IEI News
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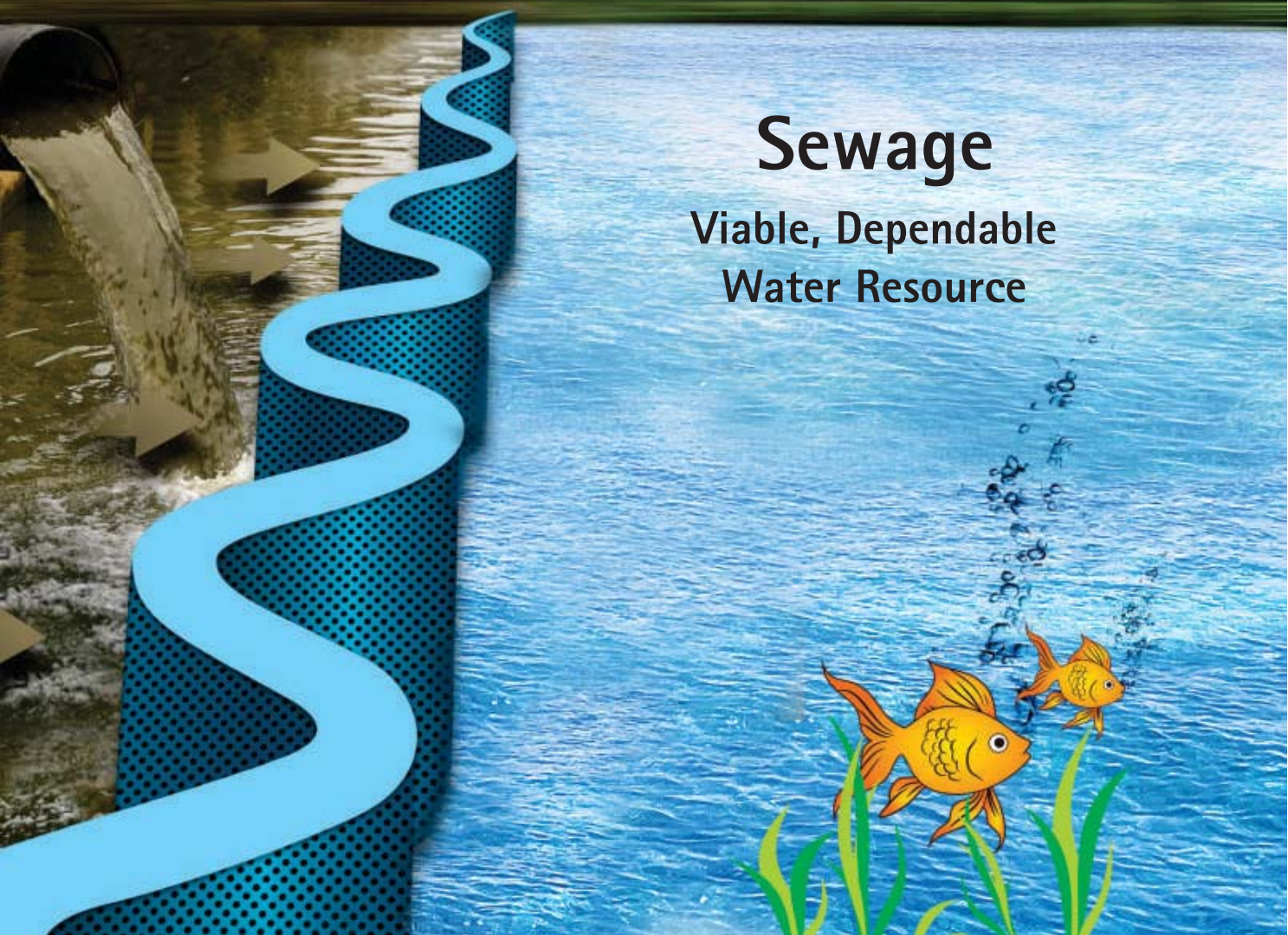
5 YEARS OF TRUST

Sewage

Viable, Dependable Water Resource



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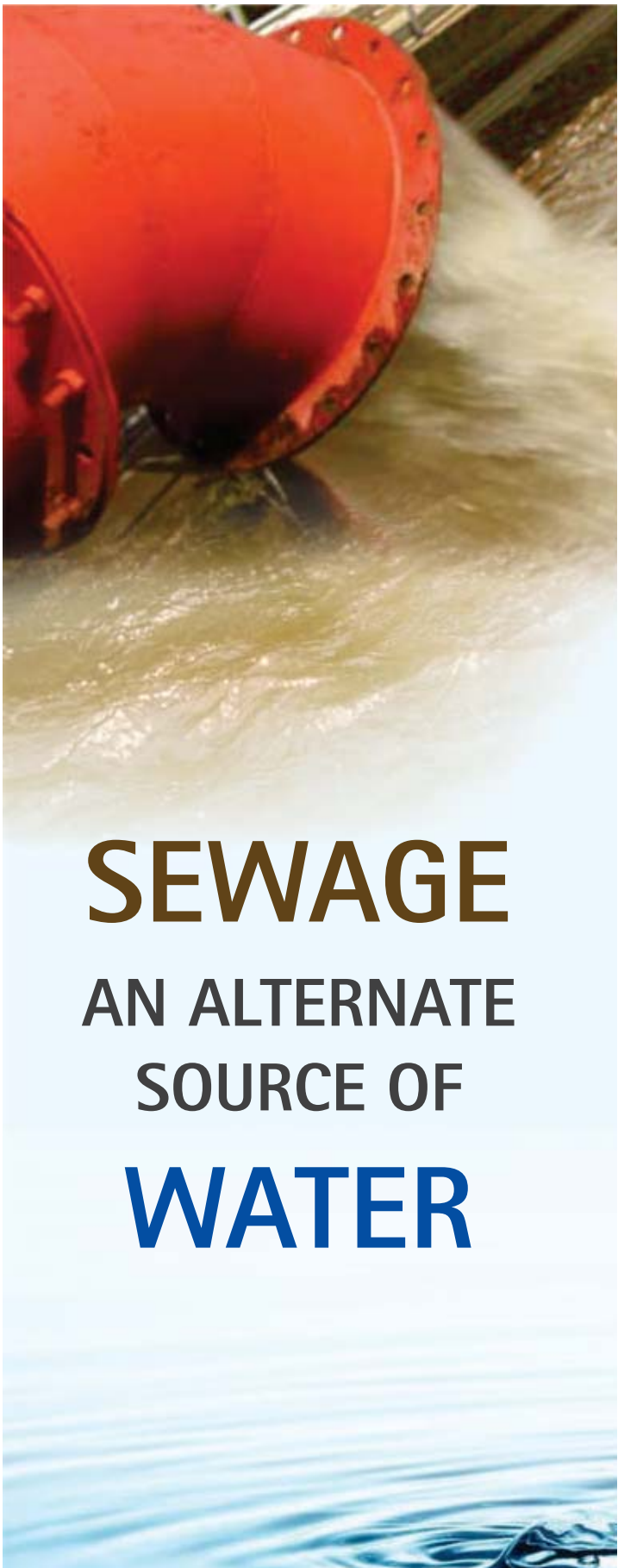


As water scarcity becomes increasingly critical, the emerging trend is to utilise alternate sources of water supply. These include sewage and waste water recycle, rain water harvesting, desalination of sea water, generating water from humidity in atmosphere, etc. Of these, recycle of sewage is rapidly gaining ground as a viable and dependable alternative source of water for specific uses. Sewage has the advantage of consistent availability - as long as water is used for various domestic purposes, sewage will be generated. Another advantage is that sewage is available at the point of use and so decentralised treatment of sewage is also practicable. Finally, recycle of sewage is also significant from the hygiene and sanitation point of view, to help create a cleaner, healthier environment.

Municipal Waste Water Reuse

Currently in urban and semi-urban areas, municipal waste water is partially treated and disposed of. Instead, treating sewage for reuse considerably reduces pressure on municipal water supply authorities as well as the load on the environment. Many progressive municipal corporations are therefore in the process of implementing waste water reclamation. Recycled water can satisfy most water requirements as long as it is treated to ensure water quality appropriate for the reuse application. Recycled water is most commonly used for non-potable purposes such as agriculture, landscaping, public parks and golf course irrigation, toilet flushing, car washing, etc. Other non-potable high end applications include cooling water and industrial process water. Companies like Chennai Petroleum Corporation and Madras Fertilisers were among the first in India to use treated municipal sewage for industrial use.

Ion Exchange is implementing various sewage reuse projects to meet the water requirement of industries. This includes the first of its type 117 MLD sewage recycle project to meet a private company's power requirement and a 30 MLD project to meet water requirement in an acutely scarce water area.

However, the uses of recycled municipal waste water are expected to further expand in order to accommodate the needs of the environment and growing demands of water supply. Planned indirect potable reuse is thus likely to become more common in the near 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. In fact, to meet their water challenges, countries like Singapore are pursuing recycle of sewage and waste water so aggressively that the treated water, though largely used for industrial purposes, is also adding to the drinking water supply.

Treatment Technologies: Various technologies are available to treat municipal waste water. For small community systems, technologies include packaged aerobic treatment systems and membrane filtration. The major benefits of these easy-to-operate and inexpensive systems are that higher quality effluent can be discharged to ground water for indirect use. They can also be used for large construction sites, disaster relief operations, etc. Constructed wetlands with sufficiently large land area can provide adequate passive treatment. Aerobic and anaerobic conditions of these systems along with micro-organisms, vegetation and gravel filters provide majority of the treatment.

One of the most efficient technologies for treating and recycling sewage is membrane bio-reactor (MBR) technology. Its success is due to greater understanding of the biological treatment so far adopted for municipal sewage treatment and because of advancements in membrane technology, especially ultra filtration membranes. Thus, MBR in combination with reverse osmosis (for tertiary treatment) can offer sustainable results; its performance has created keen interest among authorities planning for centralised and decentralised waste water treatment by using treated municipal waste water to augment water supplies for industrial as well as other non-potable applications.

Apart from membrane technologies, several processes can be adopted that treat domestic waste water to a standard that allows it to be used for low end uses or for discharge into inland surface sources without damaging them. Among these, the advanced version of sequential batch reactor (SBR) and moving bed bio-reactor (MBBR) are gaining acceptance for centralised as well as decentralised waste water treatment. However, conventional activated sludge process continues to be the preferred choice for large scale municipal sewage treatment plants (> 50 MLD).

We were the first to introduce SBR and MBR technology in 2005. We supplied the Goa Municipality with the then largest sewage treatment plant of 12.5 MLD based on SBR technology to treat domestic sewage and have more than 50 references for MBR.

Final disinfection is a major challenge. Advancements in electro-chlorination technologies that include on-site sodium hypochloride generators have balanced cost and treatment effectiveness. Pulse UV light systems and ozonation provide options at a higher price band for critical reuse applications as they destroy pathogens more effectively and at a higher rate than traditional disinfection and standard UV systems.

Water Assurance with Packaged Systems

A major problem faced by housing and commercial complexes, hotels, resorts, hospitals, academic institutions and malls is availability of regular water supplies; many today are dependent on tanker water. Recycle of sullage and sewage using decentralised packaged sewage treatment systems provides an effective and reliable solution to help augment water supply and resolve water shortage. Ion Exchange offers a range of technologies which include packaged sewage treatment plants based on membrane bio-reactor (MBR), sequential batch reactor (SBR), moving bed bio-reactor (MBBR) and an advanced version of attached growth process (NGPSTP). While selecting the treatment technology the following points need to be considered:

- End Use
- Capital Cost
- Operating Cost
- Area Available
- Life Cycle Cost
- Location
- Quantity of Sewage

If the quantity of sewage to be treated is >1 MLD, moving bed bio-reactor or sequential batch reactor are preferred options. Here, while capital cost is lower, the quality of treated sewage 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 treating smaller quantities of sewage such as in small housing complexes, sewage treatment plants like advanced version of attached growth process (NGPSTP) are more suitable as they are compact, user-friendly, and minimise the use of power and chemicals to treat and reuse sewage.

Managing Sewage Sludge

Sludge or residual solids are the by-product of biological or physical/chemical processes of sewage treatment. As more sewage treatment plants (centralised and decentralised) are installed, more quantity of sludge will be generated and sludge disposal will become a concern. Thus, sludge management is essential. However technologies to condition, treat and manage sludge are widely available. The most cost-economic treatment process for sewage sludge treatment is anaerobic digestion which, apart from treating sludge generated after sewage treatment, also produces biogas which can be used as a source of heat or/and power. The process of anaerobic sludge digestion also produces organic fertiliser.

Required – Holistic Approach

Water has become a major limiting factor that will increasingly jeopardise development and growth in many countries. About 884 million people - 1 of every 8 in the world - still lack access to safe drinking water, according to the World Health Organization and UNICEF. Meanwhile, water use has increased by more than double the rate of the world's population growth during the past century according to United Nation's data.

Water scarcity, high cost of raw water, stricter consumption and discharge norms have resulted in increasing adoption of water recycle by industry as well as residential and commercial complexes. Municipal corporations, homes and communities have various options not only to treat and discharge sewage/sullage but also use them as an alternate source to augment water requirements. Treatment of sludge along with organic kitchen waste provides a viable option to convert water into energy. In combination this will also considerably improve sanitation and hygiene conditions, a major requirement for the successful implementation of the Swachh Bharat initiative. However this requires a need for policy, better coordination among various agencies involved, the application of latest technologies and public participation.

Sewage Recycle – Sustainable Solution for Water Security & Clean Environment

Ion Exchange has used a range of technologies to meet end use requirements and choice of centralised & decentralised sewage treatment, like the membrane bio-reactor, moving bed bio-reactor, sequential batch reactor and advanced version of attached growth process for treatment and recycle of industrial effluent and municipal sewage, as well as in sectors like realty, defence, hospitality and academic.

Restoring Clear Waters

Sewage Reclamation at Hebbal Lake

East India Hotels and Ion Exchange took up the cleaning and restoration of the 50 hectare Hebbal Lake in Bengaluru. To abate eutrophication of the water body we installed a 4 MLD sewage reclamation plant based on cyclic activated sludge process (sequencing batch reactor) with co-current removal of nutrients. This technology is ideal for sewage and industrial effluent reclamation as it offers a very compact modular solution (requiring just 25 per cent of conventional systems) that is also very user-friendly, with PLC operations. The treated sewage, free from organics and nutrients, is used to replenish water losses from this large lake. The restored lake has also added to the aesthetics and value of the area.

Chalking Up Firsts

Sewage Recycle for Power Generation at India Bulls

Ion Exchange designed, engineered and constructed a 117 MLD tertiary treatment plant comprising INDION

DynaDisc and INDION DynaSand Oxy filter with contact chlorination system and sludge management. This is one of the largest tertiary treatment plants in the Indian industrial sector. The treated water from the plant will be source water to India Bull's upcoming 5 x 270 MW power plant in Sinnar, near Nasik, Maharashtra making this the first plant in India to completely use recycled sewage for power generation, when commissioned.

This plant will also be operated and maintained by us. The technology was selected based on its lower footprint, capital and operating costs, including replacement costs and maintenance requirements when compared to competing technologies like membrane systems.

Municipal Sewage Treatment & Recycle

A water security policy for sustainable development must embrace a 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.

Breaking Ground

Innovative PPP Model for Treating and Reusing Municipal Sewage by Industry

We have been awarded an innovative public private partnership (PPP) order for a 30 MLD sewage treatment plant in Kutch, Gujarat. The contract is for design, engineering, supply, erection and commissioning of the sewage treatment plant, and includes its operation and maintenance. The treated sewage will be sold to the industry.

GUDC Awards Sewage Treatment Plants

Gujarat Urban Development Company Ltd. (GUDC) has been designated the nodal agency by Government of Gujarat for the implementation of water supply and sewerage schemes for the urban local bodies (ULBs) identified under the Swarnim Jayanti Mukhya Mantri Saheri Vikas Yojana. GUDC announced EPC contracts for setting up municipal sewage treatment plants for various ULBs of Gujarat state. Ion Exchange has been awarded the following projects through competitive bidding. The scope is for design, building and commissioning, with O&M for two years, of sewage treatment plants, based on conventional activated sludge process.

At Mehsana, Dist. Mehsana: Sewage treatment plants of 23.18 MLD capacity at Nagalpur and of 18.46 MLD capacity at Kasba; also construction of staff quarters and compound wall.

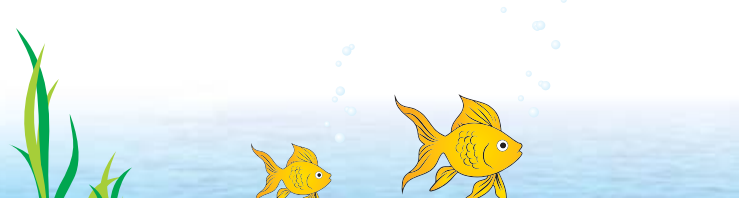
At Mahuva, Dist. Bhavnagar: 21.72 MLD capacity sewage treatment plant; also construction of staff quarters, cleaning of existing sewer line, and replacing blockage line and jetting machinery.

At Kadi, Dist. Mehsana: 16 MLD capacity sewage treatment plant including construction of house connection chamber, cleaning of existing sewer, collecting system of *gamthal* and repairing of existing oxidation pond.

At Visnagar, Dist. Mehsana: 22.42 MLD capacity sewage treatment plant including construction of office building, laboratory and wire fencing.

All these sewage treatment plants comprise of the following major treatment units:

- Inlet chamber, screen channel (bar screen), grit chamber & flow measuring channel - Parshall flume
- Distribution chamber for primary clarifiers
- Primary clarifiers and pipeline from primary clarifiers up to the distribution chamber of aeration tanks
- Distribution chamber of aeration tanks and aeration tank with surface aeration system (activated sludge process) and distribution chamber
- Distribution chamber at outlet of aeration tank for secondary clarifier and pipeline from aeration tank outlet chamber to each secondary clarifier
- Secondary clarifiers
- Chlorine contact tank along with chlorination room with chlorination system and final (treated) effluent pipe from chlorine contact tank up to disposal end
- Sludge digester and pumps for digester mixing with pump house
- Gas holder
- Dewatering system comprising of sludge drying beds and dry sludge collection and disposal system
- Primary/raw sludge sump with pump house and return sludge sump and pump house with the return sludge and excess sludge pumps
- Digested sludge sump and pump house
- Filtrate sump and pumps
- Auto ignition gas burner for bio-gas



Decentralised Sewage Treatment Plants

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 expenses of tanker water. Besides, with water getting increasingly scarce, it will soon be difficult even for tankers to procure these supplies.

Our INDION packaged sewage treatment/recycle systems have found demand in diverse sectors including construction and housing, malls, hotels and eco-resorts, hospitals and commercial complexes. Some of our recent installations are highlighted here.

Putting Waste to Constructive Use

MBR for Sewage Treatment at Jebel Ali, Dubai

Membrane bio-reactor

The INDION MBR-based sewage treatment plant at Jebel Ali, Dubai treats sewage from the labour accommodation of the client, Wade Adams, a major civil contracting company. The treated water is used for concrete curing and mixing at the client's construction sites. Another 500 m^3/day MBR and a fluidised media reactor (FMR) of 200 m^3/day were also supplied to this client.

Fluidised media reactor

Leading the Way to Water Efficiency

A 400 m^3/day INDION MBR for sewage treatment and recycle for zero discharge at HCC's 247 Park in Mumbai. The outlet water is used for toilet flushing and cooling tower make-up.

Eco-wise Luxury

Sewage Recycle with MBR at ITC Maurya, Delhi

The ITC-Welcomgroup entered a new phase in its collaboration with Starwood Hotels & Resorts, 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. In keeping with ITC's eco-vision, the renovation included environment friendly features, with zero discharge by recycling over 300 m^3/day waste water as a prime initiative. Ion Exchange's proposed installation of MBR was preferred for this project. The selection was based on our experience, capability, back-up service and local presence. Playing a key role in the award of the contract were our many full scale installations in India and our proposals to incorporate flat sheet MBR modules with their many advantages in terms of cleanability of membranes surface, over the competing hollow fibre modules.

The treated water is 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.

Welcome Factor with MBR & NGPSTP

- Hyatt Hotels Corporation, Hyderabad, Telangana
- Taj Resorts, Junagadh, Gujarat
- ITC Sheraton, Delhi
- The Leela, Delhi and Chennai

A Realty Check for FMR & NGPSTP

- Ratan Housing Development Ltd., Kanpur and Pune
- Eldeco Group, Lucknow and Gurgaon
- Silver City Housing Infrastructure Ltd., Jalandhar and Chandigarh
- Sobha Limited, Bengaluru

Fluidised media reactor

A Clean Bill of Health with FMR & NGPSTP

- Woodlands Hospital, Shillong
- Birla Hospital, Jaipur

New generation packaged sewage treatment plant

At the Front with FMR & NGPSTP

- Defence Research and Development Organisation (DRDO), Delhi and Visakhapatnam
- Assam Rifles, Shillong, Meghalaya
- Military Engineering Services, Nagpur, Pathankot, Visakhapatnam and Delhi
- Army Welfare Housing Organisation, Dehradun
- Indo Tibetian Border Police, Guwahati, Assam

Cleanliness Next to Godliness with FMR

- Maa Chintpurni Temple, Una, Himachal Pradesh
- Girnar Temple, Junagadh, Gujarat

Academic Honours for FMR & NGPSTP

- Indian Institute of Technology, Kanpur, Patna, Allahabad and Delhi
- Delhi Heart Institute and Multispeciality Hospital, Bhatinda, Punjab
- Nirma University, Ahmedabad, Gujarat
- Gujarat National Law University, Gandhinagar, Gujarat
- Birla International School, Jaipur, Rajasthan
- Manipal University, Bengaluru, Karnataka
- Rajiv Gandhi Institute of Petroleum Technology, Raebareli, Uttar Pradesh

New generation packaged sewage treatment plant

Advanced Integrated Process for Energy Recovery through Integration of Waste Water and Organic Solid Waste

ANDICOS® Waste to Energy System

VITO NV Belgium, Europem NV Belgium and Ion Exchange (India) Ltd., have entered into a technical cooperation agreement to promote the ANDICOS® waste to energy system, a technology concept for maximum energy recovery from concentrated waste streams. The concept and methodology are based on reductive processes that generate energy – primary treatment of methane fermentation or dark hydrogen fermentation and secondary treatment steps of bio-electrolysis, microbial fuel cells or secondary anaerobic digestion. These processes result in energy generation in the form of methane, hydrogen or electricity.

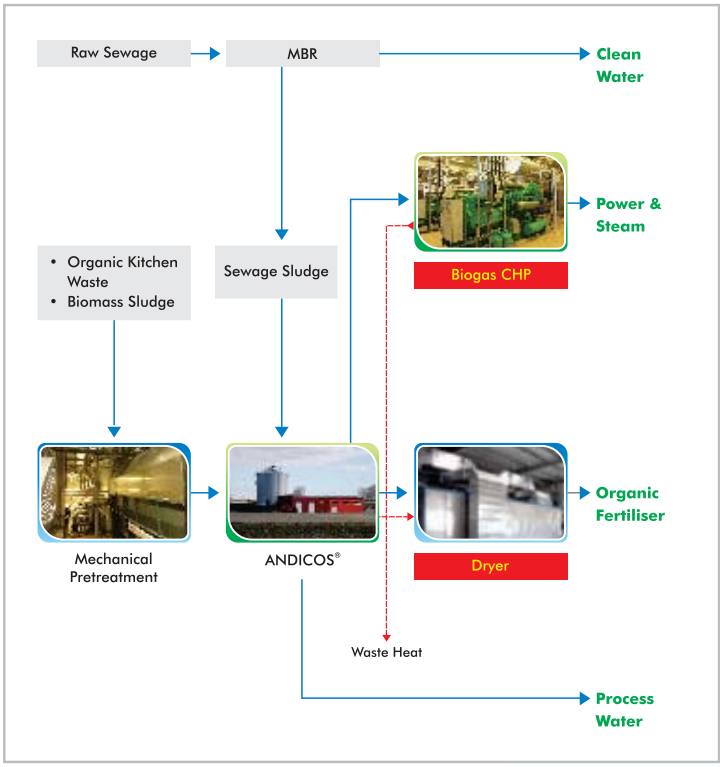
In most parts of the world including India, domestic sewage and domestic waste are collected and treated separately. Services for waste water treatment and waste management are also provided by different (public or municipal) organisations.

The objective of traditional waste water treatment is to remove pathogens and protect the environment. However, the cost of this treatment is substantial both in capital expenditure and in operational costs, especially energy costs for aeration. No products are generated from traditional waste water treatment other than treated effluent which is discharged into water bodies or used in irrigation. State-of-the-art technology for the treatment and safe discharge of domestic sewage is aerobic treatment, with typically-

- A primary treatment phase (removal of suspended solids and grit)
- A secondary treatment phase (biological degradation by injection of large amounts of air)
- A tertiary treatment phase (removal of nutrients such as nitrogen and phosphorus)
- Excess sludge treatment either by digestion, drying and/or incineration

The other solid waste problem is organic municipal solid waste, which in many countries is still disposed of in landfills or treated in composting facilities. When disposed off in landfills they generate landfill gas which often escapes into the atmosphere but which can be captured to run e.g. a gas engine for power generation.

The ANDICOS® design takes a radically different approach using a novel combination of proven technology to manage the problems of sludge, organic waste and municipal solid waste, and generate electrical power and heat.



Here, sludge generated during treatment and/or domestic waste water is combined with organic domestic waste either at source (households) or at the treatment facility for a combined treatment process. Focus is on simultaneously ensuring environmental protection and resource recovery from waste.

Domestic sewage or sludge is enriched with organic waste (or manure) to increase the overall BOD/COD load to a level that is sufficient to maintain an anaerobic waste water treatment process. This anaerobic treatment process generates biogas, sludge and clean effluent.

Clean effluent can be sent to a filtration stage or aerobic polishing stage to meet the most stringent discharge limits or to ensure that the effluent is of sufficient quality for reuse. However, the biggest advantage of anaerobic treatment is that it eliminates the need for expensive blowers to support an aerobic treatment process. Hence, the power requirements for waste water treatment are reduced (by almost 60 per cent) whilst the investment cost is similar.

Biogas is treated and converted in a gas engine to generate electrical power and heat.

The heat from the biogas engine is used to dry the excess sludge to produce an organic fertiliser that meets the required hygienic standards for use in agriculture and landscaping.

None of the processes carry any technological risk or uncertainty since they are all widely used and proven. The process innovation focusses on integration of existing technologies to provide a holistic approach to energy, waste and waste water management.

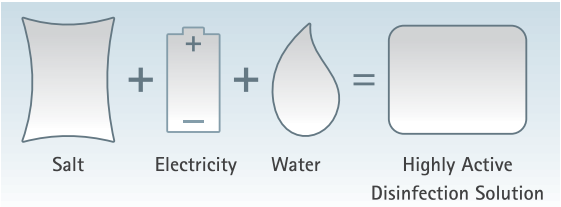
A plant to treat sewage sludge and organic waste generated by 3000 people combines waste water treatment together with organic kitchen waste in an anaerobic treatment process. Here, the waste water treatment is already present on-site and the sludge treatment stream is fed directly into the ANDICOS system and transformed into:

- Biogas production: 22000 m^3/day i.e. 2 MW electrical power / 3 MW thermal power
- 8 tonnes/day of organic fertiliser

This integrated waste and waste water management system is a net power generator, compared to conventional systems that consume large amounts of energy.

INDION® Electro-chlorination for Disinfection

Our INDION electro-chlorination system produces highly active disinfection solution on-site, using salt, water and electricity for on-site production of fresh, highly active chlorine for effective disinfection of water, treated industrial effluents and sewage.



Electro-chlorination is the process of producing hypochlorite by running an electric current through salt water solution. As the water flows between the cathode/anode channel a low voltage DC current is applied, triggering electrolysis. The process produces highly active sodium hypochlorite.

Varied Applications

- Disinfection of treated sewage, industrial effluents
- Drinking water - bottled water plants, municipalities, hospitals, hotels, etc.
- Circulation water - swimming pool water, fountains, cooling towers, etc.
- Process water - food industry, brewery industry, agriculture, livestock breeding, etc.

Many Advantages

- Fresh - local production, no age-related loss of effectiveness
- Ultra pure - highly active disinfection solution without impurities and supplements
- Operating hazards, such as with chlorine gas systems do not exist
- No transportation of hazardous chemicals plus reduces logistic cost
- No regular handling of chemicals on-site and thus, no need of special safety equipment

System Features

- Use of natural brine or sea water for electrolysis
- Standard skid and wall mounted units
- Reliable operation, even under extreme conditions (temperature, humidity, etc.)
- Standard systems available producing 30 grams Cl_2/hour to 10000 grams Cl_2/hour
- Remote monitoring system with touch screen for process control
- Low operating costs (electricity, water and salt)

Engineering Contracts

Metro Tracks

Water treatment plants for Bangalore Metro, Karnataka (multigrade, activated carbon filters and softener) and Hyderabad Metro Project, Andhra Pradesh (multigrade, activated carbon filters and reverse osmosis).

Good Chemistry

A 43 m^3/h demineralisation plant from K. P. R. Industries (I) Ltd., for their chloro alkali plant near Rajahmundhry, Andhra Pradesh. The major product is caustic soda and the demineralised water will be used for process.

For Gujarat Heavy Chemicals Ltd., order for 100 m^3/h nano filtration system for their plant at Sutrapada, Veraval, Gujarat; the processed water will be used for brine preparation.

A Menu of Solutions

Two stage stainless steel reverse osmosis plant, 30 m^3/h, from Tetra Pak India Ltd., Maharashtra. The complete plant - pretreatment, reverse osmosis (RO) and softener, is automated and the treated RO water is used for process in the dairy industry. Another plant too, of 100 m^3/h consisting of two stages RO plus softener, for this client.

30 m^3/h and 25 m^3/h applied ion exchange systems for glucose deashing supplied to Cargill India Pvt. Ltd., Davangere, Karnataka.

An applied ion exchange system supplied for oil purification to Abhay Cotex Pvt. Ltd., Dhule, Maharashtra.

Water treatment plants - multigrade and activated carbon filters, reverse osmosis and ultra filtration, to Enrich Agro Food Product Pvt. Ltd., (Coca Cola), Rohtak, Haryana.

Water treatment plant comprising multigrade filter, ultra filtration, reverse osmosis and softener from Penver Products Pvt. Ltd., Nellore, Andhra Pradesh.

Successfully Commissioned

Chemical Bonding

Effluent treatment solution provided to Gujarat Fluorochemical's polytetrafluoroethylene (PTFE)

manufacturing chemical complex at Dahej, Gujarat. The 1250 m^3/d plant for treatment of fluoride in the effluent comprises high rate solids contact clarifier, multigrade and activated carbon filters.

Water treatment plant commissioned at leading fertiliser conglomerate, Zuari Agro Chemicals at Goa. The 500 m^3/d

ultra high rate solids contact clarifier is installed to treat iron and manganese in the influent water.

A repeat order from Gujarat Heavy Chemicals Ltd., for 2.4 MLD desalination plant along with 755 m^3/h pretreatment and 100 m^3/h sea water reverse osmosis plant.

Oil's Well

First total water treatment and zero liquid discharge project in India's vegetable oil industry for Bunge India at Kutch, Gujarat, with the addition of third stage reject reverse osmosis plant to the existing effluent treatment and recycle plant, which was also supplied by Ion Exchange.

Steeling Up

At IISCO Steel plant, Burnpur, Asansol, West Bengal a turnkey contract comprising construction of intake raw water reservoir with pumps and pumphouse, cross country piping, water treatment plant, make-up water piping network, drinking water network and overhead tanks. The raw water reservoir is of 2,80,000 cu.m, water treatment plant of 2 x 1950 m^3/h, overhead tanks of 1950 cu.m and 100 cu.m and the cross country pipeline is of 44 kms.

Commissioned water treatment system at JSW, Bellary for their 12 MT steel melting shop

Shining Bright

We commissioned a large number of plants in the power sector.

For 2 x 135 MW Madhucon's coal based thermal power project, a 4.8 MLD desalination plant comprising 2 x 1400 m^3/h and 2 x 100 m^3/h sea water reverse osmosis (SWRO), 2 x 35 m^3/h brackish water reverse osmosis (BWRO) and 2 x 60 m^3/h demineralisation plants.

A 440 m^3/h effluent treatment plant to treat effluent generated from the coal gasification plant at Jindal Steel & Power's greenfield expansion project at Angul, Orissa.

For Jindal India Thermal Power Ltd., total water treatment plant for their 2 x 600 MW coal based thermal power project at Angul. The plant comprised 2 x 1750 m^3/h pretreatment, 2 x 83 m^3/h demineralisation, 3 x 510 m^3/h condensate polishing units for each unit, 3 x 110 kg/h chlorination system, 14 x 185 m^3/h side stream filters and cooling water system.

A 2 x 1500 m^3/h pretreatment plant, 2 x 75 m^3/h ultra filtration-reverse osmosis plant and 3 x 65 m^3/h demineralisation plant for Haldia Energy's 2 x 300 MW thermal power project at Haldia, West Bengal.

Total water treatment plant for 2 x 660 MW thermal power plant of DP Power Ltd., through L&T at Chhattisgarh. The scheme comprised 3 x 2000 m^3/h pretreatment plants, 3 x 100 m^3/h demineralisation plants, plus chemical dosing and cooling water systems, 3 x 800 m^3/h condensate polishing units for each unit and 16 x 290 m^3/h side stream filters.

At NTPC, Jhajjar, Haryana, fully automated 3 x 100 m^3/h demineralisation plants.

On Stream

At Satpura Thermal Power Station Ion Exchange provided a turnkey water treatment package comprising 1800 m^3/h pretreatment plants, 2 x 75 m^3/h

demineralisation plants, 2 x 80 m^3/h effluent treatment and recycle plants,120 m^3/d sewage treatment plant and cooling water systems through McNally Bharat Engineering Company Ltd., for Madhya Pradesh Power Generating Company.

For GMR's 2 x 685 MW thermal power plant at Raipur, Chhattisgarh, a water treatment plant consisting of 2 x 2000 m^3/h pretreatment, 2 x 50 m^3/h effluent treatment and recycle plant, circulating cooling water system and 9 x 220 m^3/h side stream filtration plant.

Water treatment for Reliance Infrastructure's first ever ultra mega power plant, the 6 x 600 MW Sasan project at Singuri, Madhya Pradesh.

The plant comprises pretreatment - high rate solids contact clarifiers 4 x 2850 m^3/h for cooling water and 300 m^3/h for demineralisation application, and PLC based 3 x 135 m^3/h demineralisation plant. The pretreated water is fed to the cooling tower, other auxiliaries and equipment while the post treated water is feed for the supercritical boilers.

At CSCE Ltd., Haldia 2 x 1500 m^3/h pretreatment, 2 x 84 m^3/h ultra filtration, 2 x 75 m^3/h reverse osmosis and 3 x 65 m^3/h demineralisation for the 2 x 300 MW coal based thermal power plant.

Zero Liquid Discharge for Reliance Industries

Ion Exchange was selected to design the zero liquid discharge (ZLD) system, on engineering, procurement and construction basis, for Reliance Industry Limited's polyester fibre manufacturing unit at Silvassa, Gujarat. It is the largest in one site with a capacity of 1250 tonnes per day (TPD).

The waste treatment is carried out in a dedicated PLC-HMI based automated effluent treatment, designed to treat all organic, raw and utility waste water with the objective of zero liquid discharge from the manufacturing unit. Depending on the nature of the waste, effluents are segregated into three streams. Each of the organic waste streams is treated in a multistage process to meet requirements for its use for cooling tower make-up water. The effluent treatment plant includes two-stage biological process based on INDION moving bed bio-reactor technology followed by lamella clarifier and multigrade filtration system. The treated effluent is then disinfected using sodium hypochlorite and reused as cooling tower make-up water.

The water treatment plant includes lamella clarification and multigrade filtration. Of the two streams emerging from the multigrade filter, one is disinfected as above and the other is taken to a weak acidic cation unit followed by INDION SWIFT to achieve demineralised water quality. INDION SWIFT is a completely automated system that operates on the principle of short cycle (4 hours) with regeneration (30 minutes), thereby consistently producing mixed bed quality water (conductivity < 1 µs/cm). The regeneration of INDION SWIFT cation-anion demineraliser units occurs simultaneously and automatically so as to produce near neutral effluents. The regeneration waste from the SWIFT demineraliser system is combined with effluents from cooling tower make-up water. The combined effluent undergoes lime soda softening in a high rate solids contact clarifier which allows chemical reaction, flocculation, coagulation and thickening of sludge to a consistency of 2-3 per cent.

The clarified water is thus made suitable as feed to the ultra filtration system followed by a reverse osmosis (RO) system. The RO permeate is reused as process water. The RO reject is sent to a multi-effect evaporator system to recover water (condensate) which is reused as cooling tower make-up water and also to meet the ZLD discharge objective.

The scope of the treatment also includes a sludge (solid waste) handling system. The sludge from the biological and inorganic waste streams is transferred to a sludge pump. A dewatering unit (centrifuge) is provided for the purpose of thickening, stabilising and dewatering of sludge before its disposal by the client to a secured landfill.

INDION SWIFT

Moving bed bio-reactor

Ultra filtration

Multi-effect evaporator

Other salient features include:

- Provision of a guard tank to store off-spec feed effluents and treated effluents. This effluent is blended at a defined flow rate with raw effluents.
- All major tanks are constructed using the advanced bolted tank concept to minimise civil construction time. The material of construction is glass enamelled steel with a life of 20 - 30 years.
- Our scope includes side stream filters, supply of specialty polymers, effluent treatment chemicals, RO antiscalants and membrane cleaners with an option of providing comprehensive operation and maintenance services.

The multi-effect evaporator system receives feed effluent (RO reject) having a capacity of 5 m^3/h (5000 kg/h) and TDS of 2 per cent (20,000 ppm). Condensate from the multi-effect evaporator system with flow rate of 4.8 m^3/h (4840 kg/h) with TDS of 150 ppm is blended with RO permeate & then used for cooling tower make-up.

We specially designed the multi-effect evaporator system for treating RO reject in a forced circulation type evaporation system with thermal vapour recompression. The multi-effect forced circulation type evaporator ensures long and trouble free operation without the possibility of scaling. The concentrated solids are taken out by a separate line in the form of sludge/slurry and fed to a settling tank and pusher centrifuge which produces crystals of 111 kg/h with only 8 to 10 per cent moisture which can then be disposed of as solid waste.

The effluent treatment plant is treating 100 per cent of process and utility as described above to meet the company's dual objective of zero liquid discharge and maximum use of treated effluent for process and utility applications.

Our Other ZLD Projects

- **Indian Synthetic Rubber Ltd., Haryana**
- **Holcim Ltd., Punjab**
- **MRF Ltd., Telangana**
- **Gulf Fluor LLC, Abu Dhabi**

Solutions for Rural India

Fluoride Removal

We supplied 225 fluoride removal hand pump attachment (FRHPA) units to PHED - Jabalpur, Madhya Pradesh.

200 units of FRHPA for Rural Water Supply and Sanitation Department, Nuapada, Odisha.

FRHPA unit for PHED, Seoni, Madhya Pradesh.

Iron Removal

Iron removal hand pump attachment (IRHPA) unit order from PHED, Puri, Odisha.

25 IRHPA units for PHED, Umaria, Madhya Pradesh.

Continuous Sand Filters

Continuous sand filters to PHEDs in Madhya Pradesh - of 30 m^3/h at Chhindwara and 50 m^3/h at Seoni.

Also,

- A 500 l/h nitrate removal hand pump attachment installed at Wardha, Maharashtra.
- Arsenic removal hand pump attachment unit to PHED, Rajnandgaon, Chhattisgarh.
- Multigrade filter for Rural Water Supply, Karnataka.
- Ten mobile disaster management units for Rural Water Supply and Sanitation Department, Cuttack, Odisha.

Global Spectrum

Worldclass performance, quality and service have rapidly built up the Ion Exchange credibility, as is evident from the many contracts being awarded from across the globe.

UAE

Ion Exchange supplied and commissioned a 225 m^3/d membrane bio-reactor for sewage treatment at Rumaitha, Abu Dhabi for Alsa Engineering & Construction Co LLC, a company which provides multi-disciplinary engineering services in the petrochemical field using proven technologies, systems and work processes.

Membrane bio-reactor, 800 m^3/d supplied to Petro Rabigh Aramco & Mitsubishi Heavy Industries through Al Rushaid Contracting Company. Supply comprises lifting station, equalisation aeration reactors, membrane bio-reactor with eleven membrane modules and treated water storage tank. The treated domestic sewage will be used for irrigation, dust suppression, etc.

Reverse osmosis sea water desalination plant of 50,000 GPD supplied to Bin Dirai and Partners Contracting, Abu Dhabi, UAE for the labour camp project at Asab.

Order from Asian Fibres LLC, Abu Dhabi for 800 m^3/d effluent treatment plant to treat effluent from PET bottle washing. The scheme comprises high rate solids contact clarifier followed by anaerobic treatment, two-stage extended aeration system and then filtration and recycle (ultra filtration and reverse osmosis).

A 150 m^3/d fluidised media reactor for sewage treatment supplied to Al Ghayoum Contracting and General Transport Est, Abu Dhabi.

Oman

Two units of 100 m^3/d fluidised media reactor for sewage treatment to Seeh Al Sarya Engineering LLC, one of which for a labour camp accommodation at Saffa.

200 m^3/d membrane bio-reactor for sewage treatment from Simplex Infrastructure LLC.

120 m^3/h plant (reverse osmosis-mixed bed) from Dunes Industries LLC, for their powder coating plant at Sohar.

Qatar

Order for bottling plant, 24000 bottles/hour, from Lusail Mineral Water Factory.

Saudi Arabia

Prestigious order for water and waste water treatment plants from Middle East Food Solutions Company (MEFSCO), a joint venture of Cargil and Arasco, Alkhraj Kingdom of Saudi Arabia. The water treatment plant capacity 254 m^3/h, treats bore well water with reverse osmosis system.

The 125 m^3/h waste water treatment plant treats process effluent from the maize crushing plant; it comprises high rate solids contact clarifier, state-of-the-art anaerobic process followed by moving bed bio-reactor based aerobic treatment and tertiary filtration.

Ten units of containerised reverse osmosis plant, each capacity 100 m^3/h, from Saudi Ministry, Saudi Arabia.

Bangladesh

The common effluent treatment plant, 85 m^3/h and sewage treatment plant, 2040 m^3/d supplied to Kumudini Medical College and Hospital, at Tangail, Bangladesh is a project funded by the Indian Embassy in Bangladesh. The system comprises screening, equalisation tank, pumping to flocculation tank, lamella clarifier, fluidised media reactor, treated water tank, pumping, multigrade and activated carbon filters, and filter press for sludge treatment. It is designed to treat combined waste from the sewage system as well as kitchens and other utilities of the medical and nursing colleges, hospital and hostel.

Indonesia

A repeat order from PT. Cikarang Listrindo, Jakarta for 2 x 400 m^3/h water treatment plant and 2 x 45 m^3/h demineralisation plant.

25 m^3/h water treatment plant with two pass reverse osmosis supplied to PT. Reckitt Benckeiser, Jakarta.

Tanzania

A 2 x 30 m^3/h new generation softener supplied to Labiofam Ltd.

Order for supply of 30 m^3/h plant (reverse osmosis, ultra violet and ozonation) from Dew Drops Ltd.

Order for modification of 200 m^3/h waste water treatment plant from 21st Century Ltd.

Kenya

A 2 x 250 m^3/d membrane bio-reactor and 60 m^3/d laundry waste water treatment from Green Hills Investment.

Launched

INDION® ORC for Dechlorination of Water

The INDION ORC catalyst has been specially developed to remove oxidants such as chlorine and hydrogen peroxide from water, while overcoming the disadvantages of conventional activated carbon process.

Chlorine is widely used for disinfection and destruction of organics. Excessive chlorine in water affects purifying media like ion exchange resins and reverse osmosis membranes, and so removal of excess chlorine is necessary. Activated carbon and sodium bisulphate dosing are conventional methods to remove excess chlorine. However most brands of commercial activated carbon tend to have high ash content and their use results in leaching of silica and other inorganic compounds in the treated water. In case of high chlorine content in feed water, use of activated carbon filter reduces pH of treated water. The contact time required to effectively remove chlorine is higher with activated carbon, and the antioxidant dosing method requires continuous monitoring.

INDION ORC, developed after extensive R&D, overcomes the drawbacks of conventional activated carbon process. It effectively removes chlorine in minimum contact time, hence the volume of media required is almost less than half of activated carbon, and so the size of the carbon unit also becomes more compact. Moreover it has a longer life than activated carbon. Its half dechlorination value is much superior to commercial carbon. It does not affect the pH level, maintains inlet TDS levels and does not impart any other impurities to the treated water. It can tolerate high levels of chlorine (10 - 15 ppm) and can handle high loads of TDS.

INDION ORC finds application in many industries for effective dechlorination of water. For example in the food & beverage industry, the current practice of steam sterilisation of activated carbon consumes huge amounts of time leading to longer plant downtime. INDION ORC, can be sterilised using hot water which consumes less time. Thus, INDION ORC offers significantly higher life cycle cost advantages over conventional activated carbon process. It also reduces problems related to disposal of used carbons due to its longer life.

Applications

ZERO B™ UV Grande

The Zero B UV Grande water purifier uses next generation UV technology to paralyse disease-causing bacteria and viruses. The purifier comes with a unique electrolytic tank sanitising system which prevents germ build-up 24x7, recontamination and slime build-up of bacterial growth. An LED smart indicator system comprising five different indicators notifies the health of the water purifier and water quality. Available in two models of 2L and 4L, the purifier is launched across India.

Expanding Initiatives

Ion Foundation continued its many CSR activities in the field of education, health, hygiene & sanitation, and environment protection.

At New Gurukul Girls High School cum Jr. College Patancheru, Telangana 300 saplings of 32 varieties were planted on World Environment Day. The greening initiative will benefit the 640 participants... and generations to come.

'Running for a Cause' at the Standard Chartered Mumbai Marathon, we participated in the Dream Run to support Project Muktangan which provides educational support to the underprivileged.

At Chitkul Primary School, Patancheru, Telangana 416 students & staff members were benefitted by Ion Foundation's contribution towards salaries, classroom furniture and fixtures, first aid boxes, sports equipment, etc. Similarly, at Zilla Parishad High School, Lakdam, Andhra Pradesh an IT teacher, first aid box, drinking water tank and water supply system were provided for the school's 510 students and staff.

Educational assistance and a water purifier were provided to a government run primary school at Malcornem, Goa.

In Mumbai, we supported Chetna Learning Centre by providing educational assistance to students pursuing higher education, and fees for three school children. Diwali celebrations were organised with NGO 'Salaam Mumbai' for all the students.

ION FOUNDATION
Initiate • Organise • Nurture

Infrastructure support was provided in Ankleshwar, Gujarat to Sarangpur Prathmik Primary School and Rohid Prathmik Group Primary School.

eco⁺ Puriline water purifier units were provided to World Vision and used furniture was donated to Good Life Centre, a home for homeless children, Panthope Railway Colony Primary School and Anna Anadhai Illam Orphanage. This initiative in Chennai has 345 beneficiaries.

Ion Foundation focussed on drinking water solutions, installing a reverse osmosis water treatment unit each at Government Boys Secondary School in Hosur, Tamil Nadu and at SOCARE IND, Bengaluru; education assistance was also provided to the latter.

INDION Lampak , a compact single tank unit for drinking water treatment, was installed at Pindkapar village in Nagpur, Maharashtra to provide safe drinking water for the 640 villagers.

Vasundhara Charitable Trust, Kudal, Maharashtra was provided with eco⁺ Puriline water purifier units, and assistance towards a science on wheel van, training centre, mobile library, health camps and education activities.

Construction/renovation of toilets/urinals and water storage tanks was undertaken at Vardayini Madhyamik Vidyalaya, Dr. Babasaheb Ambedkar Vidyalaya and Madhyamik Vidyalaya Sakhar in association with SWADES/SHARE FOUNDATION and WATSAN School Project in Raigad, Maharashtra.

Our first time initiative to educate through sports was in association with Magic Bus at Pashamylaram village in Patancheru, Telangana and Thenmelpakkam Panchayat, Kattankulathur, Tamil Nadu. 200 students were a part of the programme.

Ecowise

We engaged employees and customers in our greening mission through a series of e-cards, e-tips, e-messages, desktop screens, posters and contests.

Environment Day

Corporate office employees signed a pledge 'I will consume with care' in concurrence with the World Environment Day theme for 2015.

Earth Day

A contest was held to sensitise employees towards environment protection.

World Water Day

Water Essentials, an e-series highlighted crucial water consumption areas and how use and misuse of water affect socio-economic development.

E-Series

Our fortnightly e-mailer series featured environmental facts and underlined responsibility towards the environment.

Efforts Recognised

Water Digest Water Awards 2014–15

Ion Exchange was once again the proud recipient of the Water Digest Water Awards in three categories:

- Best Water Company
- Best Water Treatment Solution Provider
- Best Complete Domestic Water Management Solutions Provider - Domestic & Institutions

We were also recognised as the Business Leader of the Year – Water Management at CHEMTECH CWE Leadership & Excellence Awards 2015.

ION EXCHANGE
Refreshing the Planet

Edited and published by Charmaine Sequeira for Ion Exchange (India) Ltd., Ion House, Dr. E. Moses Road, Mumbai 400 011, India.
Tel: 022-3989 0909 • Fax: 022-2493 8737 • E-mail: ieil@ionexchange.co.in • Website: www.ionindia.com