WATER AUDIT & LEAKAGE MANAGEMENT

Reducing water leakage in water supply networks is good business.

Non-revenue water (NRW) and unaccounted-for water (UFW) within a water supply network represent unbilled consumption, apparent losses, and real water losses (water leakages). The average number in India as per Census 2011 is 33% and varies between 20 and 70% in different states. In Northern Europe, it will be around 10% (6% in Denmark). There is no reason why the same could not be the case in many cities and states in India.

Water Audits and Benchmark

Leakage management is an ongoing process with continual improvement of operation services, swift reactive repairs as well as proactive maintenance of pipes, valves, junctions, tanks etc., and timely replacement of old worn-out infrastructure.

S.No.	Indicator	Benchmark	Status (census 2011)
1	Coverage of water supply connections	100%	50%
2	Per capita supply of water	135 lpcd (cities)	69 lpcd
3	**Extent of non-revenue water NRW**	20%	33%
4	Extent of metering	100%	13%
5	Continuity of water supplied	24 hrs	3 hrs
6	Efficiency in redressal of customer complaints	80%	73%
7	Quality of water supplied	100%	82%
8	Cost recovery	100%	39%
9	Efficiency in collection of water charges	90%	59%

The Ministry of Housing and Urban Affairs, Government of India, has guidelines for service delivery benchmarks and proposed frequencies of audits. Extent of non-revenue water is one out of 9 indicators.

For individual water utilities having annual budgets for water delivery services, there is good business in investing in establishing organisational capability in using a leakage management system for resilient, sustainable and reliable water supply.

Summary

Clients

- Irrigation and Water Supply Departments
- Utilities
- Private industries
- Contractors

Challenge

- Existing water supply network is not mapped, or leakages are "invisible".
- No instruments are available, uncalibrated, or they are malfunctioning.
- Missing communication about leakages and malfunctioning data transmission
- Lack of data management and analyses for water audit and water balance calculations
- Organisation lacking O&M capability or no budget available for maintenance.

Solutions

- Registration and mapping of pipelines, tanks, valves, pumps
- Instrumentation with flowmeters at strategic locations
- Leakage detection systems, through instruments, data acquisition, database management, and data analyses
- Conduct of water audit, one-time and at regular intervals,
- Active Leakage Control system as part of Leak Management System

Value

- Assume 930 MLD (million litre per day) input, NRW 51%, revenue loss 474 MLD or Rs 28.4 lakh/day assuming 6 Rs/m^3
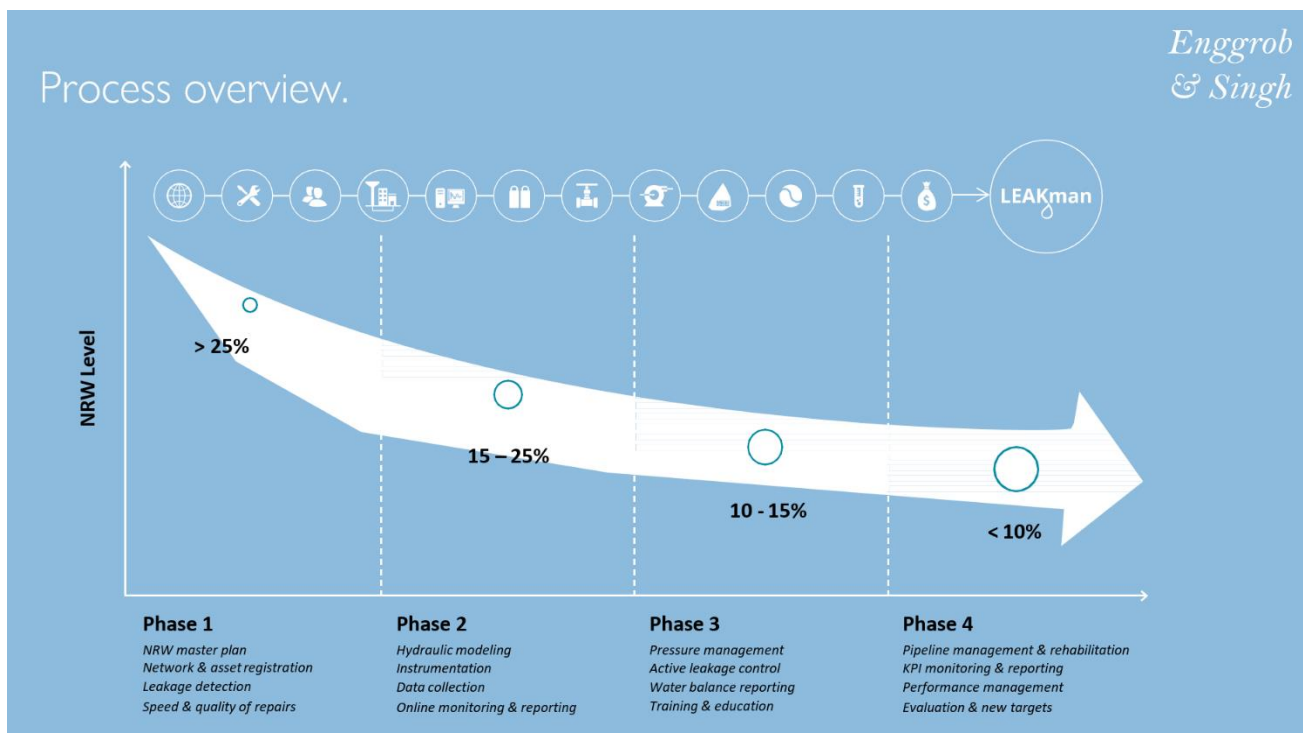- If NRW is reduced to 10%, revenue loss is only 93 MLD or Rs 5.6 Rs lakh/day*

*) *data from Bangalore*

Approach to Water Audit and Leakage Management

E&S helps setting up a strategy and master plan for instrumentation, data acquisition, data processing and analytics, and for better detection and prevention of leakage management and thereby better revenue recovery, water saving and energy pumping cost reduction.

Reducing Non Revenue Water (NRW) is a low hanging fruit.

- **Problem assessment**: Statement of the issues, initial water audit, review of current O&M procedures, existing data, organisation capacity, budget available, short- and long-term objectives, masterplan.
- **Leakage detection and monitoring**: Update and improvement of GIS maps, position and functionality of instruments, data collection, hydraulic assessment, real-time data acquisition
- **Data analytics**: Establish data management procedures, database, dashboards, quality checking, conceptual digital twin of network, advanced data analytics, diagnosis, repair and mitigation
- **Leakage management system**: Pressure management, change in O&M procedures, improve reactive repairs, setup proactive maintenance protocols, water audits at regular intervals, active leakage control with IoT sensors and dashboards for operators and KPI reports for managers

Process overview.

Phase 1	Phase 2	Phase 3	Phase 4
NRW master plan	*Hydraulic modeling*	*Pressure management*	*Pipeline management & rehabilitation*
Network & asset registration	*Instrumentation*	*Active leakage control*	*KPI monitoring & reporting*
Leakage detection	*Data collection*	*Water balance reporting*	*Performance management*
Speed & quality of repairs	*Online monitoring & reporting*	*Training & education*	*Evaluation & new targets*

E&S provides training and capacity building and makes extensive use of local experts for instrumentation and data acquisition, and international experts (like LEAKman above) for new technologies including data analytics for diagnosis, detection, and mitigation.