

# Encouraging Progress

## New schemes and technology advancements in the sector

There has been a growing government focus on the water and waste sectors in recent years. A number of big-ticket programmes have been launched to bridge water supply gaps, improve access to clean drinking water, encourage water conservation and reuse, and develop a robust sewage infrastructure. Schemes such as the Jal Jeevan Mission, AMRUT 2.0 and the Swachh Bharat Mission (SBM) are progressing well and have opened up opportunities for private sector participation. That said, there are still several challenges that require attention. Industry experts comment on the performance of the sector during the past year, the key challenges faced and the future outlook. . .

### What has been the progress in the water and waste sector over the past year?

#### Abhaya Krishna Agarwal

The government has played the role of a facilitator in developing the water and waste sector.

- Under the Jal Jeevan Mission (JJM), the Andaman & Nicobar Islands, Goa and Telangana have achieved the 100 per cent target of providing a functional tap water connection to every rural household, and 70 million rural households have been connected with the piped water facility.
- Circular economy action plans are being developed for 11 categories of waste by committees constituted by NITI Aayog.
- Waste management infrastructure in the states/union territories is being strengthened through the SBM.
- The use of technology in the management of wastewater services has also increased. ULBs are introducing online platforms. Under AMRUT, many municipal functionaries are trained.
- To address the possibility of acute water shortage in the future, industries have also started initiating efforts to utilise water judiciously. Many industries are trying to install captive ZLD plants. Chennai, Delhi, Mumbai, Hyderabad, Nagpur, Bengaluru, Surat, etc. have implemented wastewater reuse projects for industrial and non-potable applications and have witnessed a reduction in dependence on fresh water for purposes where treated water can be used.
- Under the national groundwater program-



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me, Atal Bhujal Yojana, the government is working towards improving groundwater management. The programme is implemented in 9,000 gram panchayats across seven Indian states.

- The water resources monitoring system is now being expanded to cover the entire country, including the Indus, Ganga and Brahmaputra-Barak river basins.
- The Fifteenth Finance Commission in its report for 2021-26 has earmarked 60 per cent for national priorities such as drinking water supply and rainwater harvesting and sanitation, out of the total grants earmarked for Panchayati Raj Institutions.

All these initiatives clearly depict the commencement of the process of creating awareness among communities.

#### Sourav Daspatnaik

We would first like to separate the segments of water and wastewater. Under the JJM-Rural

drinking water projects, states have taken up schemes at both single- and multi-village levels in a big way. Some of the leading states are Uttar Pradesh, Karnataka, Rajasthan and Gujarat, which have increased their spend and coverage through faster implementation of JJM-rural projects. The north-eastern states will be benefited immensely from the scheme. The urban areas under AMRUT 2.0 have also embarked upon the augmentation of the existing infrastructure.

The progress in terms of technology has been very encouraging, especially the use of new membranes and new-age materials such as graphene and ceramic membrane becoming mainstream. New applications are used in the adsorptive process for the removal of contaminants from water. Internet of Things (IoT)-based applications are also coming on stream for utilities. Besides, sludge management and odour control for STPs in metros are huge challenges for modern cities. This is one area

where India can adopt more advanced technologies for better management of discharge, sludge and odour control.

#### **Arun Lakhani**

The water sector is seeing a lot of positive movement and giving hope for a brighter future. Many states such as Uttar Pradesh, Odisha, Madhya Pradesh have taken the lead in JJM-rural water supply schemes. Projects worth more than Rs 1 trillion have been awarded in these states and are at different stages of execution. AMRUT 2.0 is also seen picking up pace in various towns. Project management consultancy contracts have been awarded for various projects along with a few execution contracts. The wastewater sector, however, needs a little more push. These are a part of sensitive ecological issues, which need to be tackled on priority. National Mission for Clean Ganga (NMCG) projects have gained momentum. Hybrid annuity mode (HAM) projects have been awarded under the mission in Bareilly, Ayodhya, Maheshthal, Agra and Meerut.

#### **Subhash Sethi**

Water availability defines the economic growth of a nation. The SDG6 goals promulgated by the United Nations call for ensuring access to water and sanitation for all by 2030. In line with this, the Indian government is working towards providing clean drinking water facility to all households in the country through dedicated schemes. There has been an increase in the access to water supply in urban India, from only 48 per cent in 1990 to almost 96 per cent in 2021.

The flagship scheme of JJM has connected an additional 67.6 million rural households with functional tap water connections since its launch in 2019. The scheme is being implemented in mission mode, and as of August 15, 2022, all households in 75,073 panchayats spread across 157,275 villages of 113 districts in the country have been covered under the scheme. The coverage of tap water connections on a pan-India basis has reached 99.95 million rural households out of a total of 191.46 million in the country, thus covering 52.2 per cent.

In August 2021, the government along with

“To address the possibility of acute water shortage in the future, industries have started initiating efforts to utilise water judiciously.” **Abhaya Krishna Agarwal**

the Central Water Commission and 10 participating states signed an agreement with the World Bank for a \$250 million project support for a long-term dam safety programme to improve the safety and performance of about 120 dams across Chhattisgarh, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Rajasthan and Tamil Nadu, as well as at the national level. These apart, there are several water security and infrastructure development schemes for water source augmentation, groundwater recharge, rainwater harvesting and irrigation with technological innovation, as well as NMCG for the construction of municipal and industrial wastewater treatment plants across several states.

#### **What has been the impact of the key initiatives taken by the government?**

#### **Abhaya Krishna Agarwal**

The key initiatives taken by the government are the JJM, the Jal Shakti Abhiyan, the Atal Bhujal Yojana, the Har Khet Ko Pani component of the PMKSY, AMRUT, SBM, Per Drop More Crop scheme, the National Aquifer Mapping and Management programme, and campaigns such as “Catch the Rain” and “Sahi Fasal” under the National Water Mission. These initiatives have given a push to water conservation by incentivising stakeholders, igniting brainstorming that leads to efficient water and waste sector infrastructure management, designing water security plans, initiating the development of efficient monitoring tools, reducing costs and providing access to funds to implement projects, etc.

#### **Sourav Daspatnaik**

The major flagship programmes under the gov-

ernment include the SBM, with a focus on ODF++, JJM and AMRUT 2.0 for urban water, the NMCG for river rejuvenation and cleaning of Ganga and tributaries. The SBM with a focus on ODF++ initiated the need for sludge management and reuse and recycling of water, which has paved the way for the deployment of new technologies, both global and homegrown. As we expect the market to grow, the per unit costs shall become more affordable and economical. It is expected that the reuse, recycling and localised and decentralised treatment of water will give rise to demand for recycled water.

JJM-rural will be a major game changer in providing functional house service connections across the country. Meanwhile, the NMCG is progressing well and similar initiatives must be taken to clean other national rivers as well.

#### **Arun Lakhani**

The JJM will change the life of the rural population in a big way. Access to clean drinking water is a start of a positive cycle, which ultimately encompasses health, family well-being, social harmony, etc. Further, as a result of the various projects kicking off, the demand for pipes and meters has increased, adding to manufacturers and small contractors in rural areas are getting work, which is leading to large-scale rural employment generation.

#### **What are some of the key emerging digitalisation trends in the sector?**

#### **Abhaya Krishna Agarwal**

To achieve water resilience, digitalisation is one of the important pillars. To start with, digitalisation will help maintain a database of water- and wastewater-related assets, enable digital billing,

“The market for recycled water is yet to gain momentum.” **Sourav Daspatnaik**

“The Jal Jeevan Mission will change the life of the rural population in a big way.” Arun Lakhani

provide monitoring tools for quality and quantity of water, warning systems, etc. The emerging trends in this area revolve around:

- Conserving water resources
- Building resilience
- Efficiently managing water and sanitation services
- Strengthening enablers for water security, etc.

The trends may include connectivity, wherein customers can use apps to derive information on water quality; monitoring usage; technologies for pre-emptive and predictive maintenance in water infrastructure; digital solutions to address the inundation of riverine and coastal infrastructure; smart metering; energy saving sensors; smart irrigation including satellite remote sensing-based irrigation monitoring and decision-making platforms; operational intelligence for water and wastewater utilities to reduce losses, assess network health and improve revenue; etc.

#### Sourav Daspatnaik

The potential of such solutions depends on the push from key government programmes and the willingness of the executing agencies. In the urban space, GIS-based solutions, instrumentation in the area of metering, SCADA, leak detection solutions, billing and customer grievance systems are some examples. There is a need for converting intermittent networks into 24x7 water networks with the conversion of networks into district metering areas. This will require refurbishment of the network to handle the electromagnetic or ultrasonic flow meters. Most Indian cities have high non-revenue water (NRW) and this is an area where last-mile connectivity and IoT-based metering will help in automated meter reading and accurate billing. Large metros will need to migrate from mechanical to auto-

mated meter reading (AMR) and advanced metering infrastructure (AMI). In the area of emerging rural water schemes, gigawatt-level sensors, metering solutions, chlorine analysers, pressure sensors, remote terminal units, edge devices and energy sensors, and pump controllers can be used. However, one must be careful of digitalisation without proper infrastructure.

#### Arun Lakhani

The Digital India campaign is touching every sector in India. In the water and wastewater sector, SCADA is becoming an integral part of water supply as well as treatment projects. IoT is another technology gaining traction in water projects. Online quality monitoring and online bill payments have become a norm for water utilities. Digitalisation is also helping improve distribution efficiency by way of automated valve operations using actuators. Under the Smart Cities Mission programme, many towns are implementing SCADA and automation.

#### Subhash Sethi

Smart solutions powered by artificial intelligence (AI) and machine learning help in smart asset management by analysing the probability of failure in ageing infrastructure, thereby identifying areas that need improvement and repair. It helps in improving the life and efficiency of the asset through timely intervention. Automation and robotics help to fine-tune work processes for greater efficiency. Robotic lab analysers test two to three times more samples than human operators and allow analysis to be carried out round the clock. This helps keep a strict check on various parameters concerning the quality of water.

Adopting smart water solutions such as smart metering and smart leak detection would help in reducing NRW through real-time mon-

itoring to ensure a sizeable reduction in transmission and distribution losses. Electronic instruments such as pressure and acoustic sensors, telemetry units and control systems connected wirelessly with cloud-based monitoring systems generate real-time information on leaks with accurate location details so that they can be detected in the distribution network quickly and precisely. Big data and analytics techniques help in harnessing the data coming from different sources and provide early indications in areas such as quality, abnormal consumption, reliable fault detection and optimised customer interactions. Drones can be used for efficient execution and monitoring. Smart end-to-end water networks offer the opportunity to improve productivity and efficiency while enhancing customer service.

**What are the key challenges that remain un-addressed?**

#### Abhaya Krishna Agarwal

The efficient reuse of treated wastewater needs detailed management planning. Steps need to be taken to ensure better coordination between different agencies dealing in urban development, water resources, agriculture and environment works and there is a need for detailed policies across all sectors to initiate the reuse of wastewater on a large scale across India. Uniform water tariff is also a critical element, which can improve water use efficiency. The development of well-structured PPP projects and innovative financing options is crucial in this sector.

#### Sourav Daspatnaik

Water and wastewater are a state subject and local delivery to the people is based on several political considerations. The tariff and revenue model for water infrastructure is yet to mature on the lines of power sector reforms. There is a need to have a water regulatory mechanism to look into tariff and infrastructure utilisation.

Investments in water and wastewater infrastructure are considered to be long-term.. The water infrastructure sector is yet to be defined clearly as a sector by the Reserve Bank of In-

“We need to consider an integrated approach to water supply and wastewater management.” Subhash Sethi

dia. As a result, it does not always qualify under the infrastructure lending norms, often leading to anomalies in lending terms. The refinancing of delayed projects is always a challenge in view of the data of commencement of commercial operations norms. Furthermore, in HAM projects with grants from the government and private sector investment, the assets are not considered bankable due to the lack of adequate security with only revenue collection account treated as security.

The efficient use of water is yet to be monitored in the industrial and municipal sectors, and NRW is not yet being monitored in most urban cities due to the non-availability of a tariff model and lack of monitoring. This creates financial stress on government asset owners or ULBs with inadequate funds for upgradation and maintenance. It is time to consider the PPP model for asset utilisation, monitoring, and upgradation and refurbishment. The market for recycled water is yet to gain momentum due to the lack of networks for channelising the recycled water to consumers and also incentives for using the same. That said, we have seen a perceptible increase in the use of recycled water for power plants.

#### **Arun Lakhani**

Amidst all the new opportunities and trends, there remain some challenges. The quality of DPRs, for instance, has huge scope for improvement. Further, right of way and land availability are a few more age-old challenges, which often lead to unreasonable delays in project kick-offs and, in some cases, irrelevance or obsolescence of the project. Additionally, overall bid evaluation takes very long and there is scope for improvement of the same.

#### **Subhash Sethi**

Water supply management is a challenging task. We need to consider an integrated approach to water supply and wastewater management. There is a need to devise a sustainable way of augmenting water supply such as wastewater treatment with complete reuse facilities for non-potable purposes. Innovative technology adoption in the water sector is still at a nas-

cent stage and adequate financial resources are needed for building better water and wastewater infrastructure. Amendments are needed in the National Water Policy (2012) to promote the reuse of treated wastewater and reduction of groundwater extraction. Increased technical and financial assistance should be provided to water utilities to manage water supply and wastewater treatment. A national regulatory framework and institution must be created to oversee the management of water resources and resolve disputes related to availability and pricing of water on a pan-India basis.

#### **What is the sector outlook for the next one to two years?**

#### **Abhaya Krishna Agarwal**

The outlook for the water and wastewater sector is positive and it is expected that there will be more opportunities for various stakeholders including EPC players, private developers, consultants, and technology and equipment suppliers. The key areas may be digitalisation in the water and wastewater sector, development of PPP opportunities, efficient monitoring of infrastructure and data analytics. Significant efforts will need to be made towards community involvement, gender equality and social inclusion.

The future will demand stronger coordination and collaboration amongst stakeholders in the water and wastewater industry. There will be enhanced strategic investments to improve climate change resilience. One of the important developments will be the ability to do more with less.

#### **Sourav Daspatnaik**

Post the pandemic, there is a renewed focus on the water and wastewater sector. We believe that JJM-Rural drinking water will be a game changer in terms of delivering clean drinking water to village households. This will also require stable power at the village level, management of grey and black water through scientific methods instead of the current no-solution approach. Source sustainability and recharging of groundwater also need to be areas of focus. We believe decentralised technologies for the

treatment of water and sludge will be encouraged. Smart measurement, network monitoring, NRW reduction, leakage detection, etc. are major areas of opportunities. However, it is most important to rejuvenate and upgrade the existing water infrastructure instead of only focusing on developing new capacities.

There is a huge market potential for digital solutions in urban drinking water, wastewater and rural water, and the next round of modernisation and upgradation of assets is necessary to keep up with the new standards for quality and reliability of plant and machinery.

#### **Arun Lakhani**

AMRUT 2.0 will positively impact water supply in urban towns. JJM project execution will also gain traction, which will put some stress on material and labour availability. More desalination/UF-RO-based projects are also expected. The NMCG is launching new set of projects in coming time, which will have a positive outlook.

#### **Subhash Sethi**

The opportunities in the water sector, especially under the JJM, are very promising for the next few years. The government is investing comprehensively in water-related projects, including urban and rural water supply schemes, water resource management programmes, groundwater augmentation, watershed development and irrigation projects. Dedicated schemes such as JJM-rural with a Rs 3.6 trillion budget up to 2024, JJM-urban with an exclusive budget of Rs 2.87 trillion for the duration of 2021-26, and the Namami Gange programme with a Rs 200 billion budget are some of the flagship programmes that will continue for a longer period. There are other schemes such as the Pradhan Mantri Krishi Sinchayee Yojana - Har Khet ko Pani, Dam Rehabilitation and Improvement Project Phases II and III, National River Linking Project, Atal Mission for Rejuvenation and Urban Transformation for five years up to 2026, National Hydrology Programme and Atal Bhujal Yojana that promise better prospects for water infrastructure development companies, pipe and pump manufacturers and contractors for the next few years. ▀