

Water & Waste Water Treatment Solutions for Power Plants

Capabilities, Qualifications and Featured Projects



MUNICIPAL PROJECTS



INDUSTRIAL PROJECTS



NATIONAL PROJECTS



Global Environmental Solutions Ltd.



**AZRIELI
GROUP**

Water Purification for power plants & Steam Boilers

GES offers leading edge technologies for handling water purification of diverse complex qualities while producing water suitable for drinking, irrigation, and industrial use compliant with international standards.

GES has extensive knowhow, knowledge and experience in design, built, and operation of water purification plants with wide spectrum of water qualities. The facilities can be operated through an on line system which enable remote operation and control.

GES's laboratories provide professional analytic service for the monitoring and analysis of the plant's or facility performance.

Total Solution with De-mineralization (DM) systems for power plants

De-mineralization utilizes advanced "ions exchange" technology, or advanced technologies which combine resins and selective membranes based on electro-deionization (EDI) in order to produce high quality water without salts while saving in regeneration of I/X resin. Such systems are delivered to the industry in cases when the supply of maximum purity water for steam boilers is required.

References

- **Integrated RO/EDI Systems for Power Plants & Steam Boiler Applications**
- **Membrane Bio Reactor (MBR)**



Integrated RO/EDI Systems for Power Plants & Steam Boiler Applications

Year	Country	Name of Client	Industry	Technology	Capacity (m ³ /day)	Application
2010	Israel	IEC – Israel Electric Company	Power Generation	RO	2,400	Effluent Cooling Towers Blow down, Membranal ZLD
2008	Israel	IEC - Israel Electric company	Power Generation	RO	1,440	Process & Boiler
2008	Israel	Carmel Resins	Packaging & Chemicals	RO/IX 2 Pass RO	40	Process & Boiler feed water
2008	Israel	Nesher	Cement	RO/EDI 2 Pass RO	96	Turbine Cooling
2008	Colombia	Termocalendaria	Power Generation	RO/CEDI 1 Pass RO	2,880	
2008	Israel	Dimona		RO/EDI 2 Pass RO	120 + 600	Process
2007	Israel	Sugat	Sugar & Salt Refinery	RO/IX 2 Pass RO	120	Process & Boiler feed water
2006	Israel	Melta	Micro-Electronics	RO/MB	96	Ultra pure water -UPW
2006	Israel	Ben Gurion University	Laboratories	RO/MB	24	Ultra pure water -UPW
2006	Greece	METKA – Greece Electric Company	Power Generation	RO/MB 2 Pass RO	2,160	Ultra pure Water - UPW
2006	Israel	S&A	Micro-Electronics	2 Pass RO	48	Ultra pure water -UPW
2005	Greece	METKA - Greece Electric company	Power Generation	RO/MB	1320	Ultra pure water -UPW
2005	Israel	Orbotech	Micro-Electronics	RO/MB	6	Ultra pure water -UPW



Integrated RO/EDI Systems for Power Plants & Steam Boiler Applications

Year	Country	Name of Client	Industry	Technology	Capacity (m ³ /day)	Application
2004	Israel	Shellcase	Oil & Gas	RO/EDI 2 Pass RO , TOC Reduction	96	Ultra pure water -UPW
2002	Israel	Shellcase	Oil & Gas	RO/EDI 2 Pass RO , TOC Reduction	36	Ultra pure water -UPW
2001	Israel	Shellcase	Oil & Gas	RO	250	Process water
2000	Israel	A.V.X	Micro-Electronics	RO/EDI 2 Pass RO , TOC Reduction	250	Ultra pure water –UPW
1998	Israel	Haifa Chemicals South	Chemicals	2X RO/MB	3600	Process & Boiler - UPW
1998	Israel	A.V.X	Micro-Electronics	RO/IX 2 Pass RO, TOC Reduction	150	Ultra pure water –UPW
1996	Israel	Guardian Flach Glass	Glass	RO/IX	1500	Cooling & Ultra pure water
1993	Israel	Vishay	Micro-Electronics	(2 RO Passes) RO/IX	336	Process water
1993	Israel	Dale	Micro-Electronics	RO/IX TOC reduction	720	Ultra pure water -UPW



Membrane Bio Reactor (MBR)

Year	Country	Name of Client	Industry	Technology	Capacity (m ³ /day)	Application
2005	Israel	WW plant Eilon	Municipal wastewater	MBR	550	The plant treats cowsheds, food processing and sanitary wastewater
2006	Israel	Unilever	Food & Beverage	MBR	350	The plant treats the processes wastewater
2008	Israel	Teva-Tech	Pharma Industry	MBR	300	The plant treats the sanitary wastewater for cooling water reclamation



Featured Projects



Metka-I – ADG Station, Greece - Water Treatment Plant for Power Station

- Brackish water DM plant for power plant
- The water plant supplies 2,640 m³/day of UPW, in line with required standards.
- The water plant consists of double pass RO & Mixed Bed resin polishing units to produce UPW.
- The purification process comprises a series of chemical and physical process intended to use brackish water and prepare it for double pass RO membrane treatment and then resin MB polishing to achieve water conductivity below 0.1µS/cm and silica below 0.01ppm.



Metka-II – Alivery Station, Greece – Water Treatment Plant for Power Station

- Sea water DM plant for power plant
- The water plant supplies 2,160 m³/day of UPW, in line with required standards.
- The plant consists of double pass RO & MB resin polishing units to produce UPW.

Overview - GES designed, manufactured, installed, commissioned, and delivered a desalination plant to treat sea water and produce ultra-pure water for gas turbine at ALIVERI V Combined Cycle Power Plant, Greece. The Power Island of the combined cycle power plant will be using ALSHTOM turbine and generator technology and consists of one KA26-1 single shaft unit.

The Challenge - The plant currently treats Mediterranean Sea water. The sea water quality is of high salinity and the total dissolved solids are about 35,000 ppm. The plant designed to produce high quality water with conductivity less than 0.1 µS/cm to be used in the turbine process of producing electricity.

The Solution - The technology applied in this case is raw seawater preparation by pre-treatment of chemical injection and multi-media filtration prior to reverse osmosis desalination unit. The RO system consists of double pass which treat the water for the final polishing stage with Mixed-Bed. The MB is a filter filled with resins for removal of traces of dissolved solids. The plant was constructed entirely in 40 feet containers including the pretreatment and the RO units. The plant produces 2X35m³/hr of DI water.



Termocalendaria , Colombia

- The Termocalendaria – DM plant supplies 2,880m³/day of UPW.
- The source of water is brackish water.
- The process is based upon a series of chemical and physical process intended to use brackish water and prepare it for membrane treatment by a single pass RO and then EDI polishing, to achieve water conductivity below 0.1µS/cm and silica below 0.01ppm.

Israel Electric Corporation (IEC) – Gezer Power Station

- The Gezer water treatment plant supplies 2,400 m³/day treated water.
- The plant is fed by tertiary treated effluent from a nearby sanitary waste to be used in the cooling tower.
- The process is based upon a series of chemical and physical process intended to use blow-down water from the cooling tower and treat it by a single pass RO membrane to produce water recycled back into the cooling tower for make-up.



Nesher, Cement Plant, Israel

- GES designed & constructed a water purification plant to treat the low salinity grid water into UPW.
- The treated water will be used for NOx suppression and SPRINT injection into gas turbine engines and for steam injected into the gas turbine.
- The RO plant capacity is 100m³/day.
- The process comprised of three major arrays: chemical and physical pretreatment, RO double array and EDI polishing unit. The plant was built in a a 40ft container
- Project O&M: 10 years



LUZ II, Solar Power Plant, Israel

- GES designed & constructed a water purification plant to treat the low salinity grid water into UPW. The product is being used in solar power plant for glass mirrors washing.
- The RO plant capacity is 20m³/day.
- The process comprised of three major arrays: chemical and physical pretreatment, RO double array and resin based polishing unit.
- Water is being delivered at required pressure to the pretreatment unit which includes cartridge filtration, activated carbon filtration, resin based softening for scaling prevention and micron filtration.

Sugat , Sugar Refinery, Israel

- In 2007, GES designed & constructed a water treatment plant to treat the low salinity grid into UPW. The plant provides DM water make up to be fed as Boiler Feed Water for a 64 bar steam boiler plant for Sugat Kiryat Gat - sugar refinery. The high pressure steam will be fed also to a turbo alternator.
- The RO plant capacity is 120m³/day.
- The process comprised of three major arrays: chemical and physical pretreatment, water flows to double pass RO array and finally being polished by EDI unit to obtain required UPW quality.



Nilit, Textile Factory, Israel

- The Nilit textile factory, operates its' own power plant.
- The water purification plant supplies UPW quality water at a capacity of 480m³/day.
- The source of water is brackish water .
- The process based upon a series of chemical and physical process intended to use brackish water and prepare it for membrane for double pass RO treatment followed by EDI polishing to achieve water conductivity below 0.1µS/cm and silica below 0.01ppm.

AGIP, Kazakhstan

- The AGIP water purification plant supplies DI quality treated water for the power plant.
- The source of water is brackish water .
- The process based upon a series of chemical and physical process intended to take in the brackish water and prepare it for membrane for single pass RO treatment followed by DI polishing by resins to achieve water conductivity below 0.1µS/cm and silica below 0.01ppm.



Ramat Eshkol, Israel

- The Ramat Eshkol water purification plant supplies DI quality water for the power plant.
- The source of water is brackish water .
- The process based upon a series of chemical and physical process intended to take in the brackish water and prepare it for membrane for single pass RO treatment followed by DI polishing by resins to achieve water conductivity below $0.1\mu\text{S}/\text{cm}$ and silica below 0.01ppm .

Dead Sea Works, Israel

- The Dead Sea desalination plant supplies $150\text{m}^3/\text{day}$ DI quality treated water for the power plant.
- The source of water is brackish water
- The process based upon a series of chemical and physical process intended to take in the brackish water and prepare it for membrane for single pass RO treatment followed by DI polishing by resins to achieve water conductivity below $0.1\mu\text{S}/\text{cm}$ and silica below 0.01ppm .



Water, let's make it clear

Water Now and For the Future

- Full compliance with industry standards, regulations, environmental guidelines and operational cost efficiency
- Looking towards the future with a environmental friendly viewpoint
- Continued research and technological advancement to develop more effective and efficient solutions in all spheres of water treatment.

