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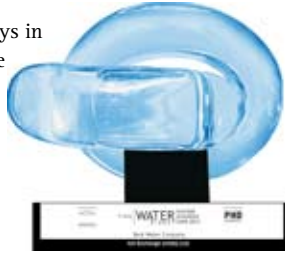


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On Display



Our raison d'etre is the customer. At Ion Exchange, this is no mere mantra but a way of life and ethos because we know we would not be in business but for our customers. This is behind our relentless efforts to raise the bar of customer satisfaction, meeting needs with the right solutions, quality products and service excellence. It is what drives us to leverage our wide range of technologies in an integrated and innovative manner, to provide total, optimal environment solutions and generate the best value for customers.

Which is why, three years back we experimented with the introduction of industry-specific verticals – for the pharmaceutical, steel, power, sugar and paper sectors. And having seen the benefits these verticals are creating for our customers, we recently set up more verticals to address the needs of many other sectors in the heavy, medium and light segments. Industries are clubbed into a vertical such as the pharmaceutical and electronic sectors, based on similarity in quality of water required and the industry operating conditions.

configured for
cust
centric
solution



Closer Customer Connections

The formation of verticals is helping us to get a much better understanding of the specific processes and needs of each sector; in turn, enabling us to use our total solutions capability to better address the requirements of each and to provide a tailor-made package for complete customer benefit. A better understanding of our customers' processes also facilitates development of innovative solutions to meet evolving customer needs.

Customer-centric Solutions

The benefits to our customers are many; they include improved quality of customer products, savings in operating costs, conservation of water and recovery of valuable by-products. In short, Ion Exchange creates substantially superior value via a one-stop package of customised solutions, quality service and technical support, with single-point contact.

Multiple Customer Benefits

- Higher ROI with lower overall cost through lower water consumption with lower cost of water/product, lower cost of ownership and lower cost of operations
- Water security, with assured quality and quantity of water, in an increasingly water-scarce scenario.
- Better quality of customer product
- Compliance with regulatory consumption and discharge norms, with reduced/zero discharge of pollutants
- Environment-friendly processes
- Creative ownership options such as BOO/T and lease
- 24/7 comprehensive service support
- Single point coordination for trouble-free operation

Heavy Segment

Power
Refinery & Petrochemicals
Steel & Metallurgy
Paper
Infrastructure

Medium Segment

Pharma & Electronics
Sugar
Textiles
Cement & Chemicals
Food & Beverages
Auto & Others

Light Segment

Hotels & Hospitals
Builder, Construction & IT Parks
Institutions
Rural





Sweetening the Sugar Manufacturing Process

The idea for this first of our verticals, originated from studying more closely the manufacturing processes of the sugar industry to see how and where we could add value. And there was much to add: a whole range of high performance products and processes specially developed for diverse applications in liquid and solid sugar manufacture.

Water Management

- Pretreatment
- Process Water Treatment
- Sugar Condensate Recovery
- Waste Water Treatment and Recycle

Sugar Re-melt Ion Exchange Decolourising Process

Process & Speciality Chemicals

- Mill Sanitation Chemicals
- Sugar Enhancers
- Flocculants
- Scale Inhibitors
- Viscosity Reducers
- Colour Precipitants
- Flotation Aids
- Boiler Water Treatment Chemicals
- Bagasse/Fuel Additives
- Activated Carbon
- Cooling Water Treatment Chemicals



The Complete Cure

When it comes to adding value and providing customised solutions to totally meet all their

needs, Ion Exchange is the natural partner of choice for pharmaceutical companies.

High Purity Water Generation & Distribution

- RO-EDI Systems
- SWIFT Demineralisers
- Ozonation for Loop Disinfection
- Distribution Systems

Total Water Management

- Water/Effluent Treatment & Recycle
- O&M of Complete Water System/Circuit
- Management of Cooling and Boiler Water Treatment

Speciality Products for Formulations & API

- Pharmaceutical Grade Resins
- Polymeric Adsorbent Resins
- Speciality Activated Carbon

The Welcome Factor

Despite deteriorating water quality and increasing water scarcity, the hospitality sector – hotels, eco-resorts,

restaurants and recreation centres, can be assured of the requisite quality and quantity of water, continuously, for

all requirements. Because, with Ion Exchange, they get total solutions covering all water and utility areas with single point

responsibility and complete service support.



Our solutions for the hospitality sector include:

- Water purification for drinking as well as for use in kitchens
- Management of heating and cooling water circuits with speciality chemical programmes
- Swimming pool water treatment
- Softened water for bathing and laundry
- Water recycle – treatment and recovery of laundry rinse water, sullage and sewage for re-use in cooling water make-up, toilet flushing, vehicle washing and gardening

A Complete Menu

For the food and beverage (F&B) industry we offer advanced systems for process applications with high end technology customised to Indian conditions as well as complete water treatment circuit.

Total Water Management

- Water Treatment
- Waste Water Treatment
- Cooling and Boiler Water Treatment Programmes
- O&M and BOO/T systems for all water

systems and utilities

Process Applications

- Purification and separation systems for all types of process applications – cheese production, whey processing/ concentration, juice de-bittering/clarification, and wine/ juice clarification
- Caustic recovery from bottle wash
- Application lab and pilot studies for new applications
- Membrane/ion exchange systems for F&B processing

Mettlesome Solutions

With our range of solutions, it is freedom from all water problems for steel plants

- Water Management for entire steel complex – pellet and sinter plants, COREX and BF, BOP and COF, HSM, CRM, long product (wire and bar rod) mills
- O&M and BOO/T for entire water treatment circuit and systems
- Effluent treatment and recycle of process streams and cooling tower blowdown/utility waste

Also, process chemicals for mining, etc.

Highway to Competitive Advantage

The auto industry is assured of lower water consumption per car, lower cost of operations and superior quality of finish, with

- Water treatment for process use in paint (electro-deposition) booths and body part press centres
- Treatment and recycle of effluent from water blowdown and utility waste
- Boiler and cooling water treatment chemical programmes
- Car wash recycle systems
- O&M for complete water systems
- Process chemicals for paint booths, etc.



Engineering Contracts

SWRO Desalination Plant for Madhucon Projects



2 x 60 m³/h mixed bed (MB).

A major order was received from Madhucon Projects Ltd., Hyderabad, for a sea water reverse osmosis (SWRO) plant. This is for a 2 x 135 MW thermal power project of Simhapuri Power Ltd., Nellore, Andhra Pradesh. The scope of work includes 2 x 1400 m³/h pretreatment, 3 x 50 m³/h and 3 x 30 m³/h reverse osmosis (RO), and

Water Supply System for Cold Rolling Mill

The contract from Steel Authority of India Ltd., Bokaro Steel Plant (SAIL-BSL) in Jharkhand is for water supply system of the cold rolling mill – III. It includes indirect cooling water system, 2 x 100 m³/h demineralisation (DM) plant, process/service water system, potable/drinking water system, side stream filtration plant, overhead tank for emergency water system, make-up water system, water conditioning/chemical dosing system, RO based cooling water blowdown recycle plant, effluent treatment plant, cooling tower and pump houses.



Auto DM Plant for CPCL

Ion Exchange had supplied a two-stream (150 m³/h each) automatic DM plant for the cogeneration plant of Chennai Petroleum Corporation Ltd. (CPCL) about a decade ago. To meet the additional requirements of DM water as a part of CPCL's overall expansion and modernisation needs, CPCL awarded an additional stream of 150 m³/h to Ion Exchange. This stream will be a replica of the existing plant at site and will be fully automatic. The new stream will have to be hooked up to the existing plant and handed over to the client.

Drinking Water Maharaja Style!

Our Community & Commercial Water Solutions (Institutional) division was awarded a prestigious order for water purification in the Maharaja Express luxury train service, a joint venture project of Cox & Kings and the Indian Railway Catering & Tourism Corporation (IRCTC).



The order was for two 15 LPH RO units for ice-cube making in the dining car-cum-bar and for 19 units of a custom made electrolytic purification system (Eco+Puriline) for installation in the deluxe and super-deluxe coaches – the first-of-its-kind water purifier to be installed in a super-deluxe train.

A 3 x 800 m³/h condensate polishing unit from **Bharat Heavy Electricals Ltd.**, for Bharatiya Nabhikiya Vidyut Nigam Ltd., Kalppakkam, Tamil Nadu.

From **Gupta Energy Pvt. Ltd.**, Nagpur, Maharashtra, a contract for pretreatment with 550 m³/h high rate solids contact clarifier, demineralisers, 1 working and 1 standby, with a 25 m³/h post ultra filtration (UF) module, 2 x 150 m³/h soft water streams with 2 x 225 m³/h multi-grade filters, 2 x 20 kg/h gas chlorination system, instruments and two-year O&M spares.

A repeat order from **Gujarat Fluorochemicals Ltd.**, Dahej, Gujarat, for a 12 m³/h high purity system using UF, RO and auto DM high purity polishing system comprising special UVs, cartridge filters and non-regenerable resins.

From **Aditya Birla Nuvo Ltd.** (Hi-Tech Carbon), Patalganga, Maharashtra, order for 400 m³/h pre-treatment followed by filtration and demineralisation.

Order for activated carbon filters followed by DM plant and 2 x 135 m³/h MB unit with regeneration system along with cooling water system, from **National Thermal Power Corporation**, for their greenfield thermal power plant, Mauda, Maharashtra.

Order for total water management from **Sree Rayalaseema Alkalies and Allied Chemicals**, Kurnool, Andhra Pradesh and Bellary, Karnataka; the order comprises 150 m³/h pretreatment followed by UF, RO and DM.

Water Treatment Systems in Rural Punjab

The Punjab government, in its efforts to ensure clean and clear drinking water to various rural areas including schools as a part of the overall government scheme for eradication of drinking water related issues, selected Ion Exchange to partner their efforts in this area. Two major activities that we are participating in, under the government's drinking water programme, are provision of community drinking water systems for rural areas and point-of-use water purifiers for rural schools.

Community Drinking Water Systems



Our 2000 l/h fluoride removal system was installed at Chotian (Sangrur) village, Punjab

Since the raw water source in various areas in the state had different contaminants, the choice of technology was a crucial deciding factor in the government choosing to partner with Ion Exchange for these solutions. Our state-of-the-art fluoride removal systems are used to treat water containing harmful fluoride ions, thus making it suitable for drinking. For other areas in the state where turbidity and suspended impurities are a

problem because of canal water supply sources, our state-of-the-art continuous sand filters provide an effective solution for removal of these impurities. These filters, by virtue of their unique design, are ideally suited for rural areas because they require no operator attention/stoppage for backwash and can also withstand spikes and higher levels of turbidity and suspended solids.

POU Drinking Water Purifiers for Rural Schools

Under the Rajiv Gandhi Drinking Water Mission, the Ministry of Rural Development and the Dept. of Drinking Water Supply launched the Jalmani project, to provide non-electricity based drinking water purifier systems for schools in rural India. Ion Exchange received an order for 750 Eco+ Puriline systems from the Government of Punjab for their government schools, for disinfection and removal of microbial impurities from water.



Our Home Water Solutions (Retail) division created ripples with an award of a contract for 6000 Zero B Suraksha Plus purifiers from Headquarters, Northern Command.

Successfully Commissioned

Sea Water Desalination Plants

7 MLD SWRO Plant for Adani Power

Ion Exchange commissioned the 7 MLD (million litres per day) sea water reverse osmosis (SWRO) desalination plant supplied to Adani



Reverse osmosis section

Power Ltd. at Adani Power SEZ, Village Tunda and Siracha,

Mundra, Dist. Kutch, Gujarat on lumpsum turnkey basis.

Desalinated water will be supplied through pipelines from the plant to the customer's 4 x 330 MW Mundra thermal power plant, some 2 kms away. The plant will assist the

customer to achieve self-sufficiency in meeting the current water requirement of the thermal power plant.

Our contract was for complete design, engineering, manufacture, inspection and testing, erection and commissioning of the 7000 m³/day desalination plant and its accessories; it includes O&M, recommended

spares and commissioning spares.

The RO plant was commissioned successfully and the treated water was produced to desired parameters. The plant is fully automated and is operated through PLC.



Pressure sand filters



Pretreatment section



Primary motor control centre (PMCC)

6 MLD SWRO Plant for Gujarat Anjan Cement

Ion Exchange supplied a 6 MLD RO based sea water desalination plant to



Reverse osmosis section

Gujarat Anjan Cement Ltd.,

(a subsidiary of Jaypee Group of companies) at Sewagram, near Village Vayor, Dist. Kutch, Gujarat on lumpsum turnkey basis. The desalinated water will be supplied through pipelines from the plant to the company's 1.2 million tonne capacity cement plant which is about 22 kms from the SWRO plant.



Pressure sand filters

Our contract was for design, engineering, supply and supervision of erection and commissioning of this 6000 m³/day desalination plant and its accessories.

All three 85 m³/h streams of the SWRO plant were successfully commissioned and the treated water produced to desired parameters.

The plant will assist the customer to achieve self-sufficiency in meeting the current water requirement of its 1.2 million tonne capacity cement plant.



734 m³/h lamella clarifier

Inaugurated 26.4 MLD Desalination Plant for Chennai Petroleum Corporation

Chennai Petroleum Corporation Ltd. (CPCL) inaugurated its 26.4 MLD SWRO desalination plant at Kattupalli, in Thiruvallur district of Tamil Nadu. The plant was inaugurated by Mr. M.K. Stalin, Dy. Chief Minister of Tamil Nadu, in the presence of Mr. Murlidhar Deora, Union Minister for Petroleum and Natural Gas, and Mr. Praful Patel, Union Minister of State for Civil Aviation.



The cost of the desalinated water, supplied through pipelines from the plant to the CPCL refinery at Manali, about 20 kms away, works out to around 3 paise per litre, half of what CPCL was paying Chennai Water Supply before the plant was commissioned.



Reverse osmosis section

The largest reverse osmosis based sea water desalination plant in the industrial sector in India, the plant was designed, engineered, supplied and commissioned by

Ion Exchange on lumpsum turnkey basis. Our contract was for total civil work including piling, RCC tanks of

Degasser towers

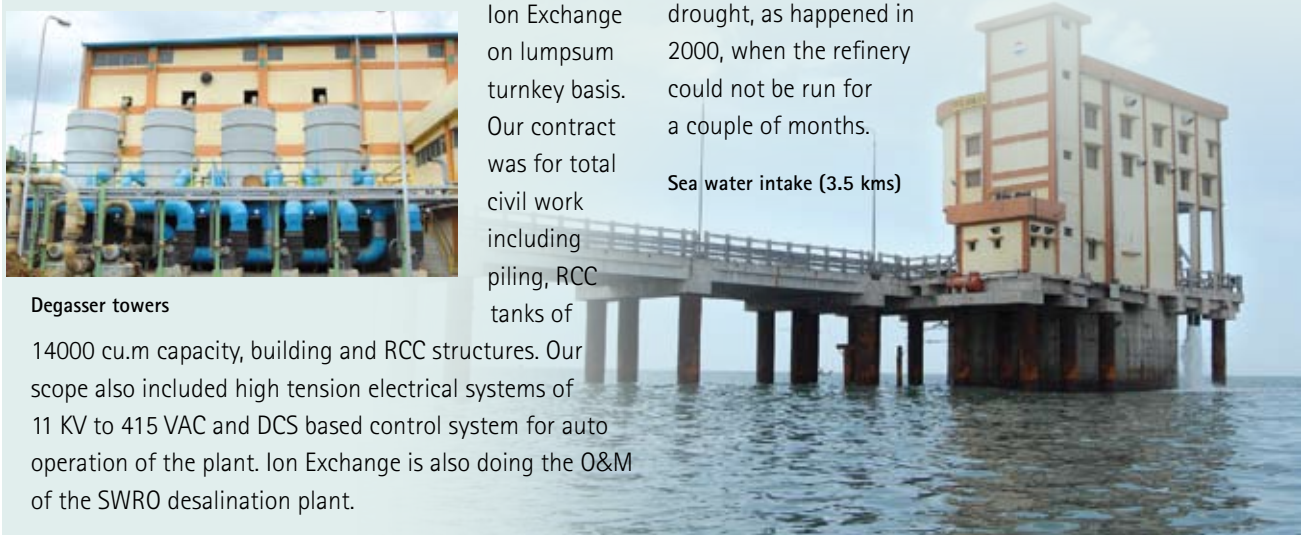
14000 cu.m capacity, building and RCC structures. Our scope also included high tension electrical systems of 11 KV to 415 VAC and DCS based control system for auto operation of the plant. Ion Exchange is also doing the O&M of the SWRO desalination plant.



Control room

The project makes CPCL self-sufficient in water for the current requirements of its Manali refinery complex and ensures that the refinery will not shut down because of drought, as happened in 2000, when the refinery could not be run for a couple of months.

Sea water intake (3.5 kms)



WaterPower



Complete Water System for Rosa Power

The complete water system for Rosa Power Supply Company Ltd., fully owned subsidiary of Reliance Energy, was successfully commissioned for the



Pretreatment (cascade aeration)



Pretreatment (high rate solids contact clarifiers)

greenfield Rosa Phase I, 600 MW coal-fired power project at Shahajanpur, Uttar Pradesh. Water intake is from Ghara River and the 2 x 1675 m³/h pretreatment, 2 x 80 m³/h demineralisation plant and the cooling water treatment system were also designed, engineered and built by us. Ion Exchange will also be undertaking the O&M for this plant.



Demineralisation plant

At NTPC Jhanor

Ion Exchange was awarded the order for design, supply, erection, testing and commissioning of a fully automatic mixed bed polishing unit and nitrogen capping system at NTPC Jhanor. Here, three mixed bed systems, two working and one standby, with a flow rate of 200 m³/h, were to be added along the DM water injection line for their gas power generation plant.

The mixed bed units are installed after the DM water storage tanks to meet the specifications of flow rate of 200 m³/h with conductivity < 0.1 micro siemens and pH of 7.

We installed the PLC based fully automatic mixed bed polishing unit after the DM water storage line and before supply to their gas turbine system. The plant performance test was successfully carried out in February 2010. With large

savings on the fuel cost, the payback period for the customer is less than a year. The O&M of this plant is also with Ion Exchange.



Zero Discharge System for Gujarat Ambuja

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

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



a scheme that includes extensive pretreatment of water, ultra filtration followed by two-stage RO and finally evaporation to handle the reject from the membrane systems. The plant, thus, recovers 85 per cent of the waste water for reuse and achieves zero discharge. At the same time it helps conserve water by reducing fresh water intake through this recycling programme.



Reverse osmosis section

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

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

To treat the effluents, Ion Exchange recommended and implemented



Ultra filtration section

Sewage Recycle at HCC's 247 Park

Ion Exchange commissioned a 400 m³/day membrane bio-reactor (MBR) for sewage treatment and recycle at HCC's 247 Park.



This corporate park houses 247 offices and more than 6000 professionals, as well as several banks, retail outlets, food courts and restaurants, and a gymnasium. Located at the upcoming IT hub at Vikhroli, Mumbai, it is a project of HCC Real Estate Ltd., a wholly owned subsidiary of Hindustan Construction Company.

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

The MBR treats and recycles the sewage which can be used for secondary purposes, thus conserving 350 cu.m., fresh water per day. With tanker water costing Rs. 80 per cu.m. and a daily saving of 350 cu.m. water, the payback period is just 15 months, after factoring in the capital and operating costs of the MBR.



Cooling Water Treatment and Distribution System at Jindal Steel & Power

Ion Exchange Infrastructure undertook the detailed design and engineering including civil construction and fabrication drawings, supply of equipment – mechanical, electrical, instrumentation, and automation for complete cooling water system for the bar and wire rod mills at Jindal Steel & Power Ltd., Patratu, Jharkhand. The system comprises:

Indirect Cooling Water (ICW) System, 1100 m³/h for Furnace: hot and cold wells, pumps and motors, piping work, side stream filtration, cooling towers and emergency overhead tank, electrical (MCC etc.), instruments (gauges, transmitters etc.) and automation (PLC) system.

ICW System, 2200 m³/h, for Mills: indirect cooling water circuit of mills (wire and bar rod) comprises cold well, pumps and motors with associate piping, side stream filtration, cooling towers, electrical (MCC etc.), instruments (gauges, transmitters etc.) and PLC system.

Direct Cooling Water (DCW) System, 5000 m³/h, for Mills: cold well, pumps, motors with associate piping, scale pit with pumping system, settling tank, pump house with piping, pressure filtration system (dual media filters) with allied air blower and dosing system, cooling towers, sludge scrapers, sludge handling system comprising thickener with rake mechanism, sludge transferring by positive displacement pumps and filter press, electrical (MCC etc.), instruments (gauges, transmitters etc.) and PLC system.

Make-up cum Drinking Water, Soft Water and DM Plant Filling Water Supply and Distribution System through Overhead Tank: 120 m³/h raw water treatment plant, 100 m³/softening plant, 20 m³/h drinking water plant and 3 m³/h demineralisation plant for complete cooling water system.



Settling tank with scraper mechanism



Pressure filtration plant



Air blower for pressure filtration plant



Overhead pipe trestle plant



On the GCC front

Petroleum Development of Oman (PDO) awarded us a prestigious Build-Own-Operate (BOO) contract for four containerised reverse osmosis plants, which have been installed at four remote oil drilling sites in Oman.

Manufactured at our Hamriya facility in UAE in a record time of 12 weeks, the plants will be operated & maintained by Ion Exchange for seven years, and thereafter purchased by the client. Our revenue is on the basis of cubic metre of water produced. Around 40 personnel will be stationed at the sites for O&M.

Apart from water purification, treatment will also remove traces of boron from the raw water. The water produced will be used for process and other requirements such as drinking water at the PDO sites; water in excess of the client's requirements will be supplied to the surrounding habitats.

570 m³/day RO plant supplied to Petroleum Development of Oman



Ion Exchange is undertaking the O&M of this 3840 m³/day RO plant at Faud site, Sultanate of Oman

Supply and installation of a 4 m³/h solar powered sea water reverse osmosis plant, along with supply of solar panels, for a beach front tourist development complex in Abu Dhabi. Intended to publicise and promote

energy saving, the 35 KWH power generated is used for running the plant, the high pressure pump and all the control systems.



More International Highlights



At PT Indah Kiat Pulp & Paper, Indonesia 6 x 150 m³/h demineralisation plant and 3 x 175 m³/h condensate polishing unit; both were repeat contracts after successful performance of the plants supplied in 2002.



At PT South Pacific Viscose, Indonesia 500 m³/h pretreatment plant using ultra high rate clarifier and dosing systems. This was an additional unit to the 2500 m³/h pretreatment with lamella clarifier and continuous sand filter, supplied in 1996.

Order for 2 x 50 m³/h automatic UF, RO and mixed bed system from White Nile Sugar, Sudan.

Build, Operate and Transfer (BOT) Projects

Infrastructure facilities and public utilities play a very important role in the development of the nation's economy and social welfare, and were traditionally undertaken exclusively by Government through public sector enterprises. In the recent past, however, the world over, execution of infrastructure projects is being increasingly entrusted to private entities. With the substantial involvement of the private sector in the construction and funding of public infrastructure works, there has also been a paradigm shift to the use of the BOT (Build-Operate-Transfer) approach as a way to delivering such infrastructure projects. Moreover, the BOT approach is being increasingly extended to projects in the industrial sector, particularly utilities and other non-core areas.

What are BOT projects?

BOT (Build, Own/Operate, Transfer) projects are typically projects in which one entity – which may be a single organisation, or more commonly a consortium or a Special Purpose Vehicle (SPV) of various parties develops, finances, constructs and operates a particular project. This entity is normally called the concessionaire and the period for which the contract runs is called the concession period.

In small and medium industrial projects (as compared to infrastructure projects) the BOT structure is very simple and just adds structured financing to the overall scope of design, engineering, construction (EPC) and O&M of projects.

What are the advantages of BOT contracts?

The client/user gets the benefit of utilising the services of specialists in the field to design, build and finance the asset and also to operate it over a long term leaving the client/user to focus on the core business areas.

For example in an industrial scenario, the complete utilities can be financed, designed, built and operated by the concessionaire (BOT company), say for example, Ion Exchange. The client could focus on expertise in the core areas of business while Ion Exchange would bring in specialist expertise for building and managing the water management project (water treatment/waste water treatment/recycling etc.) as well as associated utilities.

This would give the BOT company the opportunity to study requirements, suggest and design the best process with the most innovative and tested technologies which will value add to the client's processes through reduction in operating expenses, smaller environmental footprint etc. The client would get the benefit of having a specialist "in-house" for the utility needs at an assured price for the life of the asset/plant.

This can also be adopted in existing industrial projects where an expansion need can be met with this structure of financing.

Alternatively, a client's process could be improved by Ion Exchange, as the BOT company, by investing in new technologies to modernise the existing facility and then taking on the operation and maintenance of the new completed facility. The savings accrued by virtue of the new investment are shared between the BOT company and the client.

How are these contracts structured?

In a BOT arrangement, the concessionaire organisation/consortium/SPV designs and builds the infrastructure/plant, finances its construction and owns, operates and maintains it over a period (the "concession" period), often for as long as 20 or 30 years. Normally, such projects provide for the infrastructure to be transferred to the client/user at the end of the concession period.

Who are the key players in a BOT project?

The key players in a typical BOT contract would be the main concessionaire. The other key players are the EPC contractor, the O&M contractor and the financial partner.

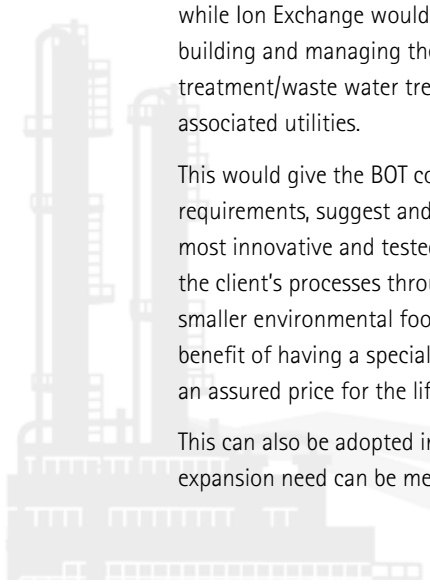
In some cases (especially in medium sized industrial projects) all the above roles may be carried out by a single company like Ion Exchange. But in large projects especially in the infrastructure area, one company may not be able to provide all the requirements of the contract and hence the coming together of organisations with specific experience in the required areas to form an SPV.

What are the roles of the various parties in a BOT project?

The concessionaire is usually a consortium of interested groups typically including a construction company, an operator and a financing institution. This entity prepares the proposal to construct, operate and finance a particular project. The concessionaire may take the form of an SPV company.

Construction contractor: The EPC contractor carries the responsibility of designing and constructing the project and is responsible for meeting the guarantees on various parameters

The BOT approach is being increasingly extended to projects in the industrial sector, particularly utilities and other non-core areas.



expected from the plant/machinery constructed. The construction contractor takes the responsibility (and hence the risk) of completing the project on schedule and within budget and ensures that the project delivers results as committed. Any shortfall in these will affect the revenue later and in turn the viability of the project and its repayment.

O&M Contractor: This contractor is responsible for taking on the O&M of the completed plant that has been constructed and commissioned by the EPC contractor. In large contracts the O&M contractor also may have an equity stake in the project. In smaller contracts the EPC and the O&M contractors may be the same company.

Financier: This entity takes the lead in funding the project. This can be a single organisation or, in large contracts, this is likely to be a syndicate of banks or financial institutions providing the debt funds to the BOT operation.

The funding agency will require a first security over the infrastructure created.

How are the contracts financed and what does the lender look for while deciding the financing?

In an infrastructure project (typically large government projects), the lenders to the project look primarily at the earnings of the project as the source from which loan repayments will be made. Their credit assessment is based on the project, not on the creditworthiness of the borrowing entity.

In an industrial scenario when an organisation is funding a plant or an asset, the user industry's financial strength as well as the bankability of the project will be evaluated.

The security taken by the lenders is largely confined to the project assets. As such, project financing is often referred to as "limited recourse" financing because lenders are given only a limited recourse against the borrower.

What are the agreements that are required in such a contract?

While the concession agreement/BOT contract will be the umbrella document, two crucial agreements which will be a part of this are the off-take agreement and the operations agreement.

Off-take Agreement: The off-take agreement is normally the key

document in a project of this nature. It is the agreement between the user/purchaser/government agency and the BOT vendor/concessionaire under which the agency agrees to purchase the output of the project (treated water, services etc.) at agreed prices and volume.

Operating & Maintenance (O&M) Agreement: The O&M agreement is a long term contract. The main contractual obligation of the operator is to operate and maintain the facility for the period of the operation and maintenance agreement.

What are the critical factors in these agreements?

Performance Standards/KPI: The critical element of the off-take agreement from the buyer's perspective is the performance warranties to be given by the BOT vendor. The performance warranties normally stipulate the quality and quantity of the

output from the project as well as the time when the output is required by the agency.

Revenue Stream/Tariff: The viability of the project and in particular its "bankability" will depend upon the reliability of the cash flow under the off-take agreement, and the buying agency/client and the BOT company performing their respective obligations.

Tariff Structure: The payment to be made by the user to the BOT company will normally be broken into two heads. One will be the fixed charges or the availability fee. This will be the fee to be paid by the user irrespective of the usage from the project/plant infrastructure created. This will normally cover

the fixed charges of capital repayment and manpower which will have to be serviced even when the asset is not used.

The second portion is the variable fee or the usage fee which is linked to the actual production or usage from the asset/plant created.

Escalation of Tariff: The off-take agreement will also provide for a part of the revenue stream to escalate during the life of the contract. The base tariff is normally indexed to an agreed formula to provide for such escalations which are bound to happen during the life span of the contract (which may be anything from 5 to 20 or more years). Further, there will also be provisions made to account for changes in the tax structure etc., which will have a bearing on the BOT price.

Turnkey Solutions for Municipal and Industrial Infrastructure

Turnkey Projects on EPC & BOO/T

- Water Supply Schemes & Distribution Systems
- Sewage Treatment & Disposal Systems
- Waste Water Recycle
- Sea Water Intake & Desalination
- Pumping Stations & Pipeline Projects
- Solid Waste Management
- Waste-to-Energy Projects
- Industrial Utility Complexes
- DAM Services

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ION EXCHANGE WATERLEAU ION EXCHANGE INFRASTRUCTURE LTD.

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Our annual bonding celebration, Jal Tarang, was organised by Corporate HR on February 13, 2010 in Mumbai. The music, songs and dances captivated one and all as our multi-talented employees and their families took centre stage to put up mesmerising

performances that exemplified the theme of national integration. The evening was indeed a memorable one!

JAL TARANG

Members of the

Ion Exchange family who had completed 10, 15 and 25 years of dedicated service were felicitated, as also the winning teams of the cricket match series. Our appreciation and congratulations to all of them.





ZERO B Intello



Our Home Water Solutions division launched Zero B Intello, a water purifier "that talks to you", with an interactive backlit display panel. The special features of this RO based purifier include:

- Intello Monitoring System that displays accurate total dissolved solids (TDS), flow rate, alarm for water quality and cartridge life
- Electronic System Sanitiser guarantees purification by sanitising the system completely at regular intervals
- Double safety purifier (resin carbon cartridge)

Both Zero B Intello and Zero B Kitchen Mate are equipped with the following value-added features:

- Low pressure/low fouling membranes
- Dry run protection pump avoids unnecessary wastage of power
- Automatic tank level control (non-wired) ensures pump cut-off whenever the tank fills up
- Auto-flush timer periodically flushes the membrane to remove the salt deposited and therefore enhances the life of the membrane
- Hydro-pneumatic tank acts as a pressure storage tank with 8-litre capacity
- Over-voltage and over-current protection power supply cuts off whenever voltage and current are more than specified levels.

ZERO B Kitchen Mate

Another launch from Home Water Solutions, is the Zero B Kitchen Mate RO water purifier - a perfect choice particularly for kitchens where space is a problem, as it can be placed below the counter.

Special Features

- Six-stage reverse osmosis (RO) water purifier
- Does not occupy extra space in the kitchen
- Removes bacteria, viruses, excess salts, pesticides, harmful chemicals, heavy metals from water
- Fully automatic operation
- Meets USEPA drinking water standard.



O&M Contracts

At Gujarat Mineral Development Corporation



Annual operation and maintenance (O&M) contract from Gujarat Mineral Development Corporation, for sea water treatment plant at the 2 x 125 MW Akrimota Thermal Power Station. This comprises 2 x 1800 m³/h pretreatment, 2 x 50 m³/h sea water desalination plant, 2 x 40 m³/h demineralisation plant and 2 x 50 kg/h electro-chlorination plant.

For Gas Turbine Power Station

Gas Turbine Power Station (GTPS) located in New Delhi is a gas-based power plant owned by the Delhi Government. The plant uses fresh water from River Yamuna which is highly contaminated due to various untreated effluents being discharged into the river. Ion Exchange has been awarded the O&M contract for the complete water system which includes pretreatment by chlorination, clarification and sand filtration followed by demineralisation. The three-stream plant was supplied by the competition and the O&M team will have to ensure that treated water quality from the exit of the mixed bed unit meets the high purity water requirement of the power plant irrespective of the quality of intake from the Yamuna. Ion Exchange has taken over the O&M since January 2010.

For Angeripalaym CETP

After the successful commissioning of one of India's largest textile effluent recycling plants using membrane bio-reactor (MBR) technology, for the Angeripalaym common effluent treatment plant (CETP) project at Tirupur, Tamil Nadu, Ion Exchange was awarded the contract for operating and maintaining this state-of-the-art system on a long term basis. The 10 MLD zero discharge treatment plant incorporates several unique technologies including MBR, ion exchange conditioning filters for removal of colour and organics, two-stage reverse osmosis and nano



Membrane bio-reactor



Reverse osmosis section

filtration. Our operations team will carry out comprehensive O&M of this complete process with over 70 people located at site. The team will ensure that the combined effluent from around 80+ industries which comes into the plant is treated in order to maximise the recovery of water and salt solution. The recovered water and the salt solution is then sent back to the processing units for reuse. Managing the treatment process as well as ensuring quality consistently will be the responsibility of this team.

IESL Corporate Office Inaugurated



The new corporate facility of Ion Exchange Services Ltd. (IESL) in Bengaluru was inaugurated on August 22. The new IESL laboratory at Ion House

was also inaugurated, on December 14.

The multi-storied Ion House, equipped with ultra modern facilities and infrastructure, will also be the single landmark address of the Ion Exchange group in Bengaluru.



Customer Recognition



IESL was recognised as a valuable service partner by Infosys, and was conferred the honour of 'Sambandh' at the Infosys Vendor Partnership meet held in Mysore on December 12, 2009. IESL is currently handling the total water operations and management at Infosys locations in Bengaluru, Chennai, Mysore, Pune and Kolkata, besides offering specific service requirements at their facilities in Jaipur, Udaipur and Hyderabad.

Knowledge Sharing

As part of IESL's value addition service, several training initiatives were undertaken to enrich the knowledge of customers.

Knowledge Forums

Training programmes conducted at Gandhidham and Goa saw large participation with a total of around 120 personnel from 71 leading industrial groups attending these events.



Mr. T.S. Viswanathan, Director - Technical Services, IESL takes the floor

Customised On-site Training

Training programmes organised at Bisleri facilities in Mumbai, Sahibabad (UP) and Bengaluru were attended by 92 of their technical personnel from functions such as Production, Maintenance and Quality Assurance. Water being their core product, this training on water management was requested by Bisleri's management. Knowledge was shared first through a theoretical session, followed by on-site practical training.

Frost & Sullivan Environment Excellence 2009 Award Best Company of the Year in Water & Waste Water Treatment Segment

Ion Exchange emerged as the winner of the Frost & Sullivan 2009 Environmental Excellence Award for the Best Company of the Year in the Indian Water & Waste Water Treatment segment. The awards in the various categories were presented at their 1st Annual Environment Industry Awards Night, on December 15, 2009 at Hotel Intercontinental – The Lalit, Mumbai, which brought together a galaxy of eminent industry experts and leaders across market segments.



The award presentation. From right: Mr. Rajesh Sharma, Vice Chairman & Managing Director, Ion Exchange; Mr. Yogen Parikh, Associate Director, Jacobs Engineering; Mr. Anand Rangachary, Managing Director (South Asia and Middle East), Frost & Sullivan and Mr. Ajay Popat, CEO, Ion Exchange Waterleau.

Receiving the award, Mr. Rajesh Sharma, our Vice Chairman & Managing Director, said, "It is our company's continuous endeavour to use technology innovatively to offer solutions to improve the quality of life and protect our earth's most vital resources for a sustainable future. This has led us to develop products and technologies to create a capability to provide integrated, cost-effective solutions for all sectors – industrial, institutional, municipal, homes and communities. It has led us

to extend our capabilities to encompass water, air, waste and renewable energy. We have pioneered solutions for recycle of industrial effluent and domestic sewage, to conserve water and natural resources. Our Zero B purifiers provide safe drinking water to all consumer segments at every price point and include innovative solutions to treat water contaminated with fluoride, iron, arsenic and nitrates. We are grateful to our customers, stakeholders and vendors for their continued support and to our employees for their valuable contribution."

The Frost & Sullivan Environment Excellence Awards recognise the exemplary achievements, winning business strategies and innovative best practices of companies operating in the highly dynamic and competitive environment industry. These recognitions culminate in the Frost & Sullivan Awards and are regarded as benchmarks for excellence in the given industry segment.

Always in the Lead Best Water Company 4th Year in a Row

The sterling contribution of Ion Exchange to the water industry was once again recognised with the prestigious 2009-10 Water Awards, presented by Water Digest in association with UNESCO and PHD Chambers, for the fourth consecutive year at the award function held in Delhi. In all, we were honoured with three awards on January 9, 2010:

- Best Water Company
- Best Desalination Plant of the Year
- Distinguished Water Purifier – RO (Zero B)

These awards to Ion Exchange follow earlier awards by Water Digest in association with UNESCO for Best Water Company (2006-07; 2007-08; 2008-09), Best Domestic RO Purifier (2006-07; 2007-08), Best Water Treatment Chemicals (2008-09) and Best Water Conservator (2007-08; 2008-09).

The Water Digest awards honour the distinguished achievements of businesses, organisations and individuals that contribute to the sustainability of water and highlight those who have worked within the community to ensure the message of water-use efficiency is primary in the minds of people, institutions, government and industries.



We will continue to leverage our total water and environment management capability to deliver total solutions that will enhance stakeholder value and enable our customers increase their ROI and improve their business.

Desalination – A Definite and Infinite Water Source

Supplies from conventional raw water sources such as rivers, bore wells, open wells, lakes etc., are depleting while at the same time there is an increasing pressure on these sources due to the high demand by industries and communities. An alternate water supply source is the sea; desalination technology has extensively developed over the past two decades to such an extent that sea water is now being almost routinely considered as a reliable, definite and infinite source of fresh water, using desalination processes.

Desalination can be done in many ways and a number of technologies are in use, which are accepted all over the world. The most widely used technologies are:

Desalination Process

Thermal

- Multi-Stage Flash Evaporation (MSF)
- Multi-Effect Distillation (MED)
- Mechanical Vapour Compression (MVC)

Membrane

- Reverse Osmosis
- Electro Dialysis

The thermal process mainly uses three different technologies – Multi-Stage Flash Evaporation (MSF), Multi-Effect Distillation (MED) and Mechanical Vapour Compression (MVC). All three processes are equipped with condenser tube bundles. In the MSF process, condenser tube bundles are used to pre-heat the brine recycle system. In the MED and MVC processes, the tube bundles function as condensers and evaporators where heating steam condenses inside the tube and vapour is formed outside the tube. The MSF process operates with top brine temperature in the range of 90 to 110° C whereas MED and MVC are operated with a lower top brine temperature of 64 to 70° C.

The reverse osmosis membrane process is a pressure driven process with pressure used for separation, allowing fresh water to pass through the membranes, leaving the salts rejected. The membranes used in the sea water RO desalination process are of specially designed synthetic polyamide material with polysulphone as the base material. This system has a compact layout and can be modular in

ION EXCHANGE
THE POWER
BEHIND WATER
INDIA LTD
Total Environment Solutions

**Leading the way
in Sea Water Desalination**

Largest Installed Capacity in India
Proven Expertise
State-of-Art RO Technology
Comprehensive O&M Services

ION EXCHANGE
The Partner of Choice

Largest industrial SWRO plant in India
• 25.4 MLD commissioned at Chennai Petroleum Corporation, Tamil Nadu

Largest SWRO plant for power project in India
• 19.8 MLD SWRO plant for NTPC-THB JV 3 x 500 MW Thermal power plant, Vallur, Tamil Nadu

First large SWRO plant in industrial sector in India
• 4.3 MLD SWRO plant for Gujarat Electricity Board, Sikka

• 7 MLD SWRO plant for Mundra Thermal Power Project of Adani Power, Gujarat

• 6 MLD SWRO plant for Gujarat Anjan Cement, Kutch

• 6 MLD for Indian Rayon & Industries, Veraval

• 3.6 MLD SWRO plant for Madhucan Power for 2 x 133 MW thermal power project of Sripatruni Power, Nellore, Andhra Pradesh

• 3.5 MLD SWRO plant for Gujarat Heavy Chemicals, Veraval

• 1.3 MLD SWRO plant for Chemplast Sarmar, Karaikal, Pondicherry

O&M contracts awarded for SWRO & MED desalination plants

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construction, so that the existing system can be expanded to handle larger capacities. RO membranes are sensitive to the condition of feed sea water, scaling, fouling and pH, so pre-treatment becomes a very important aspect while designing the RO plant. The emergence of another low pressure membrane technology called ultra filtration is the best option for pretreating the RO feed and addresses the issues of suspended, colloidal particles and microbial contamination. RO, being a pressure driven process, consumes high energy. However by introducing energy recovery systems the power consumption can be reduced by 30 to 40 per cent. Some of the emerging technologies used for energy recovery are the Pelton Wheel, Pressure Exchanger and Turbo Charger.

The common factor in all the above desalination processes is the generation of a reject stream which is highly concentrated with dissolved salts. The stream varies in volume and salts, depending on the process, but will always entail a significant water quantity. The disposal of this reject water is very important. Most desalination plants are located near the sea and discharge of the concentrate stream would generally meet marine discharge regulations and not pose a problem. The cost involved in discharge is also significant and adds to the total operational cost. Similarly, equally important in the

desalination process, is the sea water intake system. There are two types of intake systems generally used – open intake and well intake. The intake systems are as capital intensive as the main desalination process.

Data shows that the installed capacities of membrane and thermal processes are more or less equal. However, further process-wise analysis indicates that RO contributes 48 per cent of the total installed capacity of the desalination processes. In India, so far, RO based desalination plants are widely used by industries located near the coastal areas.

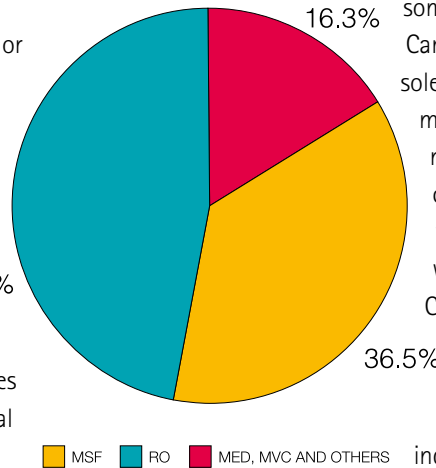
The RO membrane process has also outperformed thermal desalination processes in India, contributing 80 per cent of the total desalination plant population. The chart alongside shows the global installed capacity for various desalination processes.

As regards the main advantages, the RO process consumes less energy, is more compact, reduces corrosion-related issues and requires relatively lesser lead time. It is also less capital intensive and the operating cost too is lower compared with thermal processes. On the other hand, thermal desalination offers better outlet quality and has a lesser pretreatment component compared to membrane processes. Typically RO treated sea water would cost Rs. 35 to 40/cu.m. whereas with thermal processes this would be in the range of

Rs. 65 to 75/cu.m. Thermal processes are energy intensive and viable only if excess waste heat is readily available.

Desalination technologies, either thermal or membrane, have been extensively developed and implemented worldwide; some countries in the Middle East, Caribbean and Mediterranean regions are solely dependent on treated sea water to meet their industrial and community water needs. In India, too, many municipal corporations and city planners are working on the possibility of using sea water for potable and industrial purposes. Chennai city has already implemented desalination plants to meet its water demands. The main factor which has compelled many municipal and industrial development corporations to consider desalination as an alternate water

source is scanty rainfall, non-availability of ground water and contamination of other water resources. Considering all the above facts, sea water desalination is a reliable and definite alternate source of water supplies to meet industrial and community water demands. One would, of course, need to balance between capital and operating costs of desalinated water vis-à-vis non-availability of water for potable and industrial use, and the effect of this on health, commercial and industrial development and, in turn, on socio-economic development.



MSF RO MED, MVC AND OTHERS

Addressing Mumbai's Water Needs

Given the worsening water scarcity in Mumbai city on account of the monsoon failure, Ion Exchange took the initiative to organise a press meet in March on Solutions & Technologies for Mumbai's Water Needs. Addressing members of the press, Mr. Ajay Popat, CEO, Ion Exchange Waterleau, presented various alternative sources of supply such as sea water for industrial process use and potable/drinking water; industrial effluent for industrial process applications; sullage and sewage for secondary purposes (toilet flushing, gardening, vehicle washing, etc.) and rain water for drinking and secondary purposes.



Among the solutions to augment and conserve water supplies, desalination of sea water and treatment and recycle of sewage in particular provoked a lot of interest and interaction, and a lengthy and interesting Q&A session followed the presentation, with the press fraternity eager to know more about the technologies, cost-benefit etc.



Taking the Floor



Ion Exchange Asia Pacific Pte. Ltd. participated in Singapore International Water Week 2009, putting up a display stand at the Water Expo at Suntec Singapore International Convention & Exhibition Centre. The week's events included various business forums; Mr. Rajesh Sharma, our Vice Chairman & Managing Director, participated in the Indian Business Forum at which he made a presentation on 'Business of Water in India: Building Sustainable Growth' which focussed on investment opportunities in water.



Mr. Rajesh Sharma with Mr. Yaacob Ibrahim, Minister of Environment & Resources, Singapore.



Mr. Anil Manocha (second from right), Executive Director, Ion Exchange Asia Pacific at a meeting with Mr. Kapil Sibal, Human Resource Minister, Government of India; Mr. Ashok K. Kantha, High Commissioner of India to Malaysia, Mr. B.N Reddy, Dy. High Commissioner of India to Malaysia and CEOs of Indian companies operating in Malaysia. The meeting, at Kuala Lumpur, discussed business opportunities in India, particularly emerging sectors such as biotech, education and infrastructure, and the government support needed.

Confederation of Indian Industry's Water Equipment & Management Division, of which Mr. Rajesh Sharma is Chairman, organised a national seminar on 'Water for All' in New Delhi. Ms. Sheila Dikshit, Hon'ble Chief Minister, Government of National Capital Territory of Delhi, was the Chief Guest at the seminar.



Mr. Sharma chaired the inaugural session of the national seminar on 'Water for All' where he shared his views on Sustainable Water Security during his welcome remarks and introduction of seminar theme.



Mr. Sharma in discussion with Ms. Sheila Dikshit.



Mr. Ajay Popat, CEO, Ion Exchange Waterleau, speaking on 'New Technologies in Industrial Water Treatment' during the session on Industrial Water & Waste Water Treatment, at the seminar.

Mr. Popat was one of the speakers at the Round Table Conference on Water Supply in Mumbai – Challenges & Prospects, organised by Observer Research Foundation. He also chaired the sessions on Recycle & Reuse of Water and Use of Ultra Filtration Technology & RO Technology at the Aquatech Conference in New Delhi on Innovative Technologies in Water Sustainability, at which Mr. C.K. Sandeep, Vice President – Corporate Marketing, Ion Exchange made a presentation (below).



Round Up

Personnel at our chemical manufacturing facility at Patancheru, Andhra Pradesh participated in a number of training programmes.



At the team building programme



First aid and safety training included life saving skills and emergency evacuation drills



Quality circle programme

Customer meet at Rajamundry, Andhra Pradesh, was attended by around 130 of our customers from East and West Godavari districts.



ZERO B Initiatives

Tie-up with BPCL



The launch event at a BPCL petrol pump in Bandra, Mumbai.

Launched at 45 BPCL petrol pumps across Mumbai city, this tie-up venture included attractive schemes like giving away a complimentary Zero B Suraksha tap attachment with 2-litre MAK lubricant and distribution of coupons in 500, 1000 and 1500 denominations for redemption of equal value discounts on purchase on any Zero B RO water purifier.

On Homeshop18 Network



All our Zero B products can be purchased online on www.homeshop18.com, under the kitchen appliances segment, water purifiers link. Our products were also promoted through the Home Maker Show on the Homeshop18 channel. Further, an 18-minute slot was dedicated to Zero B Solar - the benefits, special features and technical specifications were demonstrated and explained by two anchors.

Corporate Social Responsibility

In recognition of the continuous patronage

by Ion Exchange Services Ltd. (IESL) to SOCARE over the past few years,

a memento was presented to Mr. Dinesh Sadasivan, ED & CEO, IESL, by the chief administrator of Sringeri Math, Mr. Gauri Shankar. SOCARE houses 136 underprivileged children



of convicts. As a part of CSR, IESL supports SOCARE in the areas of health and education.

A drinking water treatment system was donated

and is being maintained by IESL; an annual donation towards education fees is also made by the staff and management of IESL.

As a CSR initiative, our resin manufacturing facility at Ankleshwar provided the Sarnapur

Prathmik Shala with various items required for the school, including cupboards for their classrooms.



Spreading the Word

As part of our ongoing efforts on this front, our Corporate Communications group conducted an environmental awareness campaign through a series of internal and external communication highlighting routine day-to-day opportunities to reduce, recycle and re-use.

International environmental days such as Water Day (March 22), Earth Hour (March 27), Earth Day (April 22) and Environment Day (June 5) were celebrated with a range of initiatives to give a special thrust on the need to protect and conserve natural resources. The focus was on green living through practical, earth-friendly tips for conservation of water and energy, pollution control, recycling, sustainable living, suggestions and many other environmentally responsible 'how-tos'. And in keeping with our paper-less initiatives, most of the communications were e-based and took the form of e-cards, e-tips and screensavers as well as thought-provoking presentations and plays. The communication campaign to keep environmental issues in focus is an ongoing one and includes a weekly Friday e-series.





Eco-wise!



On Display



At Municipalika, Kolkata – an exhibition on municipal services, urban development and public works.



Our Home Water Solutions division showcases its wide range at the India International Trade Fair, Delhi.



We participated in the pharmaceutical exhibition PMEC, in Mumbai.



At Acetech, Mumbai we displayed our solutions for homes as well as the institutional sector.



At Aquatech at New Delhi



At Paperex, Delhi we showcased our range of solutions for the pulp and paper industry.



Our total solutions capability was exhibited at Powergen, Mumbai.



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