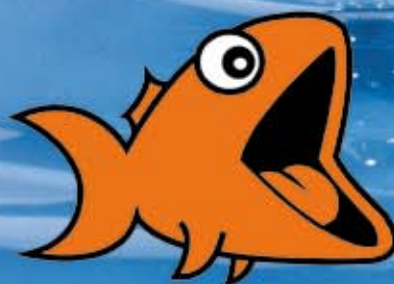




**Need
of
The Hour
WATER
RECYCLE**



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REUSE

REDUCE

RECYCLE

Recycle (verb)

a: To recover useful materials
from waste

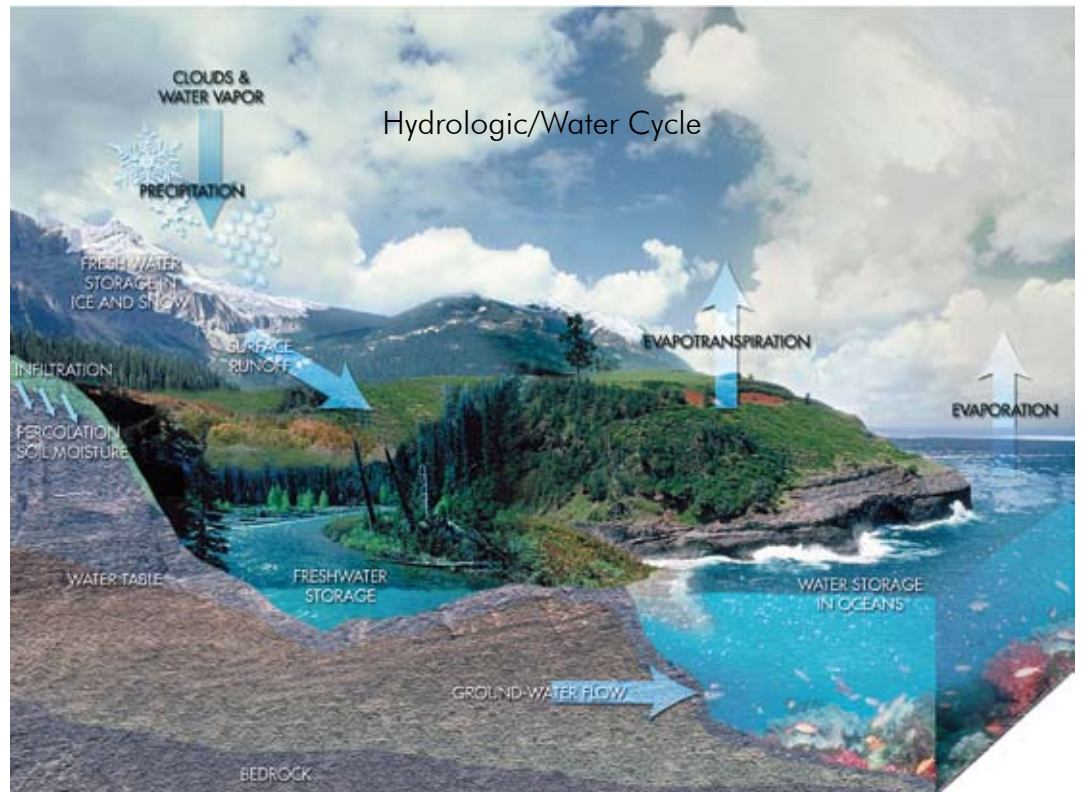
b: To extract and reuse

World over, the rapidly increasing
population, industrialisation and
pollution are exerting enormous strain
on existing fresh water resources.

Recycled water is a drought-proof, dependable, locally
controlled additional source of water supply and hence
one of the most effective solutions to help solve water
scarcity. Thus, the escalating water shortages and
rising water costs, coupled with tighter regulations on
consumption of fresh water and discharge of waste
water, have significantly boosted the adoption of water
recycle by industry and municipalities as well as by
residential/commercial/institutional complexes, hotels
and resorts.



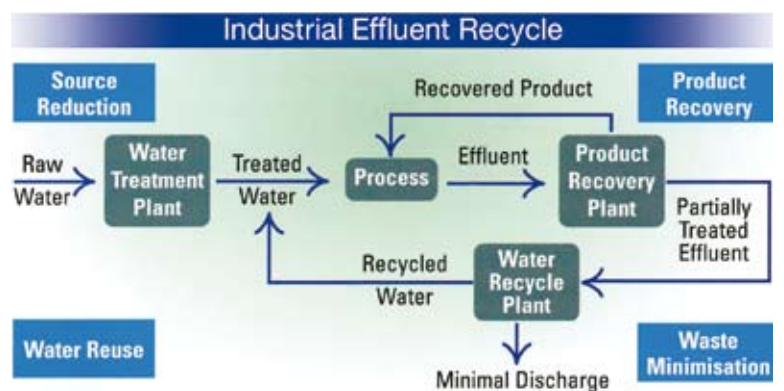
Through the natural water cycle, the earth has been recycling and reusing water for millions of years. The term water recycle, though, generally refers to the use of technology to treat and reuse wastewater for beneficial purposes, to help augment existing water resources and cope with the demand for fresh water.



Recycled water can satisfy most water demands, provided it is adequately treated to ensure water quality appropriate for the use and the receiving environment. However it is generally used for non-potable purposes such as industrial processes and cooling water, irrigation, toilet flushing, gardening, vehicle washing, construction activities, concrete mixing and artificial lakes. Advances in waste water treatment technologies and health studies of indirect potable reuse suggest that even planned indirect potable reuse will become more common in the future; some projects already use recycled water to recharge ground water aquifers and augment surface water reservoirs. Water recycle also provides tremendous environmental benefits such as decreasing waste water discharge and thus lessening pollution, and reducing the diversion of water from sensitive ecosystems. Recycled water can also be used to create or enhance wetlands and riparian habitats.

Whereas earlier, technologies to treat waste water for reuse were mainly biological, current techniques

integrate physico-chemical, biological and membrane separation processes for optimum water recovery. These include micro, ultra and nano filtration, reverse osmosis systems, membrane bio-reactors and advanced photo-chemical oxidation. Among these, the membrane bio-reactor is fast becoming the technology of choice;



it produces a very high treated water quality, effectively combining biological and membrane separation processes, and thus eliminating the need for secondary clarification after aeration as well as for tertiary treatment.

Ion Exchange has supplied a large number of membrane bio-reactors (MBRs) for treatment and recycle of both industrial effluent and municipal sewage. Showcased here are some of our installations.

Colours of Success

MBR for 10 MLD Zero Discharge System at Angeripalayam CETP, Tirupur



into the ground water system had also affected the ground water quality. In view of this, all textile units were directed by the Chennai High Court to implement zero liquid discharge.

Ion Exchange carried out extensive piloting to identify the right solution to overcome the problem faced by these units. Various combinations of technologies including biological, chemical, resin and membrane based systems were tried out. Based on this, a 0.5 MLD plant was built to gather further operating data after which the scheme for the 10 MLD zero discharge system was developed and constructed.

The main treatment scheme comprises the flat sheet MBR and two-stage reverse osmosis for effluent recycle followed by, for the RO reject stream, silica removal, sand filtration and nano filtration for zero discharge. The RO permeate has TDS of <200 ppm, COD of <5, with nil BOD, suspended solids and colour.

Benefits of the Zero Discharge System

Apart from satisfying the High Court mandate of zero liquid discharge, the ACETP/individual units derive a host of benefits:

- More than 82 per cent of the feed water (10 MLD capacity) is obtained as RO permeate of much better quality than available raw water. This improves the quality of the dyeing.
- 11 per cent of the feed water, obtained as pure brine solution from nano filtration, will be used effectively for dyeing. This means around 93 per cent of effluent is



Membrane bio-reactor

Tirupur is a hosiery and export centre located about 450 kms from Chennai, in Tamil Nadu. Around 80 bleaching and dyeing units form part of the Angeripalayam common effluent treatment plant (ACETP) project; these dyeing units consume large volumes of water which they were purchasing at around Rs. 50 to 60 per cu. m. through tankers. During the dyeing process, 10 MLD (million litres per day) of waste water with high TDS, organics and colour is generated by the individual units of the ACETP.

This ACETP and other CETPs had been set up to treat the effluent discharged from these units. The partially treated effluent, without reduction of total dissolved solids (TDS), was being discharged by the various Tirupur dyeing units into the Noyyal River, thus polluting the water and making it unfit for agriculture and domestic use. Discharge of the high TDS effluent into the river and its subsequent percolation



Membrane bio-reactor section



Reverse osmosis section

recycled and reused by the dyeing industries.

- The operating cost of the project is around Rs. 40 – 45/cu.m, much less than the fresh water cost of about Rs. 50 – 60/cu.m., a huge saving on costs of purchasing water.
- A much smaller footprint, as it uses the MBR instead of a conventional biological system.
- Sludge production is vastly minimised as the physico-chemical process is avoided.

Lead-ing the Way to Water Efficiency

400 m³/day MBR at HCC's 247 Park

HCC Real Estate Ltd. (HREL), a wholly owned subsidiary of Hindustan Construction Company, develops and markets high-value real estate projects across India, one of which is a 2-million sq. ft. composite IT park that will accommodate more than 6,000 professionals. In addition to offices, the complex will house banks, ATMs, retail shops, food courts, high-end restaurants, a business centre and a gymnasium.

Located in the heart of an upcoming IT hub at Mumbai's L.B.S. Marg in Vikhroli, the 247 Park is an articulation of the vision of being 'always on' despite possible infrastructural constraints of power, water or even natural calamities.

Ion Exchange received the contract for design, supply and installation of the 400 m³/day MBR plant for sewage treatment and recycle for the zero discharge, Lead-certified Green Building. The outlet water will be used for toilet flushing and cooling tower makeup.

Eco-development

3150 m³/day MBR for Reef Island, Bahrain

Ion Exchange was awarded the prestigious contract, against international bidding, for the MBR based sewage treatment plant for the Reef Island Development Project – our first such plant overseas. Reef Island, previously known as Lulu Island, is a man-made island being built on the Al Manama coast in the Kingdom of Bahrain. The USD 1.2 billion freehold development project will cover an area of 579,000 sq.m. (6.23 million sq. ft.) and is being constructed as a joint venture between the Bahrain government and the Bahrain-based Mouawad Group Real Estate Development Company. The development was designed by Australia-based Spowers and Pentago. The consultant for the project is Scott Wilson, UK and the civil contractor is AMA, Bahrain.

Our contract scope included design, engineering, supply, erection and commissioning of the MBR, with a project value of USD 1.5 million. The original capacity of the plant was 2300 m³/day, later upgraded to 3150 m³/day. The plant uses flat sheet membrane modules and the scheme consists of automatic screens, equalisation tank, anoxic tank, aeration tank with MBR membranes and post disinfection system along with membrane cleaning systems. The plant is automatic with PLC controlled operation. We will also be undertaking its operation and maintenance.

Designed in the shape of the number nine, the Reef Island project is located close to the Pearl roundabout, just moments away from Bahrain Financial Harbour. It will hold 39 residential buildings with a total of 1,217 apartments with waterfront or lagoon views. It will also have a residential tower, 49 beach villas, 65 individually designed sea-view villas, a 250-room five-star hotel, a marina and yacht club, an aquarium, wellness spa, shopping mall, and a multi-function exhibition centre.



Green Manufacturing in Practice

MBR for our Ion Exchange Resin Plant at Ankleshwar

Ion Exchange's plant, one of the largest ion exchange resin producing units in India, is located in Ankleshwar, a well developed industrial area in Gujarat. The fully automated facility produces various grades of resin, anion and cation – gel, macroporous and isoporous, for water treatment as well as non-water and speciality applications. Ours was the



Membrane bio-reactor section

first ion exchange resin manufacturing facility in India to receive ISO 9001:2000 and 14001 certification for quality and environmental compliance. It also has an FDA approved facility for producing resins for applications in the pharmaceutical industry. Because of the cluster of industries, primarily chemical, in Ankleshwar and inadequate treatment of complex chemical waste generated by them, the water table and the natural water resource around this industrial area have been heavily polluted. While our own plant had a fully operational effluent treatment system treating the waste streams to acceptable levels for discharge, our commitment to recover water from the effluent and reduce the load on the environment led us to initiate a first-of-its-kind project to extend the treatment of effluents by a series of state-of-the-art and sophisticated membrane systems.

Manufacture of ion exchange resins generates waste streams

with a lot of complex bio-degradable and non bio-degradable chemicals. So it was critical to choose a combination of robust processes and technologies that could withstand the complex chemicals, convert them into harmless compounds suitable for treatment in membrane systems and meet requirements of operating costs, sustainability etc. Evaluation of technologies was also important to ensure lower life cycle costs without hindering plant performance and uptime.

The waste streams from the cation and anion plants, and the utility waste like boiler blowdown and demineraliser (DM) regeneration effluent, are segregated based on their constituent impurities and treated separately. The acidic water, wash

water, boiler blowdown and DM plant waste from both the plants are treated through a process which incorporates the high rate



Ultra filtration section

solids contact clarifier (HRSCC), hollow fibre ultra filtration and reverse osmosis. The water recovered from these streams is taken back for process uses.

The stream comprising complex organics, and the other

biodegradable waste from the toilets are combined and treated by a process involving chemical treatment, HRSCC, advanced oxidation, and the MBR to recover water for reuse.

The complete treatment philosophy was determined after extensive studies and piloting to arrive at the most suitable technology for implementation. The plants

have all been commissioned and are performing at expected levels, thereby reducing fresh water consumption in the plant as well as reducing the discharge of waste into the environment.



Pretreatment of effluent



Right: Our ISO 9001:2000 and 140001 certified ion exchange resin facility at Ankleshwar, Gujarat where cation resin manufacturing capacity was recently doubled. Above: FDA approved facility for manufacture of pharma grade resins.



Eco-wise Luxury Sewage Recycle with MBR at ITC Maurya

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. These super deluxe and premium *Luxury Collection* hotels are located at seven strategic business and leisure locations in Delhi, Mumbai, Kolkata, Bangalore, Hyderabad and Agra.

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 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. Ion Exchange was among the companies selected to present technology options. Our proposal to use the MBR was accepted; and after being shortlisted, with two other world leading MBR

back-up service and local presence. Playing a key role in the award of the contract were 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.

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.

The project execution was indeed challenging, as work had to proceed in a functioning hotel and the arrival of dignitaries and celebrities would bring execution of the project to a halt for the duration of their stay. However, close cooperation and interaction between the ITC and Ion Exchange teams saw the completion of civil and piping work, electrical cabling, mechanical erection and the installation and commissioning of the MBR modules, to allow the sewage to enter the MBR.



suppliers, Ion Exchange was preferred for this project, which includes a five year O&M contract of the MBR plant. The selection was based on our experience, capability,

Putting Waste to Constructive Use

MBR for Sewage Treatment at Jebel Ali, Dubai

Our Ion Exchange, UAE team successfully commissioned the MBR-based sewage treatment plant in Jebel Ali, Dubai, for Wade Adams, a major civil contracting company in Dubai. The MBR treats sewage water from the labour accommodation of the client and the treated water is used for concrete curing and mixing at the client's construction sites. Ion Exchange was also awarded the O&M of the plant.



Fluidised media reactor

Another 500 m³/day MBR and a fluidised media reactor (FMR) of 200 m³/day have also been supplied to this client.



Membrane bio-reactor

The MBR produces excellent quality of water, which enables Wade Adams to sell the excess water to other contracting sites. It has thus become a profit point to the contractor by saving costs that would otherwise have been incurred on transporting the sewage, on water (by using treated sewage), and by the sale of the excess treated water.



Membrane bio-reactor section

Other **INDION**[®] MBR Orders

- A noteworthy order from Hamriyah Free Zone Authority, Sharjah for a 4000 m³/day MBR takes our installation base for MBR plants in the Hamriyah Free Zone to 7000 m³/day.
- From NIIT, SEZ, Greater Noida, UP for 200 m³/day MBR.
- MBR, 500 m³/day, from Hotel Leela Ventures, Chennai and Delhi.
- Orbit Construction, Mumbai, 100 m³/day MBR.
- Nitesh Estate, Bangalore, 50 m³/day MBR.

900 m³/day membrane bio-reactor for the 112 acre Vrindavan Tech Village & SEZ, Surjapur Main Road, Bangalore. The treated water is being used for gardening, toilet flushing etc. The project is developed by Vikas Telecom.



Major Engineering Contracts

Steaming Ahead with Sea Power

Milestone SWRO Contract from NTPC-TNEB JV

Ion Exchange was awarded the prestigious order for public sector National Thermal Power Corporation's maiden venture into sea water reverse osmosis (SWRO) desalination. This contract, valued at Rs. 1263 million, is to set up an SWRO plant to cater to the water requirements of the thermal power plant of NTPC Tamil Nadu Energy Company Ltd. (NTECL), a joint venture between NTPC and Tamil Nadu Electricity Board (TNEB). This is the largest SWRO plant for a power project in India.

The 19.8 MLD (3x275 m³/h) SWRO plant for the 3x500 MW thermal power plant at Vallur, near Chennai, will treat processed sea water to produce demineralised water for use in the boiler drum for steam generation. Its key features include salt rejection ranging from 90 to 98 per cent and product recovery of 50 to 80 per cent based on feed water composition. A small part of the desalinated water will also be used for potable purposes. Our value adding design engineering resulted in optimisation of power and chemical consumption.

This is the first time NTPC is setting up a SWRO plant for their power projects. Winning the globally competitive bidding process in which 32 companies participated, for one of the most prestigious projects in recent times, speaks volumes about customer confidence in our capabilities.

Our other SWRO projects in the power sector include

- 7 MLD SWRO plant for Mundra Thermal Power Project of Adani Power Ltd., Gujarat
- 4.3 MLD SWRO plant for Gujarat Electricity Board, Sikka which was the first large SWRO plant in the industrial sector in India.

Additionally, our contracts for SWRO plants in other sectors include

- The largest industrial SWRO plant of 26.4 MLD for Chennai Petroleum Corporation (see Successfully Commissioned, page 14)
- 6 MLD SWRO plant for Gujarat Anjan Cement Ltd., Kutch
- 5 MLD SWRO plant for Gujarat Heavy Chemicals, Veraval
- 6 MLD SWRO plant for Indian Rayon & Industries, Veraval

Sea Water Cooling Treatment for Goa Energy

Seeking better service with competitive pricing, customer Goa Energy opted for Ion Exchange, awarding us a contract for sea water cooling treatment for their 30 MW waste heat recovery power plant. The unique feature of this contract is that condenser cooling is done with sea water with 1.5 times concentration in the cooling tower. Moreover, seasonal fluctuations in the make up water quality dramatically alters the water characteristics. This was a critical factor to be considered while designing the treatment programme which uses world class polymers to control the scaling and fouling of the condenser in the sea water cooling system. We will be placing a dedicated service engineer to monitor the treatment.

Success Saga Continues...

JSW Energy (Ratnagiri) Limited

We received a major order for water treatment from JSW Energy (Ratnagiri) Limited for their 4x300 MW thermal power plant at Jaigad, Ratnagiri, in Maharashtra. The contract scope includes design, manufacturing, supply, erection and commissioning of 2x96 m³/h automated demineralisation plants. TCE, Bangalore is the client's technical consultant for the power project.

Oily Waste Removal for General Motors

A noteworthy order from General Motors India Pvt. Ltd. is for the design, supply, erection & commissioning of an oily waste water treatment system for their power train project coming up at their newest car plant at Talegaon, near Pune, Maharashtra. The 75 m³/day capacity of the oily waste removal system makes it one of the largest membrane systems for this application in the country.

The power train facility will use a lot of metal working fluids and lubricants which will form a significant portion of the waste generated. While the high oil content, to the extent of 5 per cent (50,000 ppm), in the waste would create an environmental hazard, the oil can be reused for low end purposes, if recovered properly. Similarly, after oil removal, the water can also be reused. Considering site and environmental requirements, it was decided to use ultra filtration (UF) membranes over options which involve physico-chemical separation as these other processes need constant operator attention and also generate solid waste.

The UF system will use special multi-core tubular membranes that will ensure the oil is concentrated and removed in the retentate. The permeate water which will have traces of oil is further treated through an activated carbon bed to remove the trace oil and make it suitable for reuse/discharge. The concentrated oil is drawn out separately into a tank from where it can be suitably disposed.

The system is completely compact and fully automatic. Apart from being a completely clean process that does not generate any additional waste, it requires very little operator assistance.

Water Infrastructure

Ion Exchange was awarded the turnkey order, valued at Rs. 1056 million for design, engineering, supply and erection of the intake water system, with water treatment, for the 2.5 MT expansion of SAIL-IISCO, Burnpur, West Bengal. The project will be executed by Ion Exchange Infrastructure.



The project consists of cross-country pipeline for water treatment plant, and makeup and drinking water distribution system from overhead tank including sludge handling system. The scope of work broadly includes

- Intake pump-house of 5610 m³/h
- Electrical substation
- CDI cross-country pipeline of approx. 7 kms (of pipe size DN 900)
- Earthen reservoir of 280000 cu.m.
- 4050 m³/h makeup water treatment plant consisting of pump-house, lamella clarifiers, sludge sump, thickener, dewatering system, centrifuge, chemical house and make up water reservoir, 100 m³/h drinking water treatment plant, drinking water reservoir and potable water chlorination
- Make up water cum drinking water overhead tank and distribution network

Ion Exchange Infrastructure also won an order from Jindal Steel and Power Ltd., Patratu, Jharkhand for internal cooling and direct contact cooling water recirculation systems for their 1.0 MTPA bar rod and 0.6 MTPA wire rod mills.

Two plants, each of 80 m³/h UF and RO, for Tamil Nadu Newsprint at Karur.



- One of the largest ultra pure water systems for the photo voltaic (PV) cell industry in India – from Solar Semiconductor Pvt. Ltd., Hyderabad for their PV cell manufacturing unit, for a 12 m³/h high purity water generation system with all accessories including RO-EDI and a 50 m³/h side stream filter.
- At TVS Sri Chakra, Madurai, we successfully commissioned and commenced supply of water through a build-own-operate contract for a 14 m³/h RO with pretreatment.

Cooling Water Treatment for IOCL Mathura

A two-year contract from IOCL Mathura for cooling water treatment at three systems – the process cooling tower, the new CRU cooling tower and the TPS cooling tower. A noteworthy factor is that the make up water has very high organic matter and is blended with treated effluent. Therefore, apart from using high quality scale and corrosion inhibitors, we will be dosing large quantities of ClO₂ based chemicals and carrying out bromination for microbiological control along with our strong non-oxidising biocides. Based on our successful handling of these systems for the past three years, the contract was extended for a two-year period.

3mendous Achievement!

The Ion Exchange contribution to the water industry was once again recognized with prestigious 2008-09 Water Awards for the third consecutive year, awarded by Water Digest in association with UNESCO.



Mr. Rajesh Sharma (right) Vice Chairman & Managing Director, Ion Exchange (India) Ltd. receiving the Lifetime Achievement Award from Mr. M. Ramachandran, Secretary, Ministry of Urban Development, Government of India at the award function held in Delhi on December 11, 2008.

2008-09 Awards

Best Water Company

Best Water Conserver (Waste Water Management)

Best Water Treatment (Water Treatment Chemicals)

Lifetime Achievement Award to Mr. Rajesh Sharma, Vice Chairman & Managing Director, for his invaluable 35 years of contribution to the water treatment and management industry.

ION EXCHANGE (INDIA) LTD
THE POWER BEHIND WATER
Total Environment Solutions

It takes the best to win the best awards - three years in a row
Water Digest Water Awards in association with UNESCO

BEST WATER COMPANY (2008-07, 2007-08, 2008-09)

BEST WATER CONSERVER (Waste Water Management) (2008-07, 2007-08, 2008-09)

BEST WATER TREATMENT (Water Treatment Chemicals) (2008-07, 2007-08, 2008-09)

BEST RO WATER PURIFIER (2008-07, 2007-08) **ZERO B**

Lifetime Achievement Awards
Mr. G.S. Ranganathan, Chairman (2006-07)
Mr. R. Sharma, Vice Chairman & Managing Director (2008-09)

Successfully Commissioned

Reliance Relies on Us for Water Management

We recently commissioned the water and waste water management project for the Reliance Industries'

Jamnagar Export Refinery Project, one of the most prestigious assignments on our order list.

Reliance Industries Limited has enhanced the capacity of the Jamnagar Refinery to 1,20,000 barrels per stream per day (1200K BPSD) with the commissioning of the Jamnagar Export Refinery Project (JERP) in Gujarat. Speaking volumes for customer confidence in Ion Exchange's reliability and capability to execute the water management for this prestigious project, the contract for water treatment plant was awarded to Ion Exchange India, and for the effluent treatment plant to Ion Exchange Waterleau.



Activated carbon filters

The waste water treatment is carried out in a dedicated state-of-the-art completely automated and PLC-operated effluent treatment plant supplied by Ion Exchange Waterleau. The effluent treatment area is designed to contain and treat all internal process/utility waste water and storm/fire water, with the objective of zero discharge from the new refinery

Condensate polishing plant



Demineralisation plant

Desalinated water is fed to the 13 x 388 m³/h demineralisation plant consisting of mixed bed units to demineralise water for the boiler water turbine and for process use. The 3 x 388 m³/h condensate polishing units treat the return condensate at the refinery complex and captive power plant. The condensate, after treatment, is returned to the plant for reuse as polished feed water for low pressure and higher pressure steam generators. The return condensate is treated for removal of oil traces and low levels of dissolved solids by activated carbon filtration and ion exchange process.

complex. The treated water is recycled back to the high total dissolved solids treatment train or guard tanks, as required.



Aeration tanks

Effluents are segregated into four identical waste water streams designed for a treatment capacity of 500 m³/h each and maximisation of reuse.

The low total dissolved solids (LTDS) stream, a mixture of process/oily

water which includes non-phenolic waste water, is treated to an effluent quality adequate for reuse for cooling water as well as fire water make up and irrigation water for development & maintenance of the local green belt.

The high total dissolved solids (HTDS) stream is a mixture of process/oily waste water that has been in contact with process streams, such as in the crude unit desalters, and has absorbed or dissolved mineral ions such as sodium chloride. This stream also contains (treated neutralised) process solvents such as spent caustics, and phenolic waste water. This water is treated to an effluent quality adequate for reuse as partial make up in a sea water cooling tower.



Analyser house

The oily water sewer (OWS) stream is a mixture of process/oily water which includes oily condensates from various refinery units, sanitary sewage (after primary treatment), drainage from tanks, contaminated storm water, etc. The treated OWS effluent is used for horticulture.

The scope of treatment also includes three by-product streams generated during the treatment of refinery waste water - skimmed or slop oils, oily sludge and biological sludge. Skimmed oil is chemical and heat treated, with recovered oils



Bio-tower

transferred back to the refinery for reprocessing. Oily sludge is thickened and then

transferred back

to the delayed coker unit for reprocessing. Biological sludge is thickened, stabilised, dewatered and disposed off to landfill.

Each of the above streams employs identical equipment for treating effluents.

- Guard tanks and equalisation tanks
- Free oil removal facilities including pre-deoiler and API separators, installed with continuous oil skimming and sludge removal facilities
- Solids and emulsified oil removal by dissolved air flotation (DAF) unit
- Two stage biological treatment – bio-tower with pH correction at outlet, and a plug flow nitrification/de-nitrification process with anoxic tank and aeration tank
- Clarification (with INDION polymer dosing to aid settlement)
- Dual media filtration
- Activated carbon adsorption (only for LTDS 1, LTDS 2 and OWS streams)
- Disinfection – with chlorine and chlorine dioxide
- Treated waste water storage
- Chemical dosing facilities (common)
- Sludge and oil handling (common)



Guard ponds

The treatment scheme also includes an automatic belt filter press for dewatering biological sludge, two chemical houses, three analyser houses and twenty sampler skids for automatic sampling and analysis of critical effluent parameters on a continuous basis. Our scope includes supply of specialty INDION polymers and effluent treatment chemicals along with maintenance by a team of trained and competent process engineers.

The effluent treatment plant is treating 100 per cent effluent generated by the refinery since its commissioning in December 2008 and consistently producing treated effluent (pH 6-8.5, sulphide < 0.5 ppm, COD < 50 ppm, oil and grease < 5 ppm, phenol < 0.35 ppm) meeting guarantee parameters for reuse for various applications mentioned earlier.

5.8 MGD Desalination Plant for Chennai Petroleum Corporation

Con Exchange supplied a 5.8 MGD (million gallons per day) RO based desalination plant to Chennai Petroleum Corporation Ltd. (CPCL) at Kattupalli in Thiruvallur district, Tamil Nadu, on a lumpsum turnkey basis. Desalinated water

will be supplied through pipelines from the plant to the refinery at Manali, which is about 20 kms from this plant.

Our contract was for total civil work including piling, RCC tanks of 14,000 cu. m. capacity, building



Reverse osmosis section

and RCC structures. The scope also included high-tension electrical systems of 11 KV to 415 VAC and DCS based control system for auto operation of the plant.

The first stream of the RO unit was successfully commissioned and the treated water produced to desired parameters. After it is fully operational, the plant will assist CPCL achieve self-sufficiency in meeting the current water requirements of its Manali refinery complex and also requirement of Euro IV upgradation



High pressure pumping station for reverse osmosis projects which are in the advanced stages of implementation. This is the largest capacity seawater desalination plant in the industrial segment.



Degasser towers

The first 275 m³/h stream of the SWRO plant was commissioned through DCS. Balance 3 streams, each 275 m³/h, are ready for commissioning and awaiting client clearance.



Pretreatment section

Dual media filtration section of the complete water systems package supplied to JSW Steel Ltd. for their long product mill to manufacture bar and wire rods at Toranagallu, near Bellary, Karnataka



GCC Operations

Our Facility at Hamriyah

Last year we launched our operations in Sharjah's Hamriyah Free Zone, UAE. The 6000 sq. ft. Ion Exchange facility with warehousing, assembly and servicing capabilities, and an adjoining sales office, is strategically located for easy access to Hamriyah Port, 5 kms away and road transportation to other GCC (Gulf Cooperation Council) countries – Oman, Bahrain, Qatar, Saudi Arabia and Kuwait.



Warehousing: This facility stocks consumables such as chemicals, resins, membranes, media, cartridges and also maintains a minimal inventory of materials required for the assembling of packaged/containerised RO plants. Additionally, a separate 25000 sq. ft. warehouse is being operated, 20 kms away, in Umm Al Quwain where engineered products are stocked.

Assembly: The facility employs five permanent staff, while additional labour is contracted on project requirement. It has the capability to execute packaged and containerised RO plants, packaged DM plants, softeners, filters and control panels for these plants.

Servicing: The facility employs a staff of three to cater to the erection and commissioning requirements in the GCC region. The service team is being expanded to meet O&M requirements for the water and waste water treatment plants.

Sales and Project Management office: Currently twelve personnel handle sales, engineering and project management of standard as well as engineered products exclusively for the GCC region to ensure on-time deliveries and customer satisfaction.

Hamriyah Free Zone

The Hamriyah Free Zone, Sharjah, UAE was established by an Emiri Decree issued in 1995. Since then no effort has been spared in fast-tracking the development of the Free Zone to serve as a cornerstone in Sharjah and the United Arab Emirates (UAE) industrial development strategy. The Hamriyah Free Zone Authority manages the Free Zone area, which comprises approximately 12 million sq. m. of industrial and commercial land. Included in the Free Zone area is a 14 m deep water port and deep harbour, which is designed to incorporate dedicated petrochemical bulk handling and general cargo berths.



Strategically located, the Hamriyah Free Zone provides access to three seaports on the Arabian Gulf and Indian Ocean and to Sharjah International Airport – the largest sea-air transit cargo hub in the Middle East. Hamriyah Free Zone is also embarking on a major expansion that will nearly double the facility's size with the addition of 10 million sq. m. of land.



Teeing Off with Tiger Woods

5000 m³/day RO plant for Tiger Woods Project, Dubai



The real estate and zoning department of Tatweer, a Dubai Holdings company, awarded the contract for the construction of a golf course to Tiger Woods Dubai, a massive 55 million sq. ft. development with the 18-hole golf course alone accounting for 13 million sq. ft. The latter has retained Confluence as their project management company while grass cultivation on the course has been contracted to Desert Landscape group, Dubai. Treated sewage water from Dubai Municipality, after tertiary treatment will be used for grass cultivation in the nursery as well as main golf course.

The complete design, supply, erection and commissioning package for the interim 5000 m³/day RO based treatment plant for the golf course was awarded to Ion Exchange, UAE.

Our plant will treat the sewage for the immediate requirement of the nursery and watering of the golf course until completion of the main treatment plant. Treated sewage water from Dubai Municipality will be transported in tankers to the site and stored in a lagoon. The water from the lagoon will be chlorinated in the 2 x 2500 m³/day RO plant consisting of cartridge filters, high pressure pumps and RO units, operating at 75 per cent recovery ratio.



More GCC Highlights

A prestigious order from Oman Refinery, the largest refinery owned by the Government of Oman, for a 150 m³/h reverse osmosis (RO) and mixed bed unit.

An order for a 200 m³/day fluidised media reactor (FMR) from Hilal Bil Badi & Partners Contracting, Abu Dhabi, for their staff and labour accommodation.



Two SS 316 activated carbon filters for Pepsi Bottling Plant, Bahrain.

A repeat order for a 50 m³/day sewage treatment plant – for Galfar, Abu Dhabi. The earlier plant was supplied in 2008.

A 150 m³/day FMR for China Petroleum Engineering & Contracting Company, for their staff accommodation in Tarif, Abu Dhabi, UAE.



Ion Exchange, UAE has successfully supplied, erected and commissioned a brackish water reverse osmosis plant for Coca Cola Bottling Plant, Bahrain. The contract was awarded against international competition and the plant was manufactured at our Hamriyah facility in Sharjah. The 250 m³/day plant is fully automatic with stainless steel skids. This is our first overseas order from Coca Cola.

Other Overseas Fronts

Putting Our Footprint in Cambodia



Our first plant in Cambodia for a 30 MW power plant integrated with a sugar mill was commissioned for KSI, Cambodia. The plant consists of a 150 m³/h high rate solids contact clarifier (HRSCC), 4000 cu. m. clarified water storage tank, 2 x 75 m³/h auto valveless gravity filters, 2 x 75 m³/h softeners, and a 4000 cu. m. soft water storage tank.

Africa

An effluent treatment plant from Bharat Heavy Electricals Ltd. (BHEL) for their 4 x125 MW power project at KOSTI – Sudan Thermal Power Station.

A breakthrough contract for supply of cooling water treatment chemicals from Indorama, Nigeria.

Bangladesh

A 100 m³/h water treatment plant from Four H Dyeing & Printing Ltd.

A 65 m³/h softening unit from Sinha Specialised Denim Washing Plant Ltd.

Two units of 150 m³/h filtration and softening from DB Tex Ltd.

A 7 m³/h ultra filtration (UF) followed by RO and mixed bed exchanger from Nestle Bangladesh Ltd.

Yemen

Repeat order from Arab Iron & Steel Corporation for a 6.5 m³/h RO system.

Iran

Order for two units of mixed bed polisher of 200 m³/h capacity for the Bandar Abbas Refinery in Iran.

Afghanistan

A fluidised media reactor, 150 m³/day, for a hospital project in Afghanistan.



Commissioned for a copper mining company in Zambia, Africa, water treatment plant, 1000 m³/h pretreatment and 3x175 m³/h RO.



Our Chairman Mr. G.S. Ranganathan and his wife (third & fourth from right), on a visit to our US operations, Ion Exchange LLC (IELLC), in Fremont, California. Mr. Ranganathan traced the origins and growth of Ion Exchange while the IELLC executives highlighted their entry into the refinery industry for anion weak base resins, water treatment plant upgradation in Silicon Valley and service contracts obtained for waste water treatment plants.

Prestigious EPC project from Technip Malaysia Containerised Pretreatment and RO Plant

We received a prestigious order for a 27 m³/h pretreatment, two-stage 11 m³/h sea water reverse osmosis and EDI plant of 4 m³/h, mounted on 10 containers, from Technip, Malaysia for a project in Turkministan.

The plant incorporates a number of noteworthy features such as:

- Design temperature -17° C to +45° C; design pressure for RO is 45 bar and for filtration 14 bar.



- The plant is fully containerised and fully automatic, with 1600 dia. filters mounted inside containers. Top level of automation, with latest features, uses distributed IO philosophy, which minimises cabling and provides

more operating space to the operator; automation is supplemented with power backup, mounted within the containers.

- The containers are equipped with heavy duty HVAC designed for handling outside temperatures of -17 to +45° C while maintaining inside temperature at 25° C, with automatic adjustment through temperature controllers.
- Sodium hypo required for RO is generated inside the containers from sea water, capacity 2 kg/h, concentration 0.2 per cent.
- Instrument air required for automation is also generated in the containers. This system is specially designed for handling suction air temperature of -17 to +45° C; the compressors are provided with auto on off and with dryers to suit instrument air requirement.
- All chemicals dosing systems are within the containers.
- EDI units for producing high purity water were despatched, fully assembled, from our fabrication facility in Hosur, Tamil Nadu, India.



A contract, for the Escravos gas to liquid project for Chevron, Nigeria, for a condensate polishing package consisting of filtration, twin bed and mixed bed demineralisation. The consultant is KBR, USA.

Filter stream: Condensate from the heat exchangers is polished in a series of cartridge, de-oiling and activated carbon filters, for removal of free/dissolved oil. It is designed to produce a net flow rate of 49.9 m³/h of treated condensate (one train working + one standby).

Fully automatic, it can however also be operated in semi

auto and manual modes.

Twin bed demineraliser: Provides polishing of process condensate from the plant. The main stream consists of cation and anion demineralisers in series. Net flow rate is 238 m³/h (one train working + one standby); there are two trains in parallel, with the same components.



Mixed bed demineraliser: This is the final treatment stream for the treated condensate of the above two streams stored in the

condensate tank. Net flow rate is 273 m³/h, with one working and one standby.

Showcasing our **INDION[®]** Iron Specific Resin

Ms. Renu Saraf, Sr. Manager – Technology, presented a paper on *Iron Specific Resin – a novel technique and an excellent choice for removal of iron from ground water* at the International Water Conference at San Antonio, Texas, USA on October 27, 2008. The conference was attended by about 200 delegates and her paper generated a lot of interest and enquiries from the audience.



The paper provided details of the INDION ISR (Iron Specific Resin) developed by Ion Exchange. This resin based patented product (207613/2007) has manganese dioxide as catalytic

moiety, which enhances the oxidation of iron and converts the soluble iron (Fe^{++}) to insoluble ferric hydroxide which is removed during backwash. The media acts as catalyst, where manganese dioxide reduces to manganese oxide and ferric hydroxide is precipitated. During backwash the media gets scoured and manganese oxide is converted to manganese dioxide. Media does not get consumed during the process and chemicals are not required to reactivate/recharge the media.

The paper also elaborated on the basics of catalytic media, existing iron removal technologies, and the technical superiority and commercial viability of our product.

A number of systems incorporating our ISR resin have been supplied and are successfully operating in India and overseas.

In the Pipeline



Ion Exchange Services is setting up its integrated corporate complex in Bangalore, expected to be ready by July 2009. This 22000 sq. ft. facility will house the company's corporate and southern regional offices, an analytical laboratory and a training center. It will also house the Bangalore offices of Ion Exchange India and its group companies. An eco-friendly facility, it will incorporate water treatment along with recycle and rain water harvesting.

24x7 **ZERO.B** Helpdesk

Our Home Water Solutions division launched the ZeroB all India centralised 24x7 customer care toll free number, 180030181818. The toll free number enables a quick, efficient and effective response to customer needs and queries.

Inaugurated



Directors of Ion Exchange Infrastructure Ltd. – (from left) Mr. M. P. Patni, Mr. Rajesh Sharma, Mr. Aankur Patni and Mr. Dinesh Sharma, cutting the inaugural ribbons at the opening of the company's new office at NAM Complex, Block M, Phase 1, 5th Floor, Alipore, Kolkata 700 053.

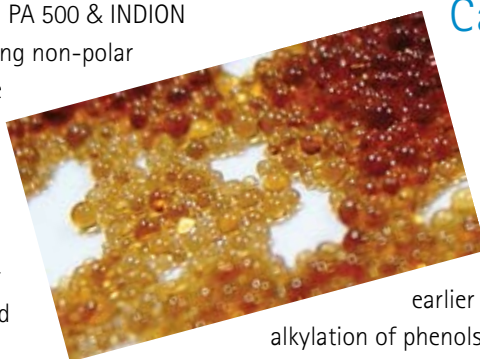
INDION® Innovation Resin Realm

A pioneering spirit, focus on customer needs, sustained R&D and expertise that spans 45 years is the perfect recipe behind a range of new resins and adsorbents that have been developed and successfully commercialised.

Polymeric Adsorbents

Working on the Vander Waats forces principle, our polymeric adsorbents INDION PA 500 & INDION PA 800 are capable of removing non-polar substances from polar streams. They are extremely effective in replacing activated carbon, and thus successfully address the carbon disposal issues faced by industry. Moreover, the surface of the adsorbents can be reactivated for repeated use, offering a distinct cost and environmental benefit.

These polymeric adsorbents have been well received by process industries as well as the bio-technology and pharmaceutical industries for applications such as removal of phenol from hydrochloric acid, removal of polyphenol and chlorophyll from herbal extracts and removal of non-polar impurities from fermentation broth.



Brine Softening Resin

INDION BSR was developed to address the problem of membrane fouling in the chlor alkali industry. The membranes used in the membrane cell based manufacturing process in the chlor alkali industry are very expensive but highly susceptible to fouling by the Ca and Mg present in the brine. By reducing the Ca and Mg in the brine to acceptable limits, INDION BSR effectively eliminates the problem of membrane fouling, and has been found a very effective solution by many manufacturers.

Catalyst Grade Resin

Our catalyst grade resin INDION 190 has proved to be very successful in the esterification of free fatty acids which is part of the bio-diesel manufacturing process. It had been earlier used effectively as a catalyst in the alkylation of phenols, camphor manufacturing as well as other esterification processes. This product eliminates the need to use sulphuric acid thereby reducing the many related hassles of handling and disposal.

Indicator Grade Mixed Bed Resins

To increase the user-friendliness of our existing range of mixed bed resins, we've introduced the indicating variant with a feature which makes the resin change colour on exhaustion. This range of mixed bed resins with colour change indicators is targeted at the medium and light industries, where elaborate testing laboratory set-ups are not needed or are unavailable.

NSF Certification

NSF 61 certification of our cation resins, INDION 222NaBI and INDION 225NaF, has opened up new market vistas in the USA and other regulated markets. NSF certification guarantees the absence of toxic impurities in these products, enabling their use for potable water applications.

INDION®



Ultrapure Water Unit

The INDION LAB Q is ideal for research laboratories requiring ultrapure water that consistently meets stringent purified water standards. The compact, convenient countertop unit produces ASTM Type III (American Society of Testing and Materials) grade ultrapure water @ 5 l/h; it kills micro-organisms and removes 95 per cent ions, and produces water with conductivity levels as low as 0.25 microsiemens and total organic carbon (TOC) level below 200 ppb.



The unit comes with features such as online conductivity and raw water quality monitors. Inbuilt auto sanitisation after every eight hours, an ultra violet cartridge and microprocessor

controls assure that purity standards are maintained. Besides, all components are NSF certified and equipped with an auto flush device. Thus, the INDION LAB Q is by far the perfect choice for a wide range of laboratory applications such as feed for ASTM Type I ultrapure water units, media and

chemical preparations, rinsing of high sensitivity glassware and instrumental analysis.

Our INDION Lab Q received several testimonial certificates including from the Delhi University, Department of Chemistry. The unit, installed in the chemistry laboratory of Delhi University for trial and testing, was found satisfactory and consistent in performance. The conductivity of the output water was in the range 0.01 to 0.03 ps as against 0.25 ps required as per ASTM Type III, helping the department in obtaining greater accuracy in their advanced research work.



From our Home Water Solutions (HWS) division, comes the recent launch of two unique water purifiers.

ZERO B Sapphire

The elegant ZeroB Sapphire has a seven-stage purification process to assure pure and natural tasting water. It totally removes bacteria and viruses, pesticides, harmful salts and chemicals.



ZERO B Solar

The first six-stage purifier with solar intelligence,

ZeroB Solar is a non-electric, storage-cum-online wall mounted purifier which provides pure and energised water while also removing heavy metal contaminants.



Municipal Waste Water – Viable, Dependable Water Resource

In many parts of the world, water has become a limiting factor particularly for industrial development. Water resource planners are continuously looking for additional sources of water to supplement the inadequate quantity available in their region. Source substitution appears to be the most suitable alternative to meet the growing water demand especially for industrial use. Water scarcity, high cost of raw water, growing demand and stricter discharge norms has created an awareness of the benefits of water recycle that has led to its increasing adoption by industry as well as residential and commercial complexes. However this is, in a sense, a particularised or private approach to reuse of water. A water security policy for sustainable development must embrace a much broader, public approach to water recycle as an effective means of creating a new and reliable water supply. Fortunately, the emerging trend is to treat municipal waste water for reuse.

Currently, in urban and semi-urban areas, municipal waste is partially treated and disposed off. Instead, treating sewage for reuse considerably reduces the pressure on municipal water supply authorities as well as the load on the environment. There are many progressive municipal corporations who have understood this emerging trend and are in the process of implementing waste water reclamation. While considering municipal waste water recycle, the major influencing factors are aspects such as legal, technical, economic and political, in addition to social and personal prejudices. Recycled water can satisfy most water requirements as long as it is treated to ensure water quality appropriate for the reuse application. Companies like Chennai Petroleum Corporation and Madras Fertilisers were among the first in India to use treated municipal sewage for industrial use.

Various technological options to treat municipal waste water are available. For small community systems the technologies for low-flow include packaged treatment systems, geotextile filtration and membrane filtration. The major benefits of these systems are that the higher quality effluent can be discharged to ground water for indirect use. These systems are generally easy to operate and inexpensive. Apart from small community uses, they can also be used at military camps,

large construction sites and disaster relief operations, etc. Constructed wetlands with sufficient land area can provide adequate passive treatment. Aerobic and anaerobic conditions of these systems along with micro-organisms, vegetation and gravel filters provide the majority treatment. Wetland treatment requires minimal skilled labor, gives a natural appearance and consumes very low energy. However, the only drawback of these systems is the need for a large area.



One of the most efficient technologies is membrane bio-reactor (MBR) technology. Its success has been possible due to the greater understanding of the biological treatment so far adopted for municipal sewage treatment and because of advancements in membrane technology, especially ultra filtration membranes. The

MBR in combination with reverse osmosis (for tertiary treatment) can offer sustainable results. The performance of this membrane based technology has created a very high level of interest among municipal authorities who are now increasingly contemplating the use of treated municipal waste water to augment the water supplies for industrial as well as other non-potable applications.

Final disinfection is a major challenge as it needs to balance costs and the treatment effectiveness. Pulsed UV light systems are at the forefront of waste water technology for final

disinfection because they destroy pathogens more effectively and at higher rate than traditional disinfection and standard UV systems.

Recycled water is most commonly used for non-potable purposes, such as agriculture, landscape, public parks and golf course irrigation, toilet flushing, car washing etc. Other non-potable, high end applications include cooling water and industrial process water. However, the uses of recycled water are expected to expand in order to accommodate the needs of the environment and growing water supply demands. Planned indirect potable reuse is thus likely to become more common in the not so distant future. Such projects would include augmenting surface water reservoirs and recharging ground water aquifers to enhance ground water supplies and to prevent salt water intrusion into coastal areas.

Apart from using membrane technologies, processes can be adopted that treat domestic waste water to a standard that allows them to be used for low end use or for discharge into inland surface sources without damaging them. Among these the advanced version of the LUCAS SBR (sequential batch reactor) technology is used extensively; it incorporates all the advantages of the SBR while eliminating all disadvantages of conventional systems as well as the variable volume SBR systems. This process treats the waste water to a standard higher than the conventional discharge norms along with removal of nitrogen and phosphorus. Removal of nitrogen and phosphorus makes the treated water suitable for discharge to lakes and rivers without hampering the water body. Removal of these nutrients ensures that the health of the receiving water body is preserved.

Apart from helping meet the growing demand for water, recycle of municipal waste water would also yield enormous environmental benefits such as avoiding the discharge of waste water into the surface waters that would reduce and prevent pollution, and preserving or augmenting ground water resources.

The future outlook for sustainable development and environment protection would be recycle and reuse of municipal waste water. However it requires public participation, better coordination among the various agencies involved, a need for policy, and the implementation & application of latest technologies.

Recycle Pays Quality Dividends

Our Resin division at Ankleshwar has been undertaking several initiatives to conserve natural resources. A recent quality improvement project selected by the team was Reduction in Water Consumption.

The water consumption norm set by the Gujarat Industrial Development Corporation (GIDC) was 647 KL/day. The proposed doubling of our plant capacity posed a major challenge of meeting water requirements without exceeding GIDC norms as, after expansion, the water requirement was expected to be 1000 KL/day. The anticipated water recycle through the RO unit was 100 KL/day. Hence, a quality improvement project initiative was undertaken, with the mission of reducing intake of water from 1000 KL/day to 647 KL/day with 100 per cent expanded production capacity utilisation.

A cross functional team studied the water consumption and water distribution across the entire plant, brainstormed, prepared a cause-and-effect diagram and formulated critical theories which were then assessed for validity and remedial action. An amount of Rs. 200,000 was invested in modifications throughout the plant to optimise consumption of water and to recycle water such as condensate, cooling and chilling water – together this generated water saving of 273 KL/day.

The water saving through this project (excluding RO recycle water) was 16,848 KL/month; the cost of water was Rs. 62/- per KL (Rs. 22/- water cost, Rs. 40/- cost of treating effluent before discharge) yielding an annual saving of around Rs. 12.5 million.

For irreversible gains, the team revised work instructions, drew up preventive maintenance schedules and carried out training of operators.

Thus these good water management practices for better water efficiency have provided environmental as well as economic benefits to the company.

A major problem facing numerous housing complexes is availability of regular water supplies, and many today are dependent on tanker water.

Recycle of sullage and sewage provides an effective and dependable solution in helping resolve the perennial water shortages in cities – where the domestic sector consumes 80 per cent of water supplies. It is, in fact, ideal for housing/commercial complexes which do not have guaranteed water supply, by providing them relief from water shortages.

Building in Water Assurance

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, reducing the requirement of fresh water by 60 per cent. This makes more fresh water available for drinking, cooking, bathing and laundry while reducing dependence on unreliable/insufficient water supplies and drastically cutting down on expenses on tanker water. Besides, with water getting increasingly scarce, it will soon be difficult even for tankers to procure these supplies.

A Case in Point

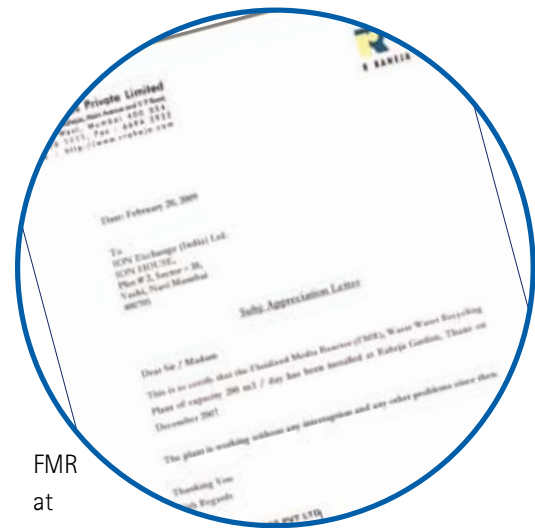
The well respected builder R. Raheja's project at Thane, Maharashtra has



a three-wing housing complex with a total of 480 flats. 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. 2.7 million annually.

A 200 m³/day INDION fluidised media reactor (FMR) was installed to recycle water. The total cost including accessories such as equalisation, treated water and holding tanks, was Rs. 4 million. A daily saving of 150 cu.m. fresh water which would have otherwise been used for secondary purposes, amounted to an annual saving of 55000 cu. m. of fresh water.

With an annual operating cost of the



FMR at Rs. 600,000 and an annual cost saving of Rs. 2.1 million, this recycle plant gave a payback in just 23 months. The additional cost incurred per sq. ft. (each flat admeasuring 1000 sq. ft.) was just Rs. 8.



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
- Area available
- Location
- Capital and operating cost
- Reliability
- Amount of sewage

If the quantity of sewage to be treated is quite high, fluidised media reactor technology may be the best. 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 make up, after appropriate tertiary treatment. For treatment of smaller quantities of sewage such as in small housing complexes, compact sewage treatment plants are more suited.

Some of our installations of INDION fluidised media reactors (FMR) and INDION new generation sewage treatment plants (NGPSTP) in the realty, hospitality and defence sectors include:

Realty Sector

- 11.5 m³/day NGPSTP for VG Properties, Goa
- 23 m³/day NGPSTP for ABW Construction, Delhi
- 300 m³/day FMR for MIR Constructions, Kerala
- For Punj Lloyd, Delhi, a 400 m³/day FMR
- Kanakadhara Ventures, Hyderabad, 150 m³/day FMR

Defence Sector

- 200 m³/day FMR each for MES Delhi and Nagpur
- 500 m³/day FMR for MES Shillong
- Two orders of 1 MLD each FMRs for MES, Udampur and Pathankot

Hospitality Sector

- 300 m³/day FMR for ITC Gardenia, Bangalore
- 150 m³/day FMR at Taj Residency, Lucknow
- 23 m³/day NGPSTP at Fort Hotel, Cochin
- Radisson Hotel, Jaipur, 100 m³/day FMR

Academic Institutions

- 4 units of NGPSTP, each 100 m³/day, for Indian Institute of Technology, Kanpur
- 150 m³/day FMR for Asian School of Business Management, Bhubaneshwar



At L & T Demag, Chennai, 35 m³/day NGPSTP



At Woodland Hospital, Shillong, 23 m³/day NGPSTP



At IIT, Kanpur, 100 m³/day NGPSTP



At Welcome Hotel, Saket, New Delhi, 200 m³/day FMR



At Taj Ummed, Ahmedabad 200 m³/day FMR



For Landmark Construction, Chennai, 10 m³/day NGPSTP



At Ginger Hotel, Pune, 46 m³/day NGPSTP



At Millanz Mall, Meerut, 34.5 m³/day NGPSTP

The Gift Of Sharing

Ion Exchange (India) Ltd. has set up the Ion Foundation to develop, undertake and assist charitable activities in the fields of education, health, medical relief, drinking water and environment protection. To start with, the Foundation is supporting the Chetna Learning Centre, which facilitates and aids the education of economically challenged children. The Foundation is also supporting the activities of Ion Exchange Services to assist the SOCARE Orphanage in the education and welfare of children of convicts.

Our socially and environmentally responsible approach is enshrined in the Ion Exchange vision 'To be the leader in our business which is vital to people's lives and the environment'.

Various CSR initiatives implemented include development of low-cost water purification to make safe drinking water increasingly available to the masses and development of technology for rural India for removing iron, nitrates, fluoride and arsenic contaminants from water to make it safe for potable purposes. Ion Exchange also provides its ZeroB drinking water purifiers, free or at subsidised cost, to

schools and educational institutions that cater to the lower economic strata. A training and employment initiative was the diploma course in water treatment operation, established in collaboration with the Babasaheb Ambedkar College, to provide practical and theoretical training and employment to the students. The organic herbal crop protectors developed by Ion Exchange Enviro Farms are yielding tremendous benefit to farmers, crops and soil by helping preserve soil, ground water and crops from the hazards of chemical pesticides.

The Ion Foundation will now bring all the various CSR and charitable initiatives under one umbrella.

Chetna Learning Centre

The Chetna Learning Centre was founded in 2002 by Dr. Aruna Sharma, wife of our Vice Chairman & Managing Director, with the objective of facilitating underprivileged schoolgoing children in the pursuit of education. It is run by Dr. Sharma on an honorary basis, along with two other volunteer teachers with sponsorship from Ion Exchange India and the Altrusa Club of Mumbai. Ion Exchange provided space for the classroom which can accommodate 16 students at a time.



Dr. Aruna Sharma, Founder, Chetna Learning Centre, with a group of students.

There is growing awareness amongst the urban poor about the importance of education. A large number of them spend substantial amounts on fees, books, etc. to send their children to English medium schools. In spite of this, there is a wide

gap between the children's potential and achievement, mainly due to the lack of remedial teaching (as most children are first generation learners). They are also unable to afford private coaching.

Chetna Learning Centre attempts to bridge this gap through remedial teaching on various subjects pertaining to their school curricula and teaching methods that recognise the individual capacity and potential. Scholarships are provided to deserving students for higher secondary and graduate education, in addition to career guidance.

- The centre has students from English, Marathi as well as Hindi medium



- At present there are 36 students studying at the centre in three batches





Our Community & Commercial Water Systems (CCWS) division donated 5000 Jal Shudhi disinfectant tablets, a 3000 litre/day capacity ZeroB water vending machine and 500 units of ZeroB Suraksha water purifiers to the Nargis Dutt Memorial Trust, for providing safe drinking water to Bihar flood victims. Presenting the contribution to Ms. Priya Dutt (centre), MP, Govt. of India are Mr. K.S. Raghuvver (left), General Manager - Institutional and Mr. Kishalay Chakravarty, Marketing Manager, Institutional Sales, of CCWS.



Drinking water plant donated to the inmates of SOCARE, being put into operation by Mr.D.G. Rao, Chairman, along with Mr.Dinesh Sadasivan, CEO, of Ion Exchange Services

- A few non-schoolgoing children are enrolled with the centre

The centre's library is stocked with help books, dictionaries, encyclopedias, thesauruses as well as story books and other recreational reading material and games. The Centre also provides psychological and emotional support to students and their parents on family and personal problems.



Achievements

- A remarkable improvement in the comprehension level and the academic performance of students after joining the centre
- Shift from rote learning to understanding and memorising, and an increased level of interest in learning
- About 150 students have benefited from the centre over the last seven years
- Several have appeared for the SSC Board (10th class), and passed with first or higher second division

Successful students are provided summer training with Ion Exchange and assisted with job placements.

Ion Exchange Services has tied-up with Trinity College of Technical Education, Pune for the training of their students. After successful completion of their term, selected students from each batch will be inducted into the company.



Ion Exchange Services and the Mass Trust & Handicapped Association in Chennai had shared the platform for assisting technically qualified unemployed rural candidates to develop a career in Water & Waste Water Management . A three month course on water treatment is being conducted by Ion Exchange Services and its first batch of 22 candidates will be joining the company.

Every year on Republic Day our Ankleshwar resin unit visits the Sarangpur Prathmik Shala to gift items to the school children based on their requirements. This year, stationery items such as compass boxes, sketch pen sets, crayons, pencils and rulers were donated to all 483 pupils studying in standards 1 to 7, along with a tricycle for the smaller children. After the flag hoisting, these gifts were distributed along with sweets.



OZONE – Preferred Choice for Disinfection

Ozone is fast emerging as the choice for disinfection because of its many distinct advantages over conventional disinfection systems. It has major applications in municipal water and waste water treatment, industrial process water and waste water treatment, and water disinfection for residential needs, hotels & clubs.

The use of ozone as a disinfectant is gaining popularity because of its

- High oxidation potential
- Ease of generation
- No formation of disinfection by-products
- Ability to improve bio-degradability of complex waste streams including detoxifying waste
- Environmental friendliness

These advantages make it eminently suitable for disinfection as well as process applications in the industrial, municipal and leisure sectors.

Q. What are the applications of ozone?

Ozone is primarily a strong oxidising agent and can be applied for various disinfection and process applications in industry. Ozone was first used by municipalities to control taste, odour and colour as well as for its germicidal action. Applications of ozone in waste water treatment include the destruction or removal of complex organic molecules, cyanides and phenols

from chemical waste, etc. In addition, subjecting municipal waste waters to a final ozone process enables their reuse for applications such as wash-water, irrigation, fire fighting systems or for industrial uses.

Ozone is also used extensively in industry in oxidation processes and for disinfection purposes. Typical examples of its use in industry are for pulp

bleaching in the paper and pulp industry, in the chemical industry where ozonolysis is necessary for the production of certain substances, and in cooling tower systems where ozone replaces the less desirable chemical biocides. The main applications of ozone can be broadly categorised as follows

Industrial:

- Disinfection of raw water
- Treatment of industrial waste water
- Process applications of ozone

Municipal:

- Disinfection of drinking water
- Treatment of sewage/municipal waste

Leisure:

- Treatment in swimming pools, spas, etc.

Some typical applications of ozone for waste treatment are described below:

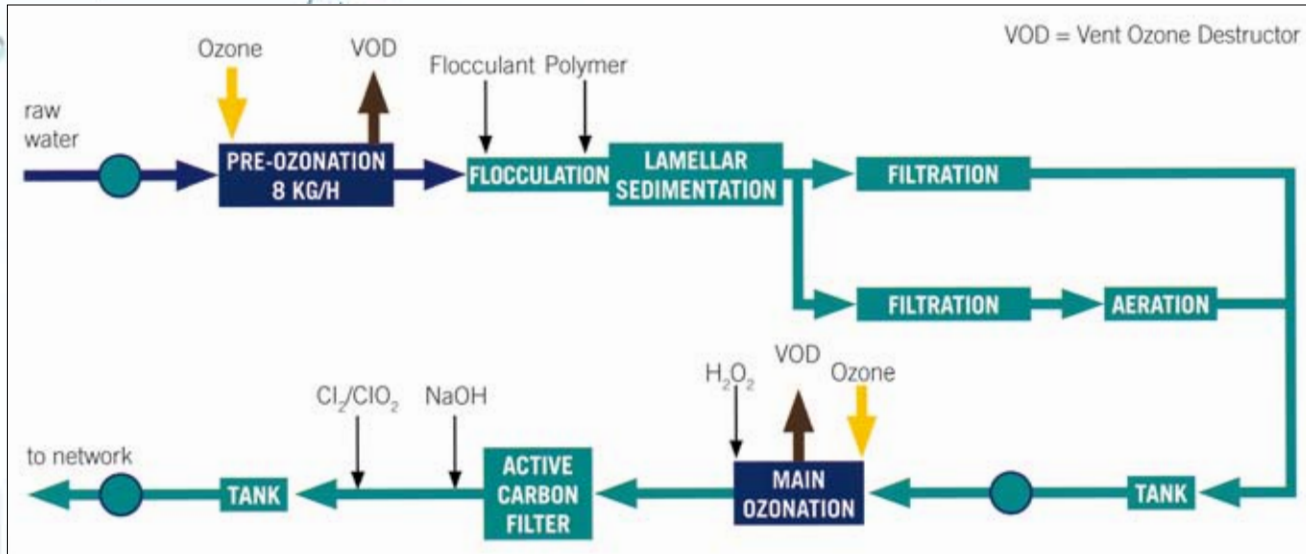
Complex organic molecules in order to improve biodegradability	Pharmaceutically active compounds (PACs) and endocrine disruptors
Colour from dye works' effluent, paper mills, etc.	Surfactants, detergents from washing centres
Cyanides and phenols from chemical waste	Odour elimination from urban waste water plants or industrial flue gas
Odours from condensates/wash-waters, which can then be recycled	

Q. Why is it beneficial to use ozone and what are the advantages?

It is an accepted fact that drinking water is disinfected when a residual of 0.4 mg/l of ozone has been maintained for four minutes (Typical CT). However, ozone has many additional benefits in the drinking water process.

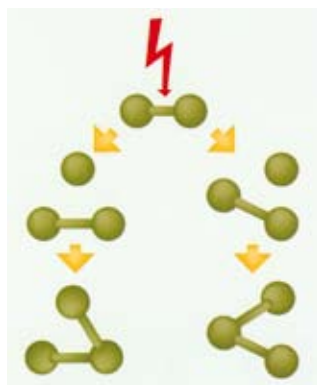
- Use of ozone in drinking water systems avoids the formation of disinfection by-products (DBPs) like Trihalomethanes (THMS) and HAA. These by-products are

Ozonation for drinking water



harmful to human beings and regulations in many countries limit these DBPs. Besides, DBPs are highest when conventional disinfectants such as chlorine are used.

- In waste water applications, ozone specifically breaks down trace contaminants and enhances the biodegradability of organic substances which are then removed in a biological treatment step.
- Finally, combined treatments involving ozone and activated carbon or ozone and peroxide are currently the most powerful means available to water process engineers for removing contaminants and to constitute a vital safeguard against accidental contamination.
- Viruses like cryptosporidium, which are not destroyed by conventional disinfectants like chlorine compounds and which are harmful in drinking water systems, are effectively destroyed by using ozone.



Ozone is formed by splitting oxygen molecules (O₂) into atomic oxygen (O), which then recombine with other oxygen molecules to produce ozone molecules (O₃).

Q. How is ozone produced?

Ozone is produced on a commercial scale by means of silent electrical discharge – the result of a high voltage alternating field acting between two electrodes separated by a dielectric and a narrow gap. The feed gas, usually air or oxygen, flows through the narrow gap across which the discharge occurs. The ozone generator's

electrodes are two concentric tubes, an outer tube made of stainless steel and an inner electrode formed by a layer of metal on the inside of a dielectric.

Various innovations in ozone generation have been introduced, by leaders in this field like Ozonia of Switzerland.

Ultra violet light is used to generate ozone typically in leisure applications like swimming pools and spas. The UV based ozone generators do not produce harmful by-products and there is also normally no need for expensive off-gas mechanisms.

Q. How is ozone used/applied?

Since ozone gas cannot be stored or transported, generation of ozone is done on site. The ozone generated is then fed to the water/waste water to be treated by various means including contact columns, diffuser mechanisms, etc. Due to the extremely high oxidation potential of ozone, contact times can be very short.

While dosage rates for drinking water/leisure applications are normally standard, waste water applications will need piloting in the lab and on the field to determine treatment capacity.

Q: What are the safety precautions and regulations for ozone?

While ozone systems are built with sufficient safety, it is essential to ensure that excess ozone is destroyed before venting into the atmosphere. With inbuilt safety in the design of ozone generation systems, the units are extremely safe to operate as well as being environment friendly.

It is essential however to choose a supplier with adequate knowledge and experience in the area of ozone generation and who can achieve the best overall conditions (prices, delivery and safety) for all types of pilot or industrial plants.

IESL-KBL Tie-up for Optimal Customer Care

Kirloskar Brothers Ltd. (KBL), the largest pump manufacturer and turnkey water project contractor in India with a global pump business, and Ion Exchange Services Ltd. (IESL) entered into a strategic service tie-up to expand and enhance customer service in the building and construction segment in India. The tie-up will offer comprehensive pumping solutions backed by 24x7 service support to this segment which primarily comprises hotels and resorts, malls, multiplexes and cinema halls, hospitals, airports, metros, large residential and all commercial complexes including SEZs.

This strategic association between KBL and IESL boasts of an all India network with 1200 qualified and trained service personnel of IESL, backed by KBL's 1000-strong brigade of authorised and technically qualified sales dealers. Together, this strong combination will provide pre- and after-sales service to clients, offering cost effective pumping solutions best suited to their needs and customised service packages.

The requirement of servicing for pumps is generally felt to be



The MOU being signed by Mr. Dinesh Sadasivan, (seated – left) Executive Director & CEO, IESL and Mr. Pradeep Chapalgaonkar, Vice President and SBG Head (IP), KBL. Gracing the occasion were Mr. Sanjay Kirloskar, Chairman & Managing Director, KBL, Mr. Rajesh Sharma, Vice Chairman and Managing Director, Ion Exchange India, along with other Directors of the companies.

critical for utilities like drinking water supply, air conditioning systems, water and sewage treatment, firefighting, swimming pools and gardens, etc.

Commenting on the tie-up, Mr. Sanjay Kirloskar said, "When a pump customer entrusts the operation and maintenance of his pumping systems to branded and reliable companies like KBL and IESL, which have been operating in India for several decades and understand the local needs, they can

rest assured of spending the minimum possible on maintenance and getting maximum value through trouble-free, round the clock service. This association will ensure that everyone will get uninterrupted, potable water supply economically. This association will help us to reach our customers better, whether they are located in big cities or in small towns. This will also ensure that every Indian gets uninterrupted water supply of the best possible quality while allowing utility providers to do so in the



Mr. Sanjay Kirloskar, (left) Chairman & Managing Director, KBL and Mr. Rajesh Sharma, Vice Chairman and Managing Director, Ion Exchange India unveil the new service offering.

most economical manner."

Announcing the service alliance, Mr. Dinesh Sadasivan stated, "The tie-up with KBL represents a strategic expansion of services in water conservation and energy savings to KBL customers in the building and construction segment." He briefed the audience on IESL's Total Water and Waste Water Management Solutions, Operation & Maintenance Services and approach to servicing of any make or type of water and waste water treatment equipment. He also dwelt on the expertise and synergy of the two companies which make for a truly unique offering vis-à-vis other service providers.

Major O&M Contracts

- Additional O&M order from Chennai Petroleum Corporation Ltd., Chennai for their 2.5 MGD sewage reclamation project plant-2. With this, we are now running one of the largest sewage reclamation plants in India.
- From JSW Bellary's CRM unit at Karnataka renewal of O&M contract for DM and effluent treatment plants.
- Three year O&M contract from Areva, Hosur along with order for water and sewage treatment system. The comprehensive O&M contract will include supply of manpower and chemicals and consumables for their uninterrupted supply of quality water at the unit.

- Ion Exchange Services is on the approved list of laboratories of Karnataka State Pollution Control Board
- Its laboratory has been re-certified under National Accreditation Board for Testing and Calibration Laboratories (NABL)

Railneer Plant Upgradation

Inauguration of the upgraded Railneer bottling plant to 8500 cartons/day at Indian Railways Catering and Tourism Corporation Ltd. (IRCTC) Nangloi facility, near Delhi.





At the Municipalika Exhibition, Mumbai



India International Trade Fair, Delhi.

Ankleshwar Celebrates Republic Day...



...and Sports Week



Our Chennai office employees & their families on a trip to the popular Yelagiri hill station in Tamil Nadu.



Powergen,
Delhi



AceTech
Exhibition,
Mumbai



Chemtech
Exhibition, Mumbai



Mr Rajesh Sharma's address at the
India Day Aquastage presentation,
Aquatech Conference, Amsterdam



Aquatech
Exhibition at
Amsterdam



Jal Tarang



The Ion Exchange annual celebration, Jal Tarang, provided the ideal forum to present long service awards and to showcase the multi-faced talents of employees and their families; it was also an occasion to connect more closely with each other and get to know the families. Enthralling music, songs, dances and skits filled the enjoyable evening with everyone in cheerful, festive spirit.



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