Wasting waste

By failing to recycle and reuse wastewater, India is losing out on a huge opportunity to minimise its acute water shortage

BY IMRAN MIRZA

ewater

Even as India continues to look for ways and means to mitigate its water woes, millions of litres of wastewater generated across cities and rural areas generated every day, which can be treated and reused for various applications, is dumped untreated into the rivers and seashores of the country.

Discharge of untreated sewage in water bodies is among the largest causes of water pollution in India. As per the latest estimates, about 38,254 million litres per day (MLD) of wastewater is generated in urban India comprising Class I and Class II cities. The municipal wastewater treatment capacity developed so far is about 11,787 MLD that is around 30 per cent of the generated wastewater. Twenty seven cities have only primary treatment facilities and 49 have primary and secondary treatment facilities. The level of treatment available in cities with existing treatment plant varies from 2.5 per cent to 89 per cent of the sewage generated.

Thus, there is a large gap between generation and treatment of wastewater in India. Central Pollution Control Board (CPCB) studies describe that there are 269 sewage treatment plants (STPs) in India, of which, only 231 are operational. The existing treatment capacity is just 21 per cent of the present sewage generation. Even the operational plants are not functioning to their design capacity.

Aerial view of the 240 MLD sewage treatment plant at Ahmedabad, Gujarat, built by SPML

Operation and maintenance of existing plants and sewage pumping stations is also not satisfactory, as nearly 39 per cent plants do not conform to the general standards prescribed under the Environmental (Protection) Rules for discharge into streams as per the CPCB's survey report. In a number of cities, the existing treatment capacity remains under-utilised while a lot of sewage is discharged without treatment in the same city. "Wastewater management in India has started picking pace only over last decade and a half. India is lagging behind by two decades as compared to developed nations in Europe, North America and Far East Asia," states RR Prasad, business head, Eureka Forbes Limited.

"The status of wastewater generation and treatment capacity developed over the decades in urban centres is insufficient and unsuitable," says Rishabh Sethi, executive director, SPML. With the population increase, demand of freshwater for all uses will become unmanageable. It is estimated that the projected wastewater from urban centres may cross 120,000 MLD by 2051 and that rural India will also generate not less than 50,000 MLD by that time given the government plans and development in water supply infrastructure and designs for community supplies in rural areas.

While wastewater treatment appears to be an ideal solution to minimise India's water problems, the country would have to do much more than setting up sewage treatment plants (STPs) to reach there. Unlike other developed countries, India lacks basic sewage infrastructure in most of its cities, except the top metros such as Mumbai and Delhi. The situation in tier I and tier II cities is far from ideal for setting up municipal STPs. There is no proper sewer collection network. Only about 46 per cent of the total urban population is connected through sewer networks for sewerage disposal. "If wastewater management has to pick up in a big way, the government must look at building decentralised water treatment plants in smaller rural areas for communities and villages," says David McMillan, general manager, sales, Grundfos India.

India's per capita availability of water has gone down from 5,177 cubic metres in 1951 to 1,544 cubic metres in 2011

So, India will have to first get its cities and upcoming urban centers connected to the sewage network. This would require laying of nearly 200,000 km of new sewer lines according to estimates by Frost & Sullivan, calling for an investment of billions of rupees.

Some believe that PPP would be the best model for wastewater projects as it would give the government the financial muscle and technical expertise to execute such projects. However, considering the state of other PPP infrastructure projects, the government would find it difficult to find a partner. "The concern remains whether wastewater projects are of the type that would generate operating revenues, or realise a financial return on the project investment," explains Sethi. Considering the Indian scenario, where water is available

virtually free of cost, it remains to be seen how wastewater projects would become financially viable. Unlike in the case of industrial consumers, who can be asked to pay more for their water consumption, billing higher charges for residential and agricultural users is a huge political risk, which no local or state government might be willing to take, at least for now.

In recent decades, compliance with Government wastewater quality requirements has been the primary driver of industrial wastewater treatment programs in India. An industry should abide by the Government wastewater quality requirements for the specific concentration limits of the wastewater discharged. The Zero Liquid Discharge (ZLD) or Zero Discharge (ZD) Policy has been drafted by the Ministry of Environment and Forest (MoEF) and Central Pollution Control Board (CPCB), which urges industries to strive for ZLD status. The implementation of this Policy is the responsibility of the respective State Pollution Control Boards (SPCBs). "Currently, only a few states and specific industrial users like petroleum refineries, chemical and petrochemical plants, textile and automobile manufacturers and breweries are mandated to achieve ZLD status," shares Sethi.

120,000 MLD
PROJECTED WASTEWATER FROM URBAN CENTRES BY 2051

Storage tanks at a wastewater plant

INNOVATIONS IN WASTEWATER MANAGEMENT

De-centralised treatment plants: These are treatment plants specific to small communities/condominiums/ buildings and are not connected to the main wastewater treatment system. They remove flow from nearby sewers to produce reclaimed water close to the use area and thus avoid laying of pipelines and pumping systems to return the reclaimed water to the use areas from central treatment plants.

Membrane separation technologies: It involves the separation of liquids from solids using ultrafiltration, microfiltration or reverse osmosis technologies. The water produced is so clean that it is potable, though most of the applications of reclaimed water are for grey water and irrigation use. These technologies are becoming increasingly popular as the costs of membranes are showing a downward trend.

Biodiesel from fats, oil and grease in waste water: fats, oil and greases are collected from wastewater and converted to biodiesel through esterification and hydrogenation.

Electricity and heat from co-generation: Biogas fueled co-generation systems allows wastewater facilities to utilise energy from treatment process itself. Co-generation produces electricity and hot water from biogas, a naturally occurring byproduct of sludge dewatering. The electricity produced can be used to supply power to anaerobic digesters in the plant thereby offsetting electricity purchases.

Electricity from sewage powered fuel cells: methane from sludge dewatering plants can be converted in biogas or to hydrogen which can be used in direct fuel cells.

Water source heat pumps: Water-source heat pumps are being used in Japan to extract residual heat energy from wastewater, after treatment and before discharge by outfall. Similar heat extraction technology is now being developed for extracting heat from wastewater in sewer pipelines. Wastewater temperatures average around 16 degrees Celsius. This heat can be used as an energy resource.

The maximum demand for industrial wastewater treatment comes from petroleum refineries being the most water intensive process. "Other Industrial processes that produce a lot of wastewater are paper, pulp and steel production industries, and most of them have developed processes to recycle water within their plants, before they could be reused or disposed," says Sethi. While it make sense for government to impose strict ZLD guidelines on industries to ensure they utilise water efficiently, experts believe it must focus its policies and resources on getting basic wastewater management systems for municipal purposes. India still has a long way to go when it comes to ZLD technologies. While companies like Grundfos are bringing the products and technology required for ZLD, it would make sense for the government to prioritise basic wastewater recycling at the moment.

Besides building the infrastructure, it is essential to sensitise people about the importance of wastewater management. "The system can succeed only by education and knowledge dissemination. Hence, there is an urgent need to introduce topics on wastewater management and water conservation in the syllabus of primary and secondary schools across the country, and there is also a need to run workshops for administrators to become aware of the urgency to implement wastewater management systems in a big way," says Prasad of Eureka Forbes.

Till then, we would have to live by the philosophy: waste not, want not. CW