NRW Management

A critical step towards water security

Subhash Sethi, Chairman, SPML Infra Limited

In India, almost one third of the current population lives in cities and this will reach half the country's population in just a few decades. With increasing economic activities, population growth and rapid urbanisation are exerting major pressure on water supply, water quality and public health.

India is soon going to be confronted by a serious resource challenge. The available water resources have reduced over the years but the demand has escalated and is projected to overtake the availability very soon. Water demand will continue to grow and by the year 2025, it is expected to increase by over 20 per cent, fuelled by industrial requirements which are projected to double from 23.2 trillion litres per annum at present to 47 trillion litres per annum. Domestic demand is expected to grow by around 40 per cent from 41 trillion litres per annum to 55 trillion litres per annum while irrigation will require 14 per cent more water- 592 trillion litres per annum up from 517 trillion litres per annum currently. The Ministry of Water Resources, River Development and Ganga Rejuvenation predicts that per capita water availability will reduce by 36 per cent by 2025 and by about 60 per cent in 2050 from 2001 levels. While agriculture will remain the major water user, the challenges posed on water requirement by growing urbanisation calls for a monumental shift in response from all stakeholders.

Non-revenue water

Non-revenue water (NRW) is water that has been produced but does not generate revenue for the utility and is "lost" before it reaches the customer. Losses can be real (through pipe and network leaks, referred to as physical losses) or commercial (theft or metering inaccuracies, incorrect billing or illegal connections). High levels of NRW are detrimental to the financial viability of water utilities as well to the quality of water itself. Utilities with high NRW rates cannot provide sustained and reliable services to their customers, and often lack the capacity to fix problems or extend networks.

Most of the water utilities in the country are facing huge challenges as a consequence of increased urbanisation, higher demand, increased prices, and ageing and dilapidated distribution networks. The NRW level is quite high in Indian cities, which results in huge volumes of treated water being lost during transmission and distribution. This affects the financial health of water utilities through lost revenues and increased operational costs. A high level of NRW indicates that water utilities are poorly managed and have governance issues, lack accountability as well as the technical and managerial skills necessary to provide reliable services to the citizens.

In the West, urbanisation took place when economic conditions were improving steadily, and over a significantly longer time period. The cities were planned with adequate funds and expertise to develop the infrastructure required to manage water and wastewater along with other facilities. In contrast, the magnitude of India's increasing population and levels of urbanisation have simply overwhelmed the financial and managerial capacities of the cities, including their water supply and wastewater management systems.

NRW management initiatives

While the need for NRW management in Indian cities is important for the operational and financial health of water utilities, it is hard to understand why efforts to improve the situation have been so limited. Cities such as Singapore, Manila and Phnom Penh have successfully implemented water loss management programnes to reduce NRW to below 20 per cent levels. Indian water utilities are struggling to provide clean drinking water due to ever-increasing populations, expanding service areas and high levels of water loss. Reducing water losses is critical to efficient resource utilisation, effective utility management, enhanced consumer satisfaction, and reduction in capital-intensive capacity addition. Utilities which have initiated and sustained water loss management programmes have gained significantly in terms of financial returns and better consumer services.

The way forward

Water is paramount to human sustainability, but far too often it is wasted, polluted and taken for granted. In an increasingly complex water situation, the country's water utilities need to focus on ways to ensure more efficient water management and the adoption of new technologies for maintaining municipal water supply systems. Utilities which carefully and creatively use their water assets for strategic urban advantage will ultimately be more sustainable and competitive.

Bengaluru water loss management project

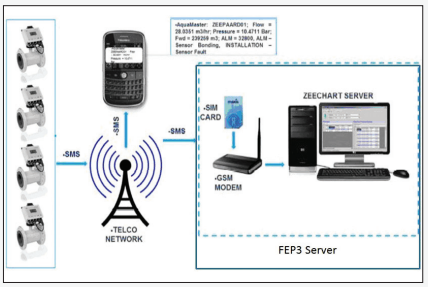
The classic example of NRW management in India is the Bengaluru water loss management project which was initiated by the Bangalore Water Supply and Sewerage Board (BWSSB). The project was funded by the Japan International Cooperation Agency (JICA) and was awarded to SPML Infra Limited in consortium with Suez. At the time of project award, the NRW level in the designated area was over 61 per cent. In a busy city like Bengaluru, executing a water loss management project in the central part was an engineering challenge due to very high traffic volumes combined with narrow streets of densely populated areas and business hubs. The project area also included areas with the maximum number of slums, which posed a tough challenge to bringing down the water loss from the existing levels to the optimum levels. With strategic planning and dedication of the team, the project has already covered major areas where 50-60 year old pipes have been replaced with new pipes, leakages have been sealed, and electronic district meters suitable for global system for mobile communication/ general packet radio service communication have been installed for measuring flow and pressure control.

By using innovative helium leak detection technology to accurately identify and locate hidden leaks in large and small pipes, NRW reduced significantly from 61 per cent at the beginning of the project to 27 per cent currently, thus saving 39.2 million litres of drinking water per day. The water saved from the project will be used to provide drinking water facilities to 110 urban settlements for which the creation of water networks is under progress in the extended colonies of Bengaluru city. Reducing water losses due to leakage has been the focus and the action taken has resulted in significant improvements. The water loss management work is still in progress and has a target to reduce the NRW rate further to an optimum level of 15-18 per cent. Once this is achieved, it will save another few million litres of drinking water every day.

IT initiatives under the project

Information technology (IT) has played a crucial role at every phase of project execution. A phase-wise elaboration of the above and its link with IT is given below.

- **Digitisation of the water network**: The design phase involves studying the existing network and digitising it using GIS software. The pipe details and specifications recorded by the software is further used for design and engineering. After digitising the existing network, it was imported into design software WaterGEMS for analysis. The data was then transferred to drawing software AutoCAD for reference and execution.
- **Design of the network**: Once the existing network is developed on GIS software platform it is then imported and analysed using InDesign software for the final outcome of the improved distribution system.
- **SCADA integration and UFW calculation**: With the formation of district metering areas (DMAs), inlets and outlets of the DMAs are installed with electromagnetic flow meters for accounting net inflow to the area. The net inflow to the area is compared with the sum of the billed volume and unbilled accounted volume and the difference between the net inflow volume and the accounted volume is termed as unaccounted for water (UFW). To calculate the UFW for 43 DMAs, all the inlet and outlet flow meters are integrated with a SCADA system through GSM-based communication technology which assesses net inflow to the DMA. Accessing all the flow meter data from single location through SCADA helps in the calculation of the net inflow for each DMA with ease. Separately, the consumption volume calculated from BWSSB's billing and collection system is fed separately for the calculation of UFW.



Architecture showing how DMA Meters communicate with the server to transmit data to the SCADA system