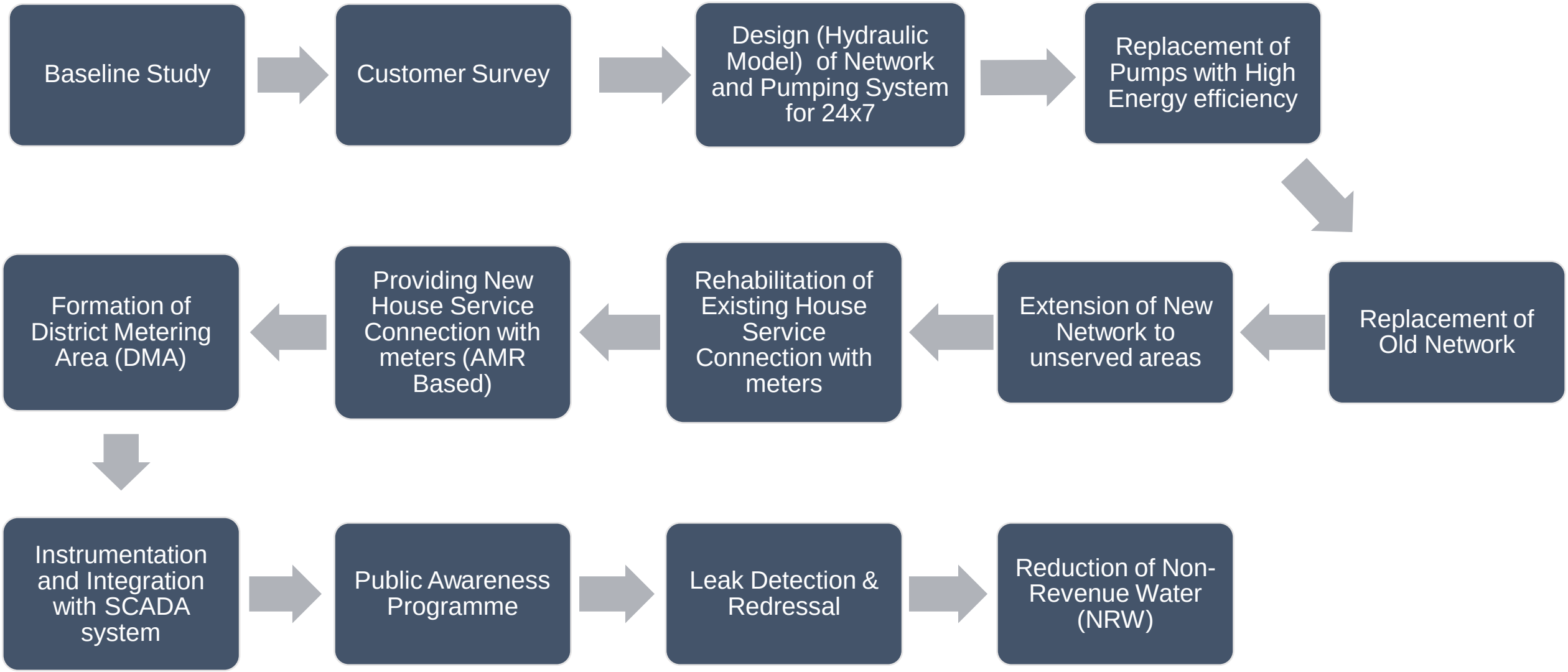
- Manual reading Collection to GPS System enabled flowmeters to cater real time data.

Innovation

- Adopting VVF Drive to from Star delta Connection
- Scada System, online monitoring system to achieve high productivity and process safety

Overall improvement

ROAD MAP – IMPLEMENTING 24X7 WATER SUPPL



LEAK DETECTION SYSTEM IN WATER DISTRIBUTION PIPELINE

In the Water Distribution Network this is very important to monitor the leakage in the pipeline this is a very becoming a common trend in the upcoming challenges of the Technology both for reduction Nonrevenue component and at the same time to improve the life of the asset.

The Technology to detect the leakage in the pipeline employs various methods. Like online monitoring of pressure in the pipeline or flow in various zones in the distribution area by acoustic principle.

As per the demand of the system and accuracy level of leak detection the distance between the sensing /monitoring points is determined. As the distance between the points goes less the procession of the leak detection increases.
As technology behind leak detection is based on a dedicated software to generate report based on the sensor data available from the points. It is also important to mention the data available from the sensor must be having
Real time GIS information to locate the leakage, Zone for necessary corrective action.

Interestingly software to define the leak profile of a particular distribution network uses Artificial Intelligence as a backbone of the deterministic algorithm.
For all the acquired data from field level sensing to central server is totally IoT based technology.

Technology for leak detection in co ordination with AI ,IoT and GIS has been so utilized so efficiently that that works has been advanced such a way that after leak detection profile is created and its KPI report is generated which will can also avoid manual intervention in maintenance of pipeline by Robotics in future.

ONLINE QUALITY MONITORING

In the Water Distribution Network another important aspect is online water quality monitoring to ensure the outlet efficiency of any Water Treatment Plant .

So online analyzers are used to monitor the water quality :
As per the priority two important parameters are minimum monitored:

- Residual Chlorine
- Turbidity
- To ensure water quality.

In addition to that other parameters may require online monitor as:

- pH
- Dissolved Solid
- Dissolved Oxygen
- Sodium
- Dissolved Ammonia etc. as per the requirement

There can be individual analyzer/sensor for each application or there can be “Multi parameter analyzer” as well. Normally analyzers are provided with the facilities of direct IoT connectivity and data logging features.

NANGLOI WATER SERVICES : ONE OF THE LARGEST PPP WATER PROJECTS IN INDIA

Project Model	➢ The project is based on PPP model (DBFOT) ➢ Government Grants: 70% on Capex related to Water Infrastructure with escalation & 100% on capex related Road Restoration Works ➢ O&M – Billing to households on monthly basis with annual tariff escalation as per price index ➢ Project Tenure: 15 years since Sep-2013
Project Scope	➢ Revamping & up-gradation of 40 MGD WTP with construction of Sludge Recycle system. ➢ Construction of 2 nos. new UGRs – Capacity 8 & 6.5 MGD ➢ Revamping & up-gradation of 2 existing UGRs ➢ Installation of 2.35 lakhs House Service Connections ➢ Installation of Flow Meter with SCADA implementation ➢ Supply and laying transmission & distribution network – 1600 Km ➢ Replacement of 1500 mm Dia. Existing MS Pipe – 4.2 Km ➢ DMA formation with NRW Reduction. ➢ Road Restoration ➢ O & M for 15 Years
Partners	➢ Swach (49%) & Veolia (51%), a leading French water company

KEY PARAMETERS

Area covered: 137sq km of Nangloi, Najafgarh, Mundka area, spanning 6 assembly constituencies of New Delhi

Population served: Over 1,000,000 population consisting of 400,000 households

Customers: Domestic and Commercial

Project components: More than 1900kms of distribution and transmission network, Creation of 35 District Metered Areas (DMAs) to reduce NRW, Establishment of customer service centres for grievance redressal and 24x7 support.

Actual Project Cost: Rs. 500 crs, out of which ~ Rs 455 Crs works have been completed.

Progress of work: 97 % (All the systems are under operation through SCADA)

Payments for Salary, Wages and Services: Around 175 lakhs per month.

Employment creation: About 700 people are directly employed by NWS besides contractors and their labourers

KEY PERFORMANCE INDICES

01 – Service delivery: **193%** ↑↑
(81,000 to 2,80,000 house connections)

02 – Volume billed: **196%** ↑↑
(32 MLD to 95 MLD)

03 – Water losses: **25%** ↓↓

04 – Won 06 (six) disputes with DJB: received INR 25 Crs., another INR 20 Crs. in process

05 – Length of network: **122%** ↑↑
810 km to 1,810 Kms.

06 – Operation rate: **32%** ↑↑
Saving of total power consumption resulting additional 12.5 Cr revenue in OPEX

07 – Collection from customer: **123%** ↑↑
INR 21 Crs. to INR 47 Crs.

SWACH AS A WATER UTILITY - HALDIA WATER SERVICES PROJECT

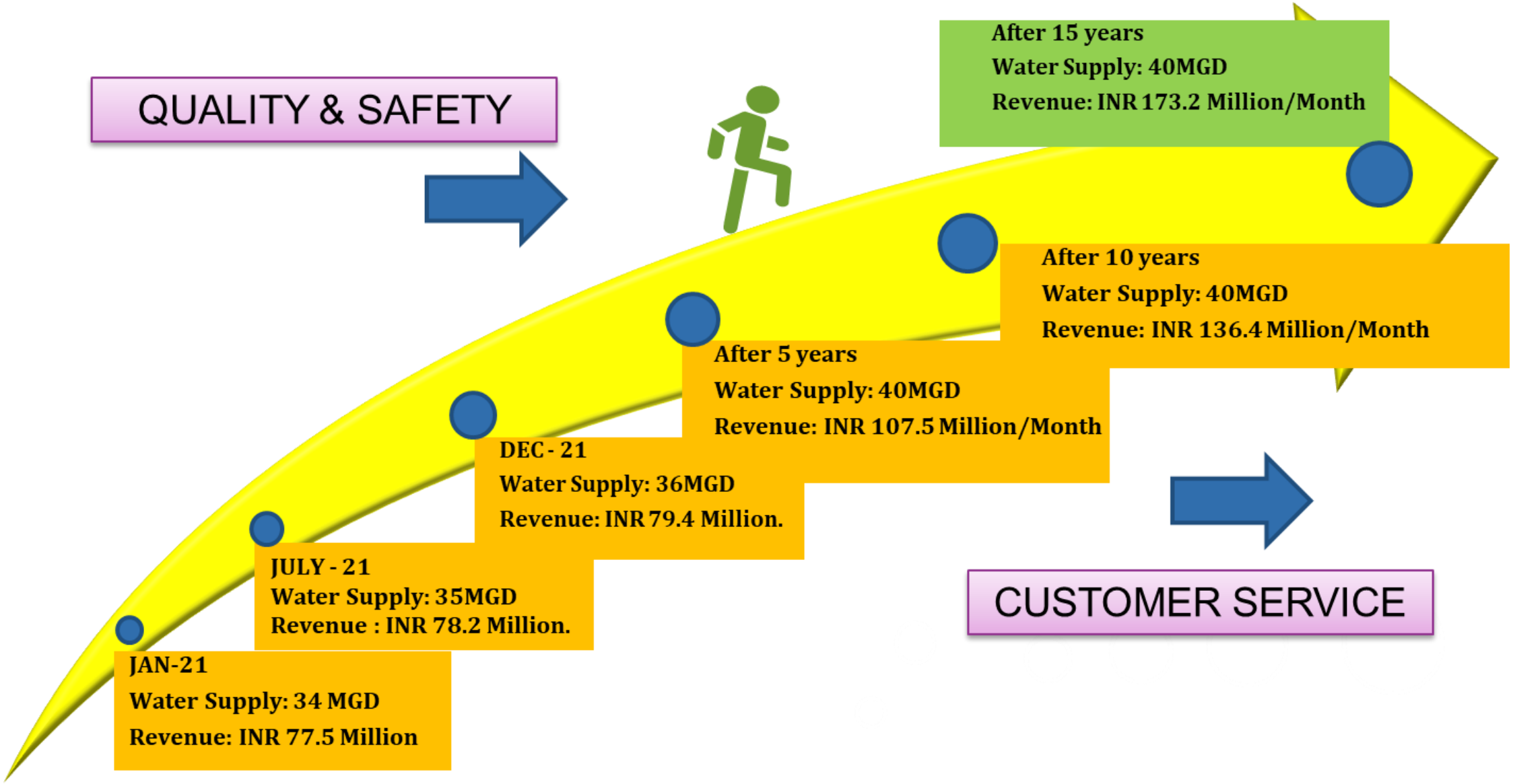
Client: Haldia Water

HALDIA DEVELOPMENT AUTHORITY

Key Industries ~90% of water supply

Project Model	➢The project is based on PPP model (DBFOT) ➢Concession Period: 15 years
Project Scope	➢O&M of the existing 2x25 MGD WTP with SCADA ➢Repair and refurbishment of existing facilities of WTP, Pumping Stations, UGR, network ➢Maintenance of existing 180 Km transmission & distribution network ➢24x7 water supply to a varied mix of Industrial, Commercial, Municipal and Domestic customers ➢Bulk water meter supply to ~3 lakh beneficiaries
Partners	➢Swach, Shristi Infra & Ion Exchange
Status	➢Project under execution since Nov 2019

MAJOR ACHIEVEMENTS



KEY PERFORMANCE INDICES

15-27 % Reduction in NRW

94% increase in consumers

Reduction in water contamination complaints

Customer satisfaction

80 % consumers have water meters

Reduction in losses at water treatment plant

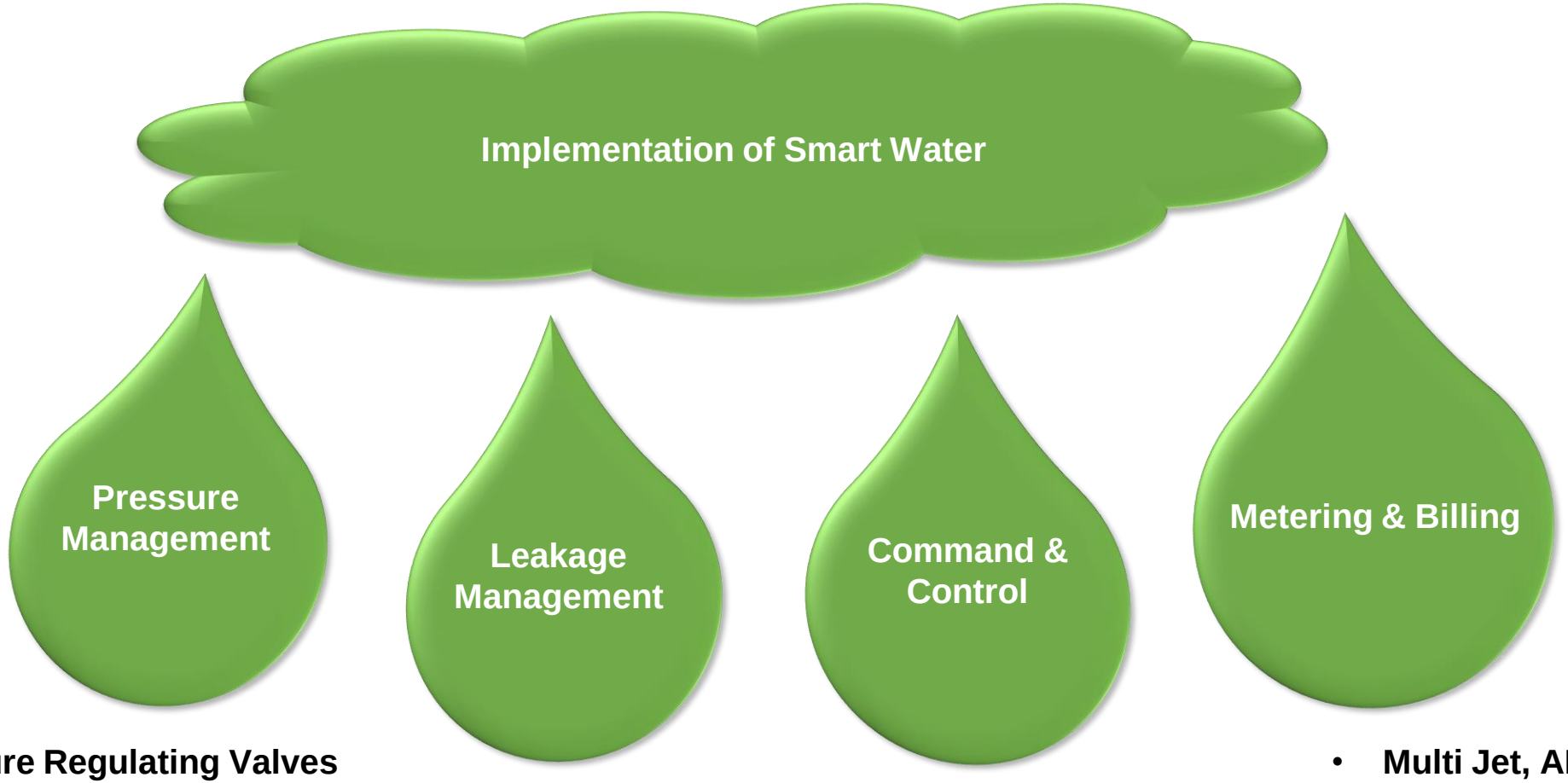
24 hr Toll Free Complaint Number

24X7 Drinking Water Supply

Formation of DMAs

KEY TAKEAWAYS / RECOMMENDATIONS

IF YOU CAN'T MEASURE IT, YOU CAN'T MANAGE IT



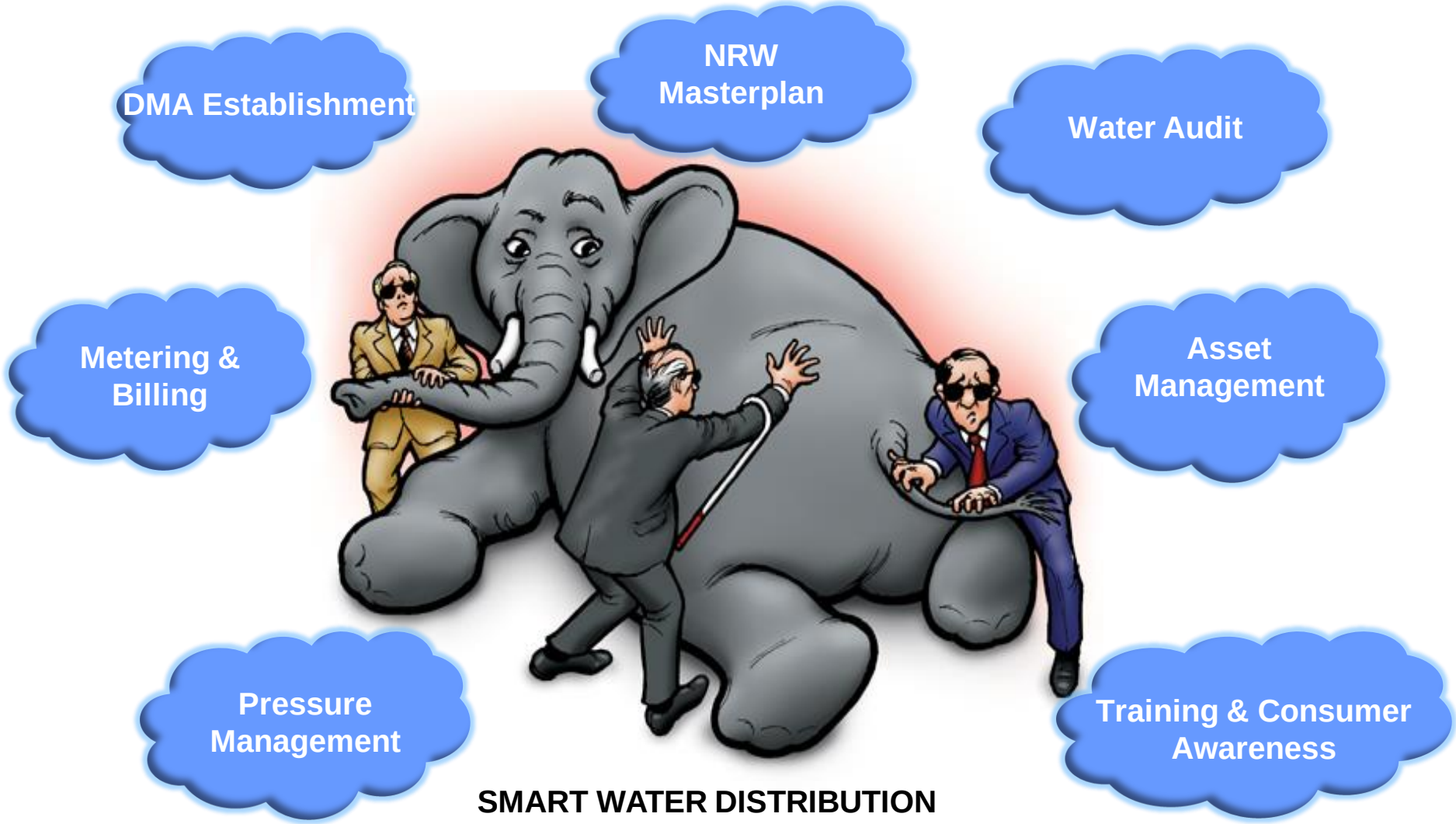
- Pressure Regulating Valves
- Pressure transmitters
- Sub-DMA approach

- Active Leakage Control
- Leak Detection Equipment

- Asset Management - GIS
- CRM, SCADA & IMIS

- Multi Jet, AMR & AMI
- Billing and Revenue Management

INTEGRATED & HOLISTIC APPROACH, WAY AHEAD



THANK YOU

For discussions/suggestions/queries email: ***isuw@isuw.in***

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Links/References (If any)

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