

Radial deionization system outperforms RO in Oman

Results from an 8-month trial of Atlantis Technologies' Radial Deionization (RDI™) system in Oman demonstrate its ability to desalinate produced water for agricultural applications at lower costs than reverse osmosis.

Fresh water in the Middle East is in high demand, and it is far less available or accessible than in many other areas of the world. Agricultural applications alone consume nearly nine of every 10 liters of water in the Middle East, and the average person uses approximately 300 to 380 liters of fresh water every day. Together, these water applications and uses create an acute need that demands creative solutions. The United States (US) company Atlantis Technologies is deploying a solution – one that has the potential to meet this enormous and unrelenting need for fresh water.

Field trials of Atlantis Technologies' Radial Deionization (RDI™) system have proven to be very effective at a water treatment facility in Oman. During an 8-month trial, produced water from oil fields in the south of Oman was successfully desalinated from 10,000 parts per million (ppm) of salt to a level useful for agriculture.

A test trial for the system ran from February to April 2016, and again from August to December 2016, treating approximately one cubic meter of water per day. During the testing periods, the Atlantis desalination plant successfully operated minimal unplanned downtime, producing more than 75 percent clean water.

These results demonstrate that the Atlantis RDI desalination technology can commercially and technically outperform reverse osmosis (RO), a water purification technology that uses a semipermeable membrane to remove ions, molecules, and larger particles from drinking water. RDI also has the potential to bring energy savings to the process of water desalination and can be seamlessly and efficiently coupled with solar power.

Atlantis Technologies' proprietary RDI solution separates

positive and negative ions as water passes through its patent capacitive deionization water treatment system. The solution has several differentiation factors, making it a radical departure from previous generations of capacitive deionization. The supercapacitor design, for example, allows for water to flow across 0.3 to 1 meter of continuous supercapacitor material. The long distance allows for greater total dissolved solids (TDS) reduction and for processing very high TDS streams and flow rates.

The RDI desalination system incorporates proprietary operating techniques that enable fouling resistance, energy conservation, brine concentration, and back-washing. Its supercapacitors incorporate the latest generation of materials, allowing for an extremely high salt capacity.

Atlantis Technologies worked with its regional partner Synergy Petroleum, and their partner Bauer Nimr LLC on the successful commercial field trial. The commercial application was conducted in the Nimr Water Treatment Facility in Oman, which treats produced water from southern Oman oil fields operated by Petroleum Development Oman (PDO), one of the major oil producers in the country. Prior to the trial of RDI, desalination work was done by using evaporation ponds, which are suitable for

disposing reject brine due to an abundance of solar energy.

Atlantis Technologies is planning to establish a hub for research and development (R&D) and manufacturing in Oman by the end of 2017. "Oman is an ideal country and environment for our company to establish a hub to serve the region," says Patrick Curran, CEO of Atlantis. "The business environment is safe and efficient; manufacturing is very competitive considering the Free Trade Agreement (FTA) with the United States, and there is a huge market for water desalination in Oman and the region." Atlantis is currently in final negotiations with investors to develop the technology hub.

Bauer Nimr would like to launch another field application to use the technology to treat hyper-saline water that is found in abundance in the northern fields of Oman. "We are excited to continually engage in R&D activities in Oman. The technology could very soon change the economics of desalinating water; in addition, it could put Oman at the forefront of water desalination technologies and water treatment equipment manufacturing. The water sector is, by far, the most essential and exciting sector to invest in – especially in the long run," says Ernst Griessemann Bauer, Nimr

CEO. Nimr and Atlantis are bidding on the additional projects.

Atlantis Technologies is a startup based in the US state of California that focuses on water desalination using capacitive deionization (CDI), a technology that has the potential to replace RO as a means of desalinating water. The technology has wide-scale applications in Oman for treating water of diverse salinities including, but not limited to, seawater, low-salinity water (found in Nimr and the Al Batinah Region), and hyper-saline water found in some of the major oil fields in Oman. Atlantis is on the forefront of this development, having built some of the largest CDI systems in the world.

Bauer Nimr is an Omani-German joint venture focused on offering water treatment and environmental solutions within the region. The company has successfully built, and currently operates, the largest produced water treatment facility in the world that utilizes reed beds as the core cleaning technology. Bauer Nimr has been active and supportive in investigating further technologies that would help Oman meet its water and environmental needs. Recently, Bauer Nimr completed bio-saline agriculture tests that eventually allowed for the materialization of farming projects in Nimr.



Containerized Atlantis RDI system with generator and water storage tanks at Bauer Nimr. Photo by Atlantis Technologies