24x7 WATER SUPPLY, INFRASTRUCTURE, NRW, UTILITY

URBAN WATER: CURBING LOSS AND IMPROVING SUPPLY IN DELHI

By Subhash Sethi

he old adage 'Bin Paani Sab Soon' (everything will finish without water) is becoming a reality although slowly. From abundance to scarcity in a few decades, water has become the topic of every discussion.

The availability of both quality and quantity of water is vital to India's economic growth and sustainability for humans and businesses. But the changing scenario suggests that India is becoming a water-scarce country with risks of drought and shrinking groundwater reserves. By 2030, India's water demand is projected to be twice its availability, implying severe scarcity and an eventual loss in the country's GDP by almost 6%.

Clean drinking water has become a precious commodity in most parts of the

world and the same is true for India as well. With water being traded alongside gold and oil at international bourses, we can understand the value of it with future ramifications. India which had an abundance of water historically is facing a difficult challenge as over 600 million people have become deprived of a clean water supply. The average annual per capita availability of water has also reduced

THE WAY FORWARD

Given the clear benefits of 24x7 water supply in urban areas, it was clear that developing a successful project would require not only technical skills but also significant communication and social skills. Strong leadership at the government and political level is an important requirement, especially the support of decision-makers.

MVV Water Utility has demonstrated the successful example of making a 24x7 water supply project and the same could be repeated not only in different other parts of Delhi but at any large city in India as it is clear that continuous water supply would deliver significant benefits for addressing water challenges in urban centers with sustainability.



Pumping Station at Shanti Niketan, Delhi

alarmingly in a span of 70 years, from 5177 cubic meters in 1951 to 1486 cubic meters in 2021, and estimated to decline further to 1191 cubic meters in next less than three decades leading up to 2050 or maybe earlier than the estimate.

24x7 URBAN WATER SUPPLY SCHEME

The average water supply time in most Indian towns and cities may last for just one or two hours every day or maybe alternate days or it could be even less in certain locations. The quantity of water supplied by water utilities or municipalities is reducing whereas qualitatively, it cannot be consumed straight from the tap. 24x7 supplies are when water is delivered continuously to every consumer of the area for 24 hours a day, every day of the year, through a robust transmission and distribution system that is continuously full and under positive pressure with intelligent monitoring and preventive maintenance.

24x7 supply reduces the burden on water resources. Continuous supply reduces water wastage arising from overflowing storage systems and open taps. It also saves on stored household water that is discarded when a new supply comes in. Because the network is renewed where needed, it also reduces losses arising from leaks in the old pipes. SPML Infra Limited has been handling a number of 24x7 urban water supply projects in different cities that have shown tremendous results in terms of effective water loss management, efficient pumping, intelligent monitoring,



Pumping Station at West End, Delhi

and significantly better service to all consumers. In an iconic legacy of four decades, SPML Infra has executed several projects that have created a benchmark for the industry. A case study of one of its urban water supply projects in Delhi is presented here.

CASE STUDY: URBAN WATER SUPPLY IMPROVEMENT PROJECT IN DELHI

Project Description

The improvement in services levels of drinking water supply project was awarded by Delhi Jal Board to MVV Water Utility Pvt. Ltd. (Consortium of SPML Infra Limited, Tahal Engineering & Hagihon Water) in September 2012, with the scope of rehabilitation of distribution system, supplying water for over 325,000 residents of Mehrauli (Qutub, Laltanki, Bawaji, and Kishangarh) and Vasant Vihar (Vasant Vihar, Vasant Enclave, Anand Niketan, Shanti Niketan, and Westend) followed by 10 years of Operation & Management (O&M) of the water supply services.

Context and Objective

DJB wishes to enhance service delivery and improved management of water distribution by upgrading Water Supply System and Network Improvement in order to significantly reduce Non-Revenue Water (NRW), conserve energy, improve water quality and collection efficiency of revenue, and extension of water supply in the unserved areas in its jurisdiction. The growing population and increased demand for water in Delhi have put tremendous pressure on its water supply infrastructure.

To address the ever-growing demand and part of the ongoing process of developing amenities and capacity building of water distribution system, Delhi Jal Board had decided to undertake Improvement in Service Level for Water Supply in Mehrauli Project Area and Vasant Vihar Project Area, Delhi on a Design, Build, Operate and Transfer (DBOT) basis, as a project for the reduction in NRW/UFW and improvement in service to the residents through uninterrupted 24x7 water supply.

- Mehrauli area, situated in the South of Delhi, has 16,500 house service connections.
- Vasant Vihar, located in the South-Western part of Delhi, is one of the upmarket and posh residential areas in the city, having 7,400 house service connections.

MVV Water Utility Pvt. Ltd. carried out design/ engineering, rehabilitation of the existing water distribution system to deliver water 24x7, installation of flow and pressure measurement/ control devices for the management of flow and pressure within DMA, revamping/ replacement of service connections, removing illegal connections, replacement and automation of pumping systems, established 24x7 consumer complaint center for improving service levels and managing the water supply to meet the below mentioned KPIs.

Key Performance Parameters

- Continuous water supply
- Reduction of Non-Revenue Water (NRW) to 15%
- Energy efficiency
- 100% connectivity
- Timely complaints resolutions
- Improvement in collection efficiency

Key Achievements

- The water supply increased from less than 2 hours per day to 24 hours per day
- 100% new house service connections
- The distribution network was designed using the latest technology and software solutions to deliver water on a 24x7 basis, designed for the next thirty years
- New technologically advanced pumping station installed for 24x7 water distribution
- The technologically advanced and energy-efficient automated pumping system draws water from the reservoir and pump it into the distribution system as per the demand thus reducing energy consumption
- The pumping system is programmed to run the pumps in combination to meet the peak and average demands in the day and controlled optimum flow during the night
- Non-revenue water in the area is reduced from about 60% to under 10%
- All borewells have been phased out
 Smart water meters have been installed at each household
- Consistent water pressure is provided eliminating individual pumps thus reducing electricity bills

Dedicated 24x7 complaint management system with the userfriendly consumer service center to receive and resolve any complaints related to water supply, leakages, new connection, disconnection, mutation, billing & revenue, etc.

UNIQUE FEATURES OF PROJECT

24x7 Water Supply

Providing pressurized drinking water supply in the area throughout the day wherein consumers can directly draw water and use it without bothering to store it at their individual premises. The water distribution system is scientifically designed to deliver 24X7 water supplies with adequate pressure without water stagnation in the system.

Feeder Mains properly deliver the treated water into the main reservoir of DMA, then a robust, technologically advanced, and energy-efficient automated pumping system draws water from a reservoir and pump it into the distribution system as per the demand.

The pumping system is programmed to select and run the pumps in combination to meet the peak and average demands in the day and controlled optimum flow during the night. The water distribution system is always under positive pressure to meet the 24X7 water supply. The entire distribution network is programmed as demand-driven resulting in optimal utilization of resources, better demand-supply management, and is self-sustaining.

Advantages of 24x7 Water Supplies to the Citizens

- Need-based usage of water with minimum wastage
- Convenience of availability of fresh pressurized water at the tap anytime
- No water contamination leading to better health and hygiene
- No storage and pumping anxieties at customer point
- Efficient use of water infrastructure such as pumping machinery, storage reservoirs, and the distribution network, among many others.



Customer Care Center

Customer complaint management is one of the crucial responsibilities of a water utility company. MVV has established a 24x7 customer care center with state-ofthe-art customer care software, to receive, resolve and report customer complaints related to water quantity, quality, billing, and customer service connections. Once the customer complaint is received by the customer care executive, it is logged in the system and dispatched to the respective DMA manager for resolution of the complaint. The DMA manager assigns the job to the network assistant who visits the customer and investigates the complaint, resolves it, and reports back to the DMA manager along with the signed copy of the complaint resolution with the comments of the Customer. The DMA manager after the due verification dispatches the resolved sheets to the customer care executive, who after verification marks the complaint as addressed and closes it in the system. The entire process of responding, resolution, and reporting is completed within the stipulated time frame allocated for different nature of complaints by the DJB.

Pumping Station at Anand Niketan, Delhi

Pumping Machinery and Automation Skid-mounted pumping machinery is deployed for pumping water into the distribution system as per the hourly water demand derived from the mass balancing and pressure within the distribution network. The pumping machinery consists of a Jockey pump (1W+1S) used for pumping the water during the lean period and main pumps (2W+1S) are used to pump the water during the peak demand and normal average demands. The automation of the pumps is done in such a manner that the pumps are automatically switched on and switched off depending on the hourly water demand and combination of pumps to pump optimal flow as per the actual water demand. The automation has safety features such as switching off the pump to avoid dry runs and cutting of supply when the pressure within the distribution network reaches 3 kg/cm². This combination of the pumping system and automation has resulted in considerable energy saving in West End, Shanti Niketan, and Anand Niketan, where it has already been deployed and the same systems will be installed in the Vasant Vihar pump

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house soon after the approval from DJB.

KEY CHALLENGES FACED

Site Permits and Clearances Too many permissions

were required from different government agencies while executing infrastructure works which inordinately delayed the schedule. We have suggested DJB to obtain all permissions as a single-window clearance and allow the companies assigned the job to work freely. If

the permits are delayed then men and machinery will be lying idle along with schedules getting delayed.

Design Issues

Water infrastructure such as distribution network, reservoirs, pumping machinery, etc. are designed based on the general guidelines issued in the CPHEEO manual, however, during the execution and subsequent operation, it is noticed that the field data are completely different from the guidelines followed in the design and hence, additional works may have to be executed beyond the scope of works.

Limited Water Availability

Detailed Project Reports (DPRs) are made following the guidelines of CPHEEO and DJB makes necessary arrangements to cater to the bulk water demand as per DPR. Water consumption expressed as LPCD depends on the social status of the population. Affluent class citizens tend to consume more water to the tune of 250 LPCD and above as against the design norm of 150 LPCD. It creates challenges as the quantity of bulk water is not made available and the distribution



system, pumping machinery, and storage capacities are not designed to handle such a big increase in demand. Sometimes, it becomes difficult to improve service levels beyond a certain point.

Reluctance by Consumers

There is reluctance from the customers to change the water-drawn habit. The customers have built huge underground sumps (8-10 KL) capacity within their premises and they prefer to draw water into their sumps, pump it to overhead tanks and then use it.

This excess drawing of water from every household results in insufficient pressure build-up within the distribution network and also an unequal distribution of water. The customers who are far away from the pump house and at the elevated area could face a low-pressure supply and may not get water on occasion when there is a short supply of bulk water. This will add an additional burden of piping reorientation and motorized valves for the safe running of pumps within stipulated duty conditions.

Delayed Payments

The company working on the project does their project planning (material,

machinery, money, and manpower) considering that the project is implemented without any hindrance and hoping that the bills will be paid on time. If the project is delayed due to delays in getting permits/ permissions, cash flow is adversely affected leading to financial stress to the company. The client needs to look into such matters and suitably compensate for such delays to keep the project running.

Project Status The hydraulic model

of the distribution network has been

designed with the latest software, WATER GEM to deliver water on a 24x7 basis for the next thirty years. The robust distribution system with instrumentation control for better flow and pressure management has been installed, hydrotested, and commissioned. Individual House Service Connections pipelines are provided in all blocks and shifting of individual house service connections from the old network to the new network is nearing completion.

Dedicated, state of the art Customer Care Center (CCC) has already been functioning to receive, resolve and report the customer complaints such as water supply, leakages on main pipe and HSC, disconnection, new connection, mutation, billing & revenue, etc.

About the Author

Subhash Sethi is an industry veteran in the water sector, having been in the business for over 40 years and leading SPML Infra Limited. Under his leadership, SPML Infra has completed over 650 projects and currently providing drinking water facilities to more than 50 million people in the country.