

Recycle of sewage and industrial effluent is an effective, dependable and economical way of solving the problem of perennial water shortages. Water recycle helps conserve vast volumes of water, while protecting the environment by reducing pollution. It reduces dependence on unreliable/insufficient water supplies while drastically cutting down on expenses on municipal/raw/tanker water. Ion Exchange has installed recycle systems at a large number of industries, hotels, residential and commercial complexes, and our customers have gained a good payback on their investment, as will be seen from cases cited below.

Water Sufficiency with Sewage Recycle

A major problem facing hotels, housing and commercial complexes is availability of regular water supplies and many today are dependent on tanker or borewell water. Sullage (grey water from bathrooms and kitchens) and sewage can be treated and recycled for toilet flushing, gardening, vehicle washing and other such low-end uses. This reduces the requirement of fresh water by 60 per cent, while making more fresh water available for drinking, cooking, bathing and laundry.

Sewage Recycle with MBR at ITC Maurya

The membrane bio-reactor (MBR) is emerging as the technology of choice for treating waste water for reuse; it produces a very high treated water quality and effectively combines biological and separation processes, thus eliminating the need for secondary clarification after aeration as well as for tertiary treatment.

Ion Exchange has supplied and commissioned an 800 m³/day MBR for sewage recycle at ITC Maurya, Delhi.



In 2007, the ITC-Welcomgroup entered a new phase in its collaboration with Starwood Hotels & Resorts, with an exclusive tie-up to bring in the Starwood premium brand, *Luxury*, to India. The makeover to luxury class started with ITC Maurya - the flagship hotel of the chain which receives VIPs from all over the world including the President of the USA.



In keeping with ITC's eco vision, the renovation included environment friendly features, with zero discharge by recycling over 800 m³/day waste water as a prime initiative.

The treated water will be used for the cooling towers, toilet flushing, horticulture and laundry as well as to maintain the 'Buddha Jayanti Park' (an ITC corporate social responsibility initiative).

Factors that played a key role in the award of this contract to us were our experience, capability, back-up service and local presence. Also, our pilot units at various locations including Delhi, our many full scale installations in India and our proposal to incorporate flat sheet MBR modules with their many advantages in terms of cleanability of membrane surface, over the competing hollow fibre modules.

Sewage Recycle at HCC's 247 Park Conserves 350 m³/day Fresh Water

Ion Exchange has installed a 400 m³/day MBR for sewage treatment and recycle for the zero discharge, Leed-certified Green Building at HCC's 247 Park.

This corporate park houses 247 offices and more than 6000 professionals, as well as several banks, retail outlets, food courts and restaurants, and a gymnasium.

Located at the upcoming IT hub at Vikhroli, Mumbai, it is a project of HCC Real Estate Ltd., a wholly owned subsidiary of Hindustan Construction Company.

The water requirement for flushing, gardening and cooling tower makeup is 350 m³/day.



The MBR treats and recycles the sewage which can be used for secondary purposes, conserving 350 cu.m fresh water per day. With tanker water costing Rs. 50 per cu.m and a daily saving of 350 cu.m water, the payback period is just 26 months, after factoring in the capital and operating costs of the MBR.

Management of sewage generated from residential and commercial complexes is gaining importance from the point of view of both sanitation and water conservation. Sewage is now being looked upon as a consistently available, alternate source for water for specific uses – because as long as water is used for various domestic purposes, sewage will be generated. That sewage is available at the point-of-use is another advantage, thus making its decentralised treatment a win-win situation.

While selecting the treatment technology, the following points need to be kept in mind:-

- ✓ End use pattern of treated sewage
- ✓ Capital and operating cost
- ✓ Area availability
- ✓ Reliability
- ✓ Location
- ✓ Amount of sewage.

If the quantity of sewage to be treated is quite high, fluidised media reactor technology may be the best.



Fluidised media reactor (FMR)

Here, while the capital cost is lower, the quality of treated sewage is not as good as that obtained with the MBR system. The recycled water is suitable for low end purposes such as flushing, gardening and in some cases, even as cooling tower makeup, after appropriate tertiary treatment. For treatment of smaller quantities of sewage such as



Membrane bio-reactor module

in small housing complexes, compact sewage treatment plants are more suited.



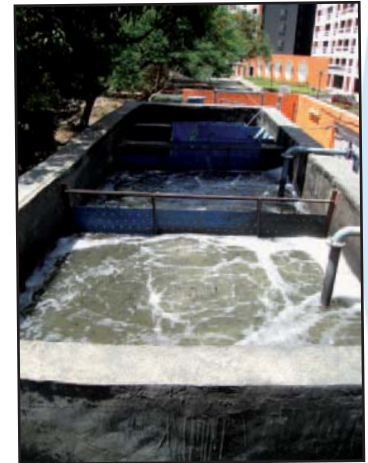
New generation packaged sewage treatment plant (NGPSTP)

Residential Complex Saves Water & Costs

Ion Exchange installed a fluidised media reactor (FMR) at a premium three-wing residential complex with a total of 480 flats in Thane, Maharashtra. The total water requirement for flushing and gardening is 150 m³/day. The cost of tanker water at Rs.50/cu.m amounted to Rs.7500 daily and Rs.27 lakhs annually.

A 200 m³/day FMR was installed to recycle water. The daily saving of 150 cu.m fresh water which would have otherwise been used for secondary purposes, amounted to a huge annual saving of

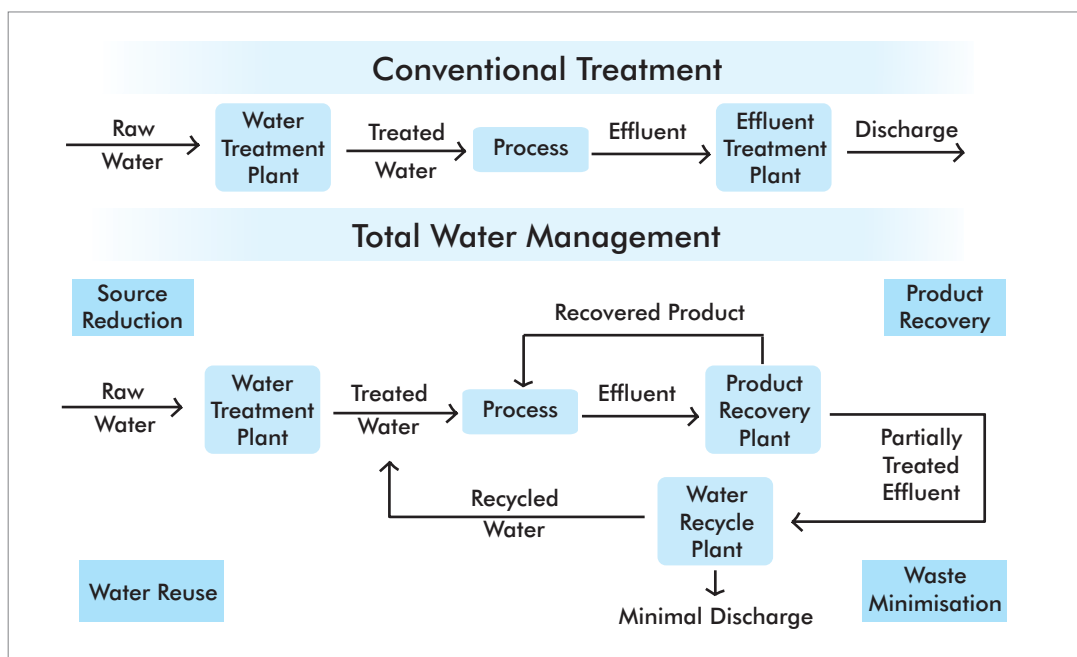
55,000 cu.m of fresh water. Taking into account these savings as well as the capital and operating cost of the FMR, this recycle plant gave a payback in just 23 months. The additional cost incurred per sq. ft. was a mere Rs. 8.



Green Gains from Industrial Effluent Recycle

Pollution and increased demand have made good quality water scarce and expensive, both in terms of direct cost of water and the effect of unsuitable/insufficient water on plant economics and product quality. Industries that

have installed our effluent recycle systems have benefited in a number of ways, and have found that water recycle is good for the environment and their bottom line too.



The gains of recycle include:

- Assured availability of water for process needs as well as low end uses.
- Less requirement of fresh water and lower water costs
- Additional savings through recovery of valuable by-products for re-use in process
- Compliance with pollution control regulations and consumption/disposal norms
- A cleaner environment through reduced effluent discharge
- For new projects, incorporation of recycle also considerably reduces capital investment on water treatment.

Water Recycle at Integrated Steel Plant

JSW Steel makes use of fresh water from Tungabhadra River for their operations at Torangallu, Bellary in Karnataka.

Keen on reducing fresh water intake, as a first step JSW decided to treat the cooling tower blowdown from three units viz. the hot strip mill, basic oxygen furnace (BOF) and cold rolling mill (CRM); this water was not being treated and was used mostly for low end applications such as pellet plant and slag quenching.

Ion Exchange was awarded this milestone contract for the first water recycling plant for an integrated steel plant in India. The order was for treating 125 m³/h cooling tower blowdown which will give 105 m³/h reverse osmosis (RO) permeate of excellent quality, with TDS <250 ppm.

The process comprises physico-chemical treatment with high rate solids contact clarification, sand and carbon filtration, ultra filtration and two-stage RO. The treated water will be used for high end applications like the process requirements of the CRM. The RO reject will be used for slag quenching.

The contract is on EPC plus O&M model as, apart from constructing the plant, the scope includes 10-year complete O&M services – inclusive of manpower, maintenance and supply of all spares, chemicals and consumables.

Zero Discharge System for Gujarat Ambuja

Ion Exchange has supplied a state-of-art zero discharge plant for Gujarat Ambuja's (GACL) 4 MT capacity cement plant, at Dist. Ropar, Punjab. The plant was successfully commissioned last year and is in operation.

GACL is a part of the HOLICIM Group, a global leader in cement production. It has a 30 MW power plant which includes two turbines, each of 15 MW capacity, high and medium pressure boilers 80/45 T/h capacity with operating boiler pressure of 67 kg/sq.cm. each.

To operate the power plant, GACL has a water treatment plant and cooling towers, as under:

Plant	Capacity
Cooling Tower	8500 m ³ /h
Softener	55 m ³ /h x 3
Pressure Sand Filter	130 m ³ /h x 2
Activated Carbon Filter	130 m ³ /h x 2
Side Stream Filter	150 m ³ /h x 2
Demineralisation Plant	8 m ³ /h x 2

The total effluent generated from the utility department of the power plant is approximately 500 m³/day. This includes blowdown from cooling towers, reject/effluent from softeners, DM plant and pressure sand filters.

A sharp decline in the water levels of the region and an overall environmental consciousness led the company to set up the first plant of its type in their group, enabling them to achieve their vision for water conservation and zero discharge.

To treat the effluents, Ion Exchange recommended & implemented a scheme that



includes extensive pretreatment of water, ultra filtration followed by two-stage RO and finally

evaporation to handle the reject from the membrane systems. The plant thus recovers 85% of the waste water for reuse and achieves zero discharge. At the same time it helps conserve



water by reducing fresh water intake through this recycling program.