

Produced Water – A New Water Resource for the Arid Western States



Ned A. Godshall, CEO

Altela, Inc.

Treating Water Naturally

7500 Meridian Pl NW, Suite B
Albuquerque, NM 87121
(505) 923-4141

5350 South Roslyn St, Suite 450
Englewood, CO 80111
(303) 993-1951

Treating water naturally – turning a liability into an asset: brackish mixed-contaminant O&G Produced Water



Produced Water

- About 60 million years old
- 2 to 3 miles below the surface of the ground
- Very brackish; often 2 to 3 times more salty than ocean water
- Mixed contaminant; ‘highly-challenged’ water; contains all of:
 - Many different kinds of salt (not just one, like ocean)
 - Residual oils, condensate, BTEX, etc.
 - Metallics, inorganics, etc.
 - Sometimes radionucleotides

Produced Water

- Nearly 100% is disposed of through re-injection wells
- Disposal cost is the sum of:
 - Truck transportation cost and
 - Disposal well cost (amortization and operation)
- Disposal costs in NM range from \$0.17/bbl to \$6.00/bbl (\$0.15/gal)
- Treating this water saves money, highways, extends well life-times, etc.
- Note that O&G producers paid to lift this water thousands of feet
- “Economic Value” (importance) of this PW is \$86,000/acre-foot

Economics of Produced Water

Produced Water:

- Oil & Gas producers often pay 40 times as much to get rid of a gallon of dirty water, as you and I pay for a gallon of clean water
- PW limits the economic life of a well, not the amount of oil or gas underground
- By lowering the cost of PW disposal, more energy can be made from the same well – and the U.S. and NM domestic ‘known reserves’ can be increased
- By cleaning this PW, costs can be lowered and the water given away for free in the arid west

Economics of Water

Water Use	\$/gal	\$/1,000 gal	\$/bbl	\$/acre-foot	X times Municipal
Irrigation water	\$0.00008	\$0.08	\$0.003	\$25	0.025 X
Irrigation water	\$0.0008	\$0.80	\$0.03	\$250	0.25 X
Municipal water	\$0.003	\$3.00	\$0.13	\$1,000	1.0 X
Low TDS water	\$0.006	\$6.00	\$0.26	\$2,000	2.0 X
'Deep Water'	\$0.012	\$12.00	\$0.50	\$4,000	4.0 X
'Produced Water'	\$0.12	\$120.00	\$5.00	\$40,000	40 X
High Cost Water	\$0.60	\$600.00	\$25.00	\$194,000	194 X
"Oil Equivalent"	\$1.90	\$1,900	\$80.00	\$621,000	620 X
Bottled water	\$8.00	\$8,000	\$336.00	\$2,608,000	2,608 X

Legal and Regulatory

- Regulation of produced water has been instrumental in protecting the environment – Treating produced water is a win-win situation
- New technology now allows, for the first time, the remediation and use of this oilfield waste water
- ‘Ownership’ of the cleaned water is now an issue, and could harm the implementation of new technologies if over-regulated or ownership is not clear
- PW has always been under the control of NM OCD, and treated as oilfield waste
- PW is no longer being treated as solely a problem of waste disposal, but instead is increasingly being treated as an asset

Legal and Regulatory

- Produced Water Transition Under-way:
 - No longer being treated as solely a problem of waste disposal but instead is increasingly being treated as an asset
 - More Water, More Energy, Less Waste Act of 2007 (Expanding Usable Water through Re-Use of PW)
 - BLM, USGS, BOR partner to recover and clean produced water to increase supplies of usable water
- U.S. EPA CBM Task Force Reviewing Federal Regs

Legal and Regulatory

- NM statutes and case-law offer support that wastewater (PW) from oil and gas production treated as:
 - Part of real property mineral estate
 - Owned by the landowner
 - Conveyed to producer via oil and gas lease
 - Transferable by the producer as personal property
 - Subject to state and federal laws & regulations

Mother Nature

vs.

Altela, Inc.

- Step 1: Passive solar energy evaporates water at the ocean surface
- Using low-grade heat and no pressure

This clean water vapor is later released as rain in:

- Step 2: Cold air cannot hold as much moisture as hot air
- So rising air gets colder, causing condensation – rain

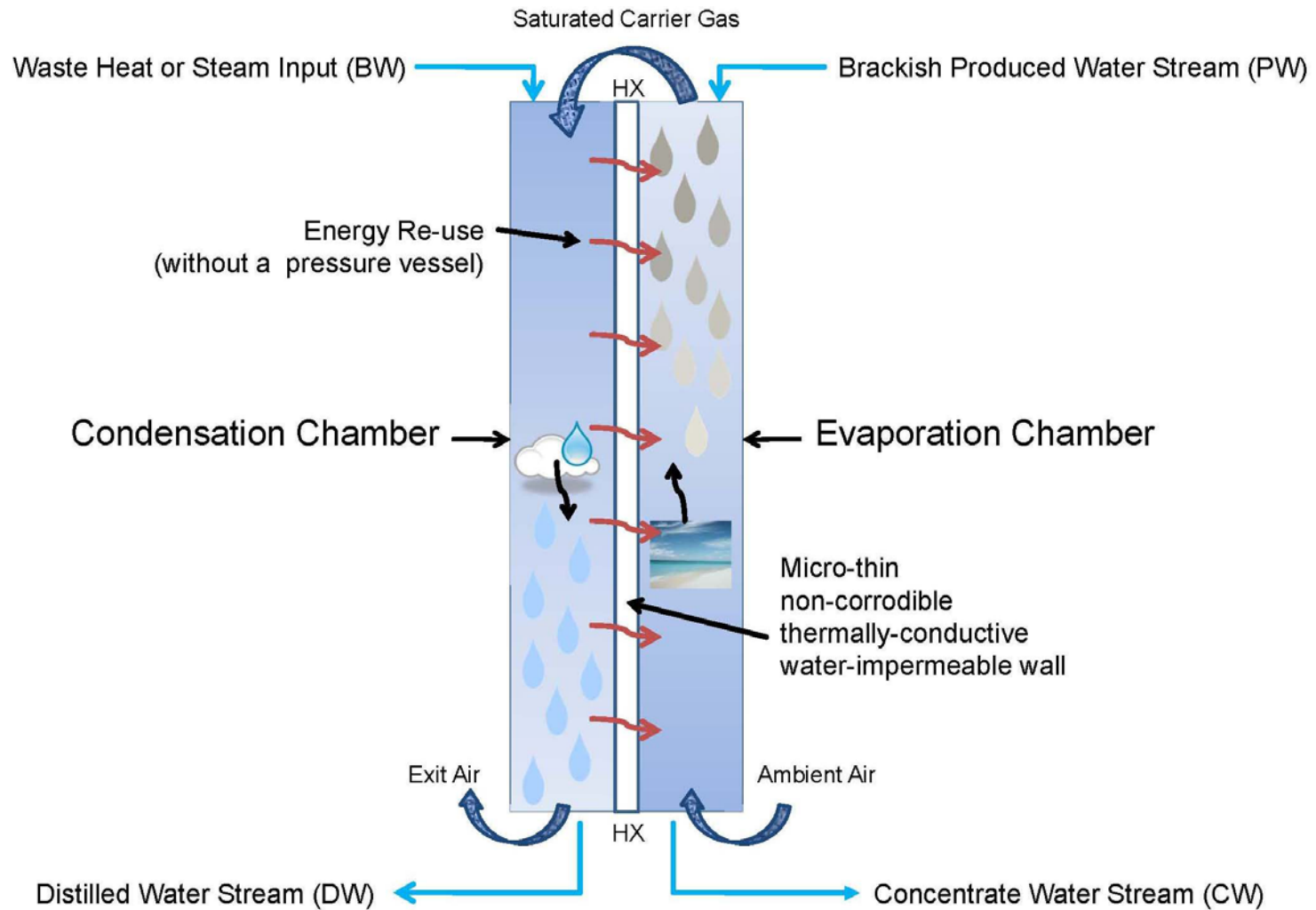
And the amount of energy given off in Step 2 is equal to the amount of energy used in Step 1: Mother Nature is very energy efficient.

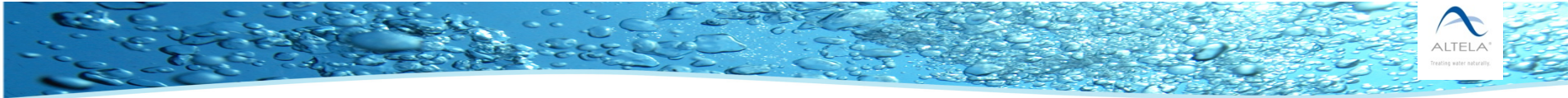
- AltelaRain® brings Steps 1 and 2 together just 200 microns (0.008”) apart, rather than thousands of miles apart
- So the energy given back in the condensation step is used over and over again in the evaporation step:
- Reducing the amount of even this low-grade inexpensive heat to only one-fourth of what it is for conventional thermal distillation
- That is, Altela desalinates 3 gallons of water for the energy to evaporate 1 gallon conventionally
- Since we use no pressure, all components are made with inexpensive plastics, rather than metals that corrode

Altela's Uniqueness: Simple, Elegant, Inexpensive

- World's only economic desal that does not use pressure - No pressure vessel is required
- Which must be constructed of metal to withstand the pressure
- For which the metal corrodes in the presence of brackish water
- For which high CapEx, high-alloy metals are required to extend lifetime of pressure vessels, pumps, valves, pipes, etc.
- And for which high OpEx costs are required because pressure requires pressure pumps, which require expensive electricity

AltelaRain® Process





Altela, Inc. – Permit to Discharge Pure Water into Colorado River

- Altela produced and released clean drinking water from our treatment into the Colorado River for the first time on July 3rd 2008
- Received environmental regulatory approval to discharge and beneficially re-use clean, treated frac and produced water for irrigation, commercial and industrial use
- Benefits farmers, ranchers and communities across water-starved western United States
- Addresses country's water and energy security
- An example of technology stepping in to convert a liability into a valuable asset using inexpensive, efficient processes

Produced water as a new water resource for the arid western states is no longer just a concept

The Sky is the Limit!

