

DIGITAL WATER IS THE FUTURE

WE'VE ALL BEEN WAITING FOR



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The growing scarcity of water poses a major threat to India's expanding urban population. Millions of households lack access to clean drinking water, which leads to serious health and sanitation challenges. The need of the hour is to integrate modern technologies and breakthroughs that ensure sustainability of infrastructure, operations and management for a water secure future.

"Future planning will depend upon the efficient handling of the entire water cycle using modern technologies and best practices. At the same time, it will be essential that necessary technologies, capabilities, processes and practices are made available on the required timescale."

Over one-third of the population in India is living in cities and the urbanisation trends are quite faster than any planning. While city dwelling units continue to grow, it may be a matter of a few more years when half of our population will be living in cities. This change of living standards has already started putting tremendous pressure on water supply services in urban India. The existing water infrastructure in most cities is very old, having aged and rusting pipelines that are well beyond their useful life cycle but still in use.

These service networks of water supply are often breaking and constantly leaking that not only interrupts the normal supply but also drives up the costs for water utilities across the country. The traditional water resource in India is being confronted with a serious challenge and over 600 million people in the country have started facing severe water scarcity. Many large cities in India have been affected by a shortage of water. The situation is deteriorating faster than any assumptions and it is projected that more than 40% of India's population will have no access to clean drinking water facilities by the year 2030.

Water Demand

India with its sheer size, population and agriculture practices uses more water than many other countries and it is also one of the largest freshwater users in the world. Around 65% of India's total water demand is for groundwater which plays an important role in shaping the nation's economic and social development.

Agriculture, domestic and industrial use, respectively, comprises India's largest users of water. Therefore with growing demand for water and depletion of the available water, assured supply of good quality water is becoming a growing concern.

The 2030 Water Resources Group (WRG) report predicted that by 2030, the gap between demand and availability of water in India will be 50% with the demand touching about 1500 billion cubic metres (BCM) and availability approximately around 750 BCM. This growing demand-supply gap will have serious implications on the accessibility of water across the industrial, domestic and agriculture sector.

The stress on scarce water supplies is widening and according to the Niti Aayog, 21 major cities are racing towards zero groundwater levels and nearly 600 million people in India have already started facing extreme water distress. Big cities like Chennai, Mumbai, and Delhi face a regular water crisis, especially during summers.

In the country, there are almost 135 million households that still lack access to clean drinking water facilities at their premises. And this is the highest number of people lacking the basic facilities as per the report by the United Nations. The government of India has realised this major issue and the initiatives taken under the Jal Jeevan Mission to provide 'har ghar jal' (water to every household) is an ambitious plan to provide clean drinking water to every household in the country with functional tap connections.

Along with Jal Jeevan Mission, Government has also initiated a massive housing scheme that intends to provide housing for all in urban areas by the year 2022 under the flagship program of Pradhan Mantri Awas Yojana (PMAY) that envisage building about 20 million houses in the

country. The schemes aimed at developing cities and towns as 'new engines for growth' will entail an investment of over Rs. 3 trillion (3 lakh crore) in the next five years.

There is a greater need for smart water management, especially under PMAY and the Smart Cities Mission. The studies suggest that cities and towns around the country use only about 50% of the supplied water for their domestic and commercial purposes and the rest half of the water is lost through leakages, theft and wastage. Even out of that water being used, 80% gets generated as municipal sewage from the households. With water scarcity becoming real and threatening the livelihood of millions of people, it is critical to measure the consumption at all levels to check negligent water usage. It is estimated that by 2030, India's water demand will be twice the availability implying severe water scarcity for millions of people and eventually losing almost 6% of the nation's GDP.

Technological Intervention in Water

In the last few decades, information technology and digital innovation have changed the business scenario in different segments and the water sector has also got its share of digitization. Internet, software code and cloud-based business applications that have matured over the last two decades are enabling water companies and utilities across the globe with robust analytics, real-time dashboard, and cellular sensor technologies that allow data to feed into any modern application for timely decision making.

As more modern and integrated technologies are adopted in the water industry, sustainability of infrastructure, operations and management are becoming easier. The technological intervention is helping to mitigate risk because operations can better manage, measure and track all that needs to be captured to ensure compliance and efficiency, shifting the operation mode from reactive to

proactive. Big data and analytics technology are helping to harness the huge data coming from a growing number of resources. This means water companies are benefiting from early indications of quality issues, abnormal consumption, reliable fault detection to determine when there is a leak, and optimised customer interactions. A truly smart distribution network goes beyond the meter to provide greater compliance and demonstrate true return on investment, acting in a proactive, rather than reactive manner.

Smart Water Management

There can be no denying that the future of water is digital. It is the need of the hour for India to rapidly evolve and develop an integrated approach around a smart water management system to mitigate the impending crisis. Some of the topmost initiatives that require on-ground implementation are the following:

- Smart water infrastructure for real-time monitoring - Adopting smart water infrastructure and management would mean non-revenue water reduction, smart real-time monitoring, smart metering at various levels that will ensure a reduction in transmission and distribution losses and a water conservation plan pre-mandated for careful and frugal water use.
- Water loss management – India has amongst the largest non-revenue water in the world and a huge amount of treated water is lost in distribution networks. Water loss is a big challenge as it is not only costly for utilities to manage but at the same time, it highly increases the chance of water contamination. Technology and electronic instruments such as pressure and acoustic sensors, telemetry units and control system connected wirelessly with cloud-based monitoring systems create real-time information

on leaks with a precise location that allows utilities to detect and seal the leaks in distribution networks quickly and precisely. By using IoT water flow meters, the water utilities can monitor their water distribution network effectively.

- Rationing water consumption - Smart water meters help in tracking individual consumption and hence helps individual to be conscious of consumption and limit usage to contain their water bills. Water utilities in the country require to empower customers with near real-time information on their water consumption to encourage better water-saving habits and encourage behavioural change towards conserving water.
- Encourage water conservation - Smart water meters are innovative solutions to measure the exact quantity of water consumed by a household so that each home is billed according to water usage, ultimately helping residential housing societies and high rises to avoid water wastage.
- Dynamic water billing - smart water meters with IoT supports a two-way interaction between water distributors and end consumers. This means that the water supplier can monitor the consumption of individual houses that are connected to its network in real-time. Hence, the need for sending a person to take onsite meter readings every month for billing end consumers is eliminated.
- Energy efficiency through automation - Huge energy savings can be made possible by controlling pumps and other equipment using variable speed drives and automation. Since water pumps typically run at partial load, huge energy savings can be

achieved by controlling their speed with variable speed drives (VSDs). The power required to run a water pump is roughly proportional to the cube of the speed, i.e. a small reduction in speed can make a big reduction in the energy consumption. A water or wastewater pump running at half speed consumes as little as one-eighth of the energy compared to one running at full speed. By employing VSDs on pumps instead of throttling, the energy bill can be reduced by as much as 60%.

- Artificial Intelligence and Machine Learning helping in Asset Management - artificial intelligence and machine learning solutions can help in analyzing which parts of the supply system are most likely to fail and which of those failures will have the biggest consequences in the ageing infrastructure thus identifying where the spending should be focused on and can improve their asset management through a budget and workforce optimization.
- Artificial intelligence (AI) – offers water utilities the potential to enhance service delivery, optimize investments, and reduce costs. It can improve the efficiency of water supply systems by maximizing the information and data available to make better operational and planning decisions.
- Big data and analytics technology - helping to harness the explosion of data coming from a growing number of resources. This means water companies are benefiting from early indications of quality issues, abnormal consumption, reliable fault detection to determine when there is a leak, and optimised customer interactions.
- Automation and robotics - utilities can also redesign work processes to

make them more efficient. Robotic lab analysers can test two to three times more samples than human operators in the same amount of time, and allow analyses to be carried out around the clock to keep a strict check on quality parameters.

- Desalination - with freshwater disappearing from the earth surface, the solution remains is to desalinate the abundantly available saline water for consumption by using reverse osmosis technology. Several new innovative engineering solutions are now available to treat saline water to a potable level with the help of technology and processes.

- Smart irrigation – this is especially needed for a country like India, where irrigation consumes almost 80% of freshwater. Low efficiencies with significant wastage have contributed to the water crisis. A sensor-based solution for smart and on-demand irrigation helps to measure water requirements in plants to make sure they get just enough water for the best produce thus effectively lowering the

water usage in agriculture.

- Hydraulic Modelling 2.0 - It is a new network analysis approach that encompasses the joint application of several methods to provide a dynamic, probabilistic representation of water distribution networks. It is the way forward for water utilities to embrace AI or machine learning at the core of their planning and operations. It represents a qualitative step forward compared to the conventional Hydraulic Modelling 1.0 currently being used.

A truly smart water distribution network goes beyond the meter to provide greater compliance and demonstrate true return on investment (ROI), acting in a proactive, rather than reactive, way. It can reduce leakage, build greater resilience; create better customer experience; improve CRI; increase optimisation; improve asset life; reduce the risk to water security; and decrease the overall carbon footprint.

Key to meeting these challenges requires planned efforts in many ways

in which water use, future needs and sustainability with treatment and reuse could be addressed. To ensure optimal water supply and demand management in future cities where freshwater sources may be insufficient to keep pace with population growth, prudent will be to use water more efficiently and cut overall demand. Above and below the ground infrastructure needs careful assessment and revamp in line with the growing demand. Future planning will depend upon the efficient handling of the entire water cycle using modern technologies and best practices. At the same time, it will be essential that necessary technologies, capabilities, processes and practices are made available on the required timescale.

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