



*Low Cost Produced Water Desalination*

[www.atlantis-water.com](http://www.atlantis-water.com)

## **CAPEX & OPEX Comparison RDI vs. Competitive Technologies vs. Salinity Levels**

Below is a comparison of the Atlantis RDI desalination system versus appropriate state of the art technologies (RO, EDR, Brine Concentrator, & CapDI in three different salinity ranges (1,600 ppm; 10,000 ppm; 75,000 ppm). Layered onto each evaluation are estimates of silica and hardness removal which is often required along with disposal costs for brine. Many, but not all, customer applications require these additional unit operations so the costs are separated for comparison.

## Salinity: 1,600 ppm reducing to < 500 ppm

In this range we compare the Atlantis RDI against:

1. Brackish Water Reverse Osmosis
2. EDI/EDR
3. CapDI

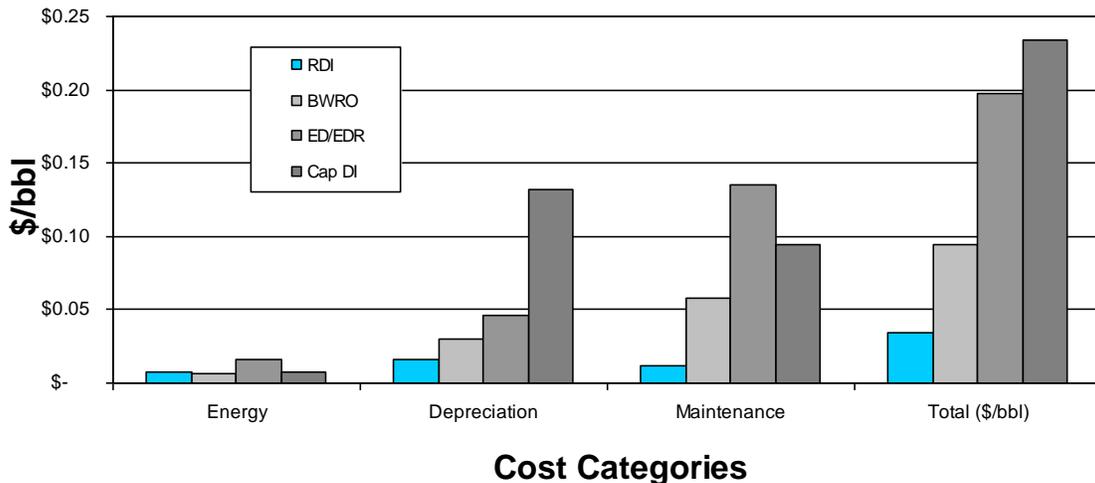
The RDI has significantly lower CAPEX and maintenance and ability to produce very little brine. This salinity range is an absolute sweet spot for Atlantis. Basic cost of ownership is 63% - 85% LESS than competitive technologies. The RDI can reach recoveries as high as 95%.

When these other advantages are included, the Atlantis RDI has a 94% lower cost of ownership.

Below are some engaged customers in our target segments with applications in this salinity range.

- Power generation:** Confidential power company.  
**Beverage:** Confidential beverage company.  
**Municipal Water:** PERC Water, HES Engineers Australia, Swissclean Water  
**Cooling Tower:** Confidential water treatment company.

### Cost of Ownership, 1,600 ppm, \$/bbl



## Salinity: 10,000 ppm reducing to < 2,000 ppm

In this range we compare the Atlantis RDI against:

1. Brackish Water Reverse Osmosis
2. EDI/EDR

When considering only the energy, CAPEX, and maintenance, Atlantis RDI cost 14% less than reverse osmosis (RO) and 64% EDR. Cap DI from Voltea was left out as they do not offer systems in this TDS range.

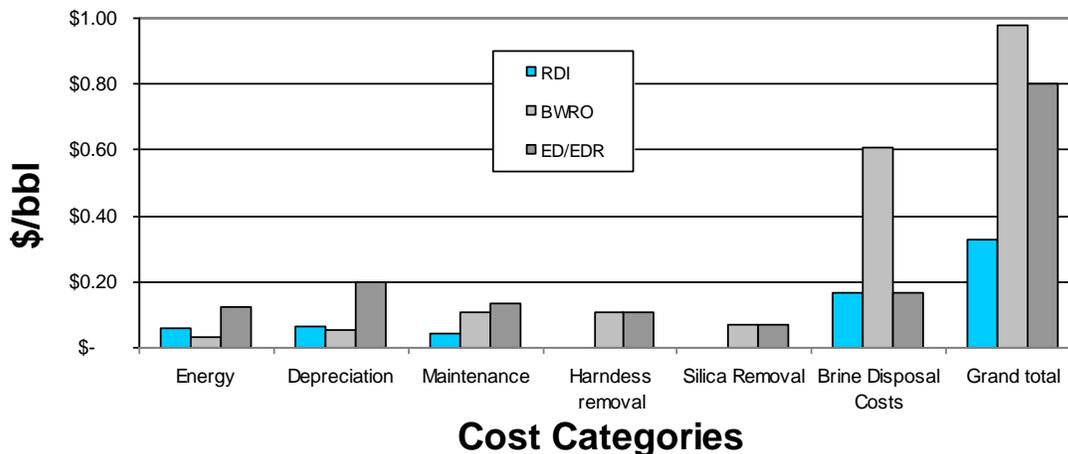
Hardness removal is often required in these applications and typically require 1 or more additional unit operations in front of the desal unit. This is especially true in the oil sands sector. Because the RDI removes these contaminants during the standard desalination process, the investment of capital and corresponding operating costs can be avoided. The brine produced in this range is problematic and often requires expensive disposal.

When the silica, hardness, and brine disposal costs are added in, an Atlantis RDI based system costs 59 – 66% less to operate.

Below are some engaged customers in our target market segments.

**Heavy Oil:** Confidential EOR customer in California  
**Oil Sands:** Confidential customer in Calgary  
**Shale Gas:** Confidential customer in Colorado  
**Drinking Water:** NASA Ames Research Center, University of California

### Cost of Ownership, 10,000 ppm, \$/bbi



## Salinity: 75,000 ppm reducing to < 5,000 ppm

In this range we compare the Atlantis RDI against a brine concentrator/vacuum distillation system only. RO, EDR, and CapDI can not operate effectively at this TDS level.

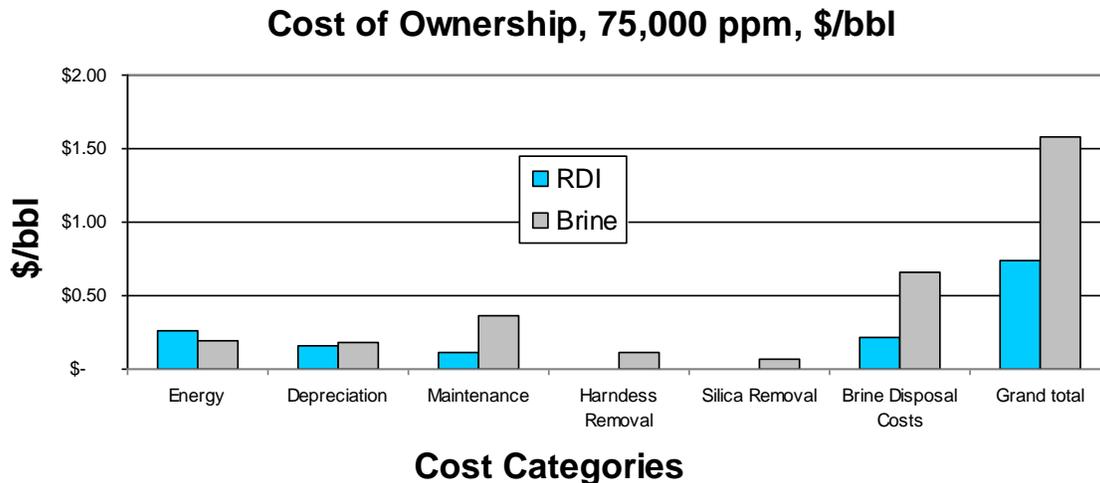
When considering the energy, capex, and maintenance, Atlantis has a 30% cost of ownership advantage over a vacuum distillation/brine concentrator.

Pretreatment for silica and hardness are quite often required in these applications and typically require 2 additional unit operations in front of the desal unit. Because the RDI also removes these contaminants, investment of capital and corresponding operating costs can be avoided. The brine produced in this range is very problematic and often disposal costs are incurred.

When both of these are added in, the Atlantis advantage grows to 53% less treatment costs.

Below are some engaged customers in our target market segments.

**Shale Gas:** MI Swaco, Schlumberger  
**Marcellus Shale:** Confidential Customer in New Jersey



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