

Conserving Clean, Potable Water for Life!

Dollars and Sense

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AWEB Supply Co., Inc.



Water, Water Everywhere and so little to Drink



“Status”

- $\frac{3}{4}$ of Earth's surface is covered by water
- Only about 2.5% of that is freshwater
- **LESS** than 1% of Earth's freshwater is surface water

What makes Potable Water so Valuable -

- Every state in the U.S. is subject to various water legislation & regulation
- Many regions of the world already experience severe potable water shortages

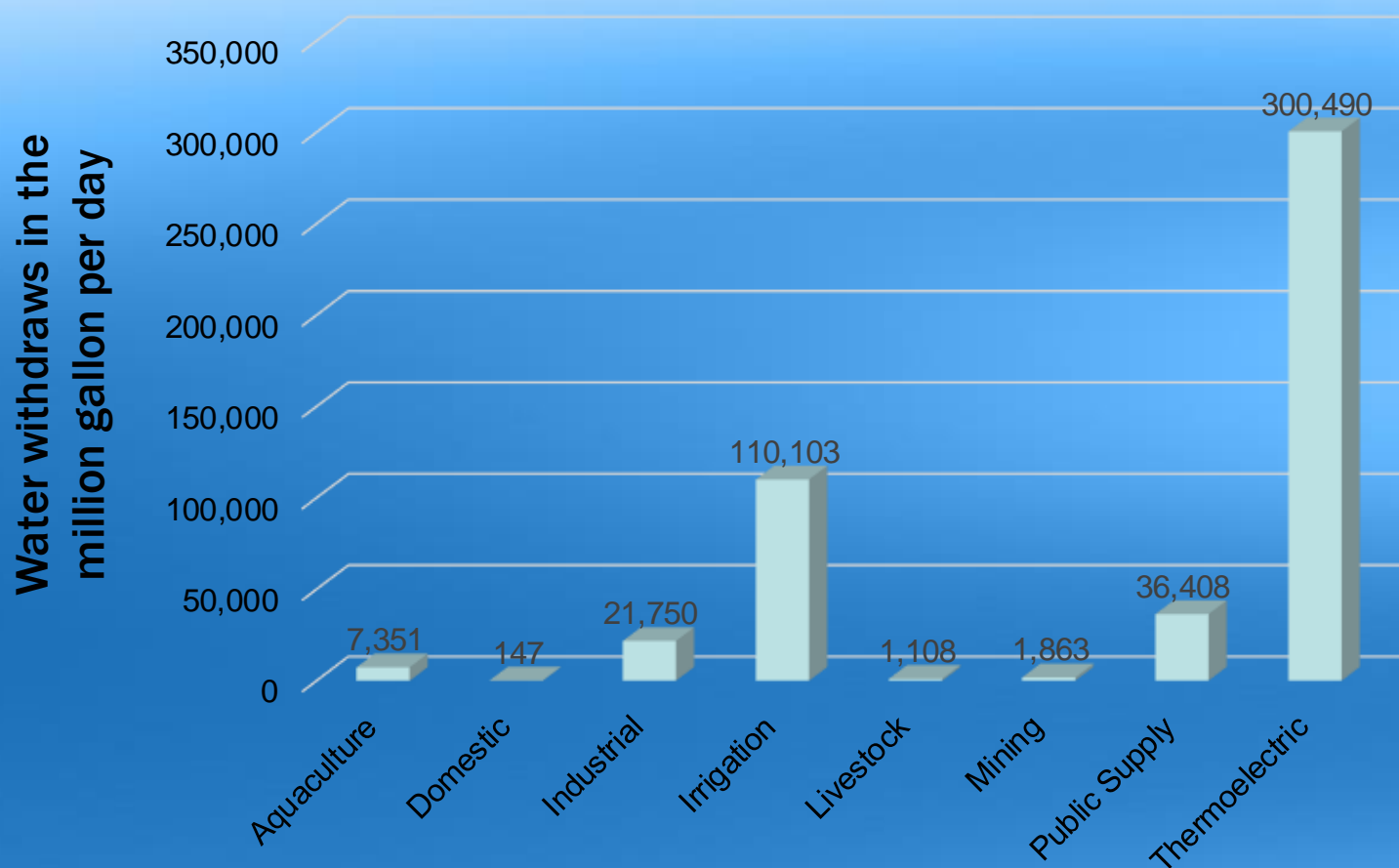


What makes potable water so precious??

- *The sustainment of life, water is second only to air*
- *The sustainment of power production, water is second to none*

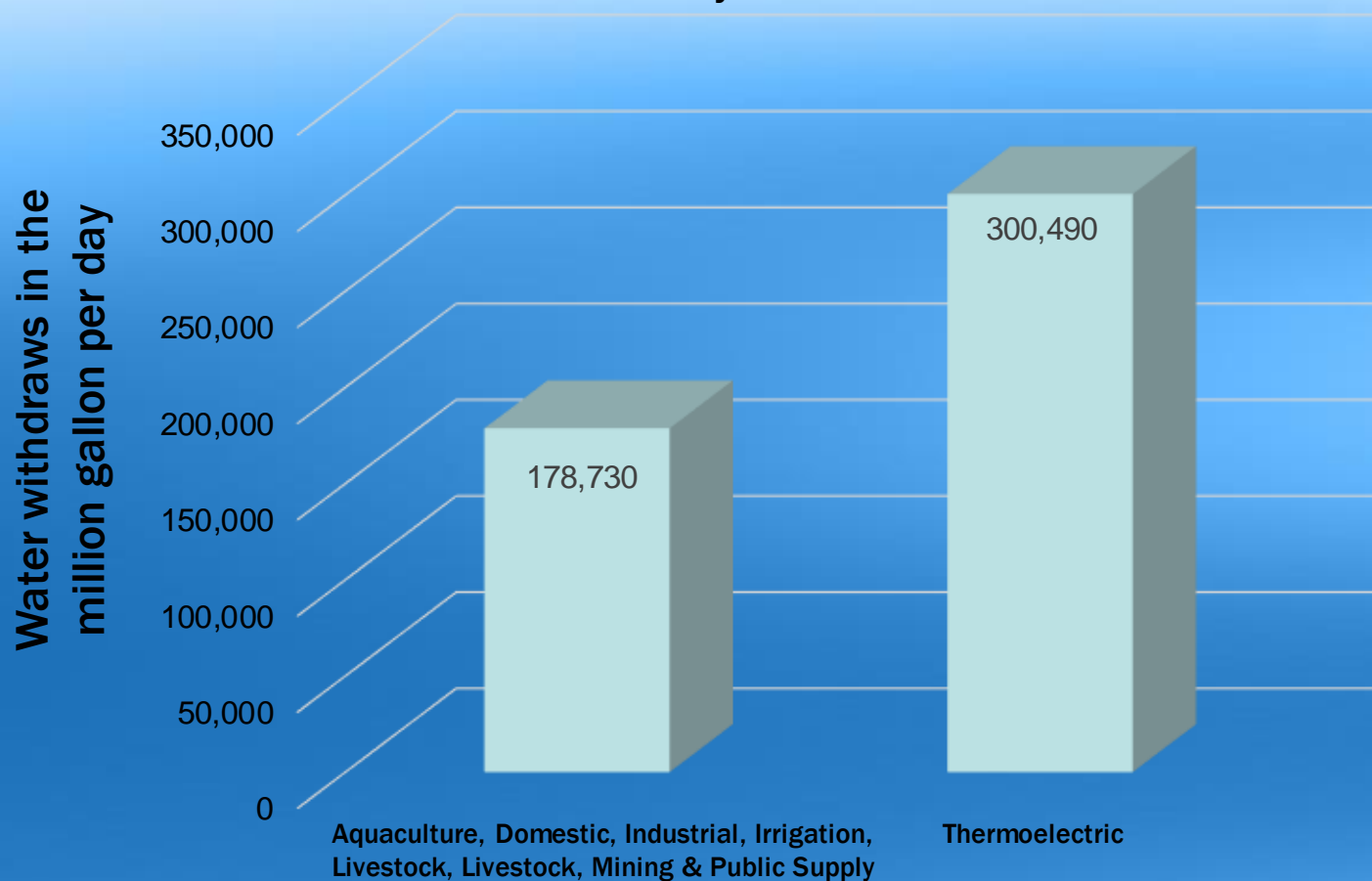
Surface Water Usage

Total surface-water withdrawals in the United States
For the year 2013

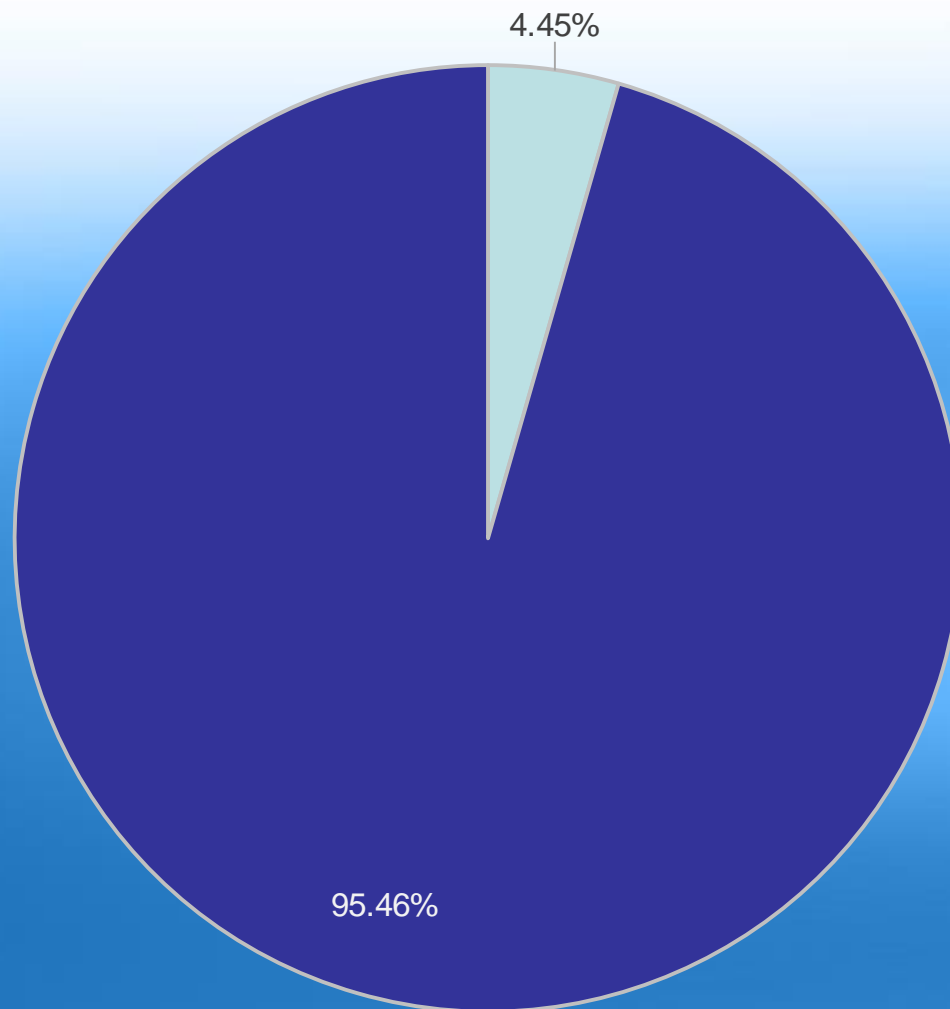


Surface Water Usage (Combined)

Total surface-water withdraws in the United States
Per Day in 2013



Over 95% of U.S. Electrical Production Requires Water



■ Geoexchange & Wind ■ Thermoelectric & Others



Power Conservation is Water Conservation



While global energy and water consumption approach critical points in some areas,

Fluid-to-Fluid Geoexchange in bodies of water unlocks a innovative approach for:

- Reduced potable water consumption
- Reduced energy consumption
- Reduced carbon footprint
- Use of accessible assets

Using Nature to Conserve Potable Water

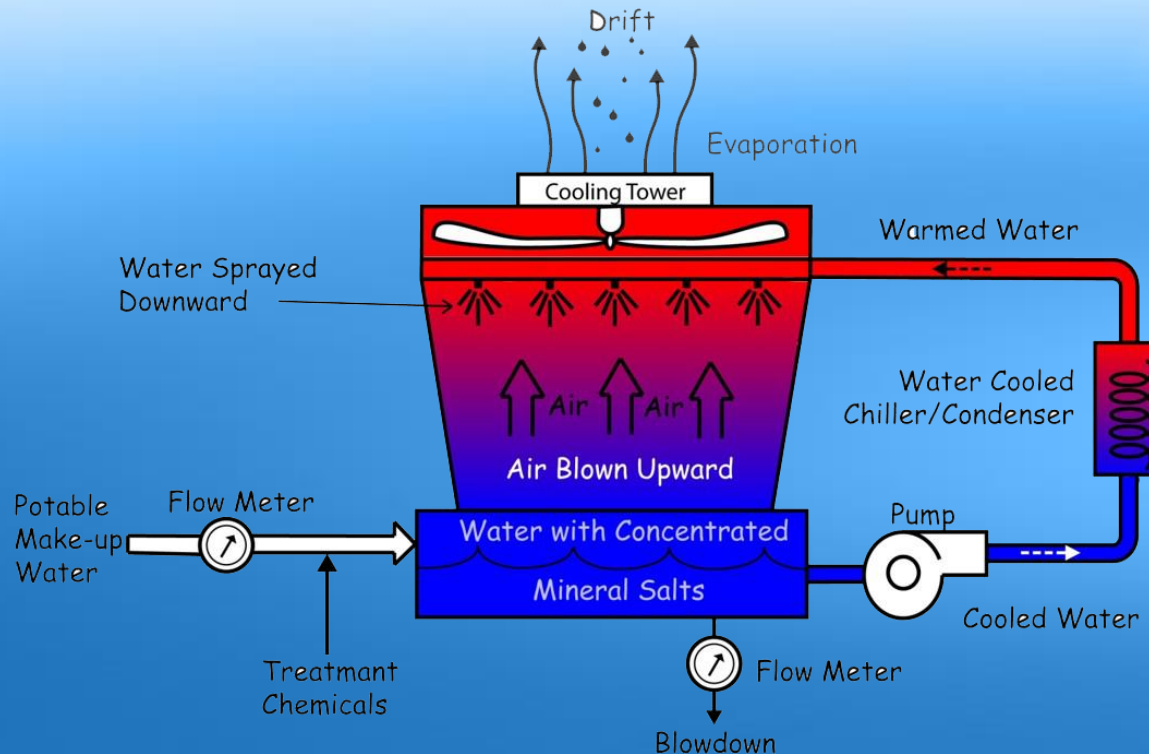


Huge amounts of potable water and power can be saved using existing resources.

The Slim Jim[®] or Geo Lake Plate[®] assembly is a proven method of reducing cooling tower dependence thus conserving potable water and power.

Conventional Cooling Tower Operation

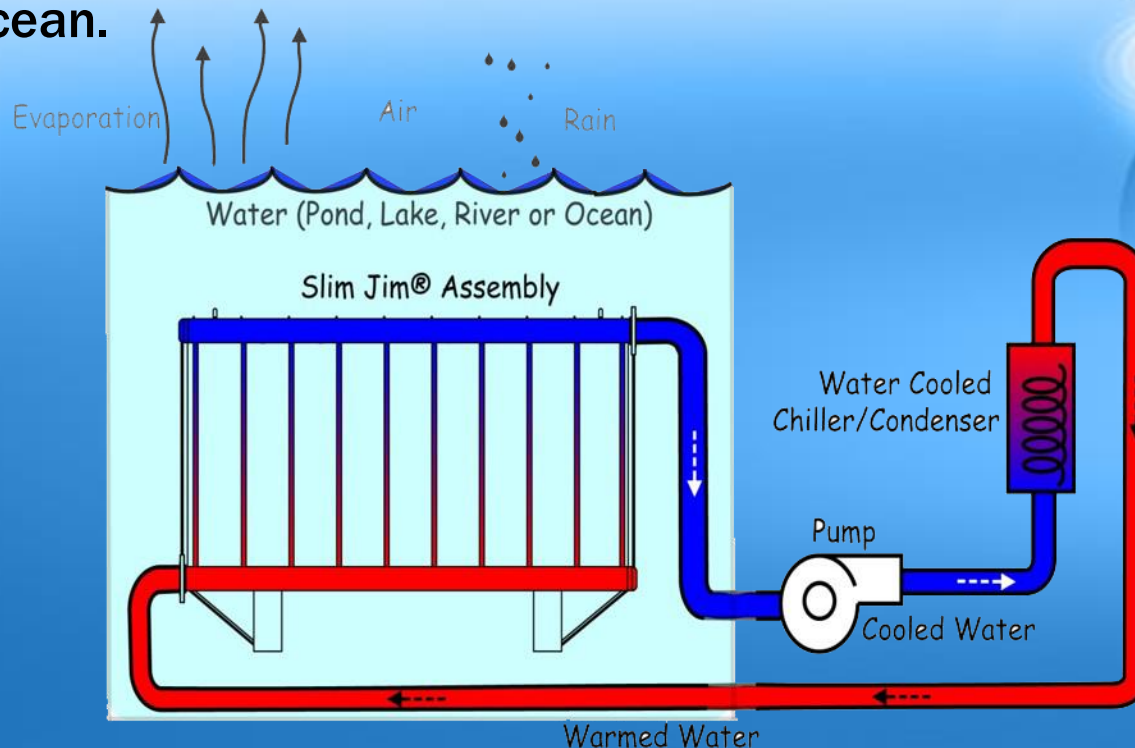
A cooling tower is used to reduce the temperature of warmed water by extracting energy from warmed water and emitting this energy to the atmosphere thru evaporation.



The above image shows a cooling tower use of evaporation whereby some of the water is evaporated into a moving air stream including drift (liquid water entrained in the air stream) is subsequently discharged into the atmosphere. Treatment chemicals and blowdown (water changes) controls the concentration of dissolved solids and is discharged from the cooling tower adding to water consumption.

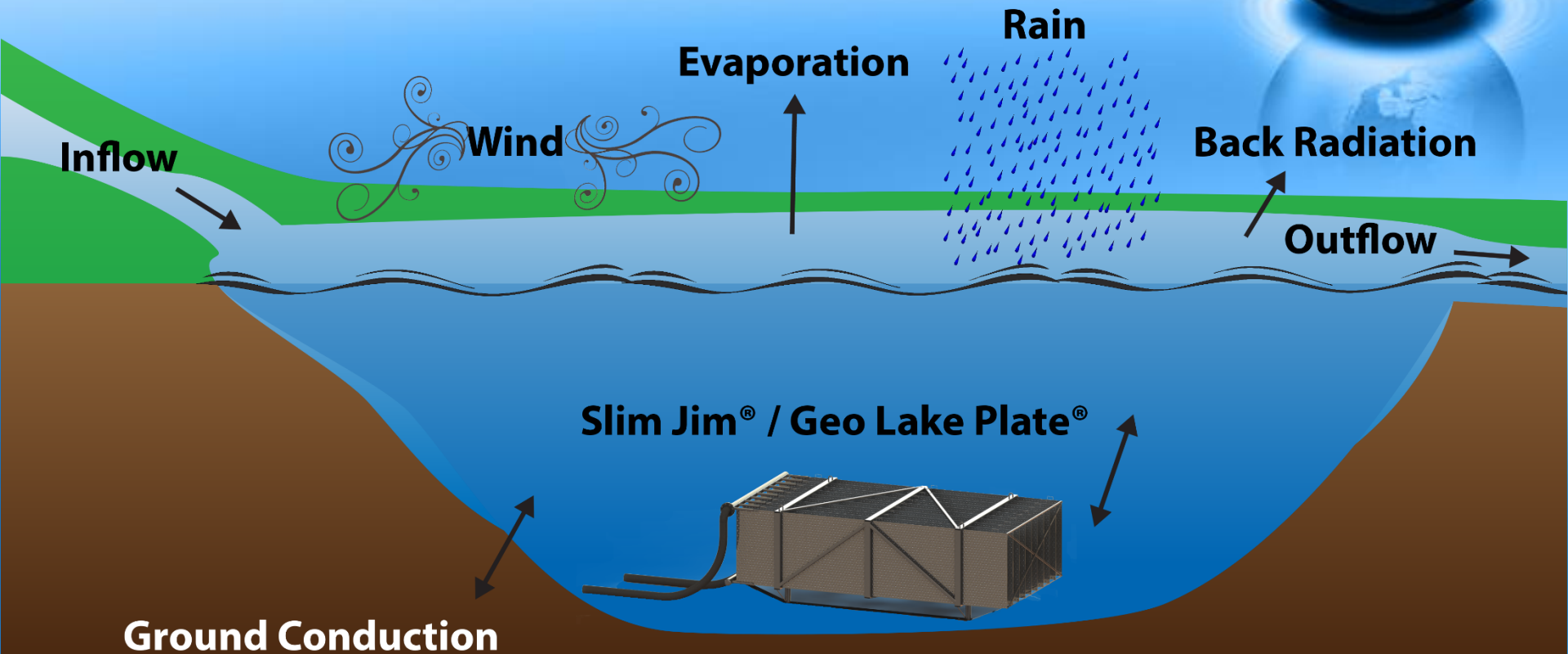
Fluid-to-Fluid Geoexchange Operation

A Slim Jim® or Geo Lake Plate® assembly is used to reduce the temperature of warmed condenser water by rejecting energy from the warmed water and dissipating it to the cooler Pond, Lake, River or Ocean.



Consequently using this process the use of potable make-up water, has been eliminated. Any make-up water for the body of water will be supplied by rain water or untreated ground water. Conserving the use of clean potable water.

Bodies of Water Energy and Mass Transfer Modes



Cooling Tower (Closed Circuit) VS. Slim Jim® / Geo Lake Plate® Operating Cost Comparison



2014	<i>Year (Select)</i>
100	Tons of Cooling (Cooling Tower)
1,500,000 Btu/hr	(HR) Btu's of Heat removed per hour of operation
100%	Run Time (per Day) {6AM thru 6PM = 12 hrs. = 50%}
3.50	Cycles (1.0 thru 10.0)
No	Metered Sewer (Select)
\$ 0.1019	kW/hr.
\$ 8.53	Water Cost (per 1,000 Gallon)
\$ 0.00	Water Surcharge (Month)
\$ 8.53	Sewage Cost (per 1,000 Gallon)
\$ 0.00	Sewage Surcharge (Month)
\$ 2.00/lb	Chemical Costs (maintain 100 ppm in Blow Down)
300 gpm	Recirculation Flow Rate: Rule of Thumb #1: 3 gpm/ton of cooling with a 10°ΔT

Fig 1

Cooling Tower (Closed Circuit) VS. Slim Jim® / Geo Lake Plate® Operating Cost Comparison



4.2 gpm	252.00 gph	2,207,520 gal/yr
3.0 gpm	180.00 gph	1,576,800 gal/yr
1.2 gpm	72.00 gph	630,720 gal/yr
0.024 gpm	1.4400 gph	12,614 gal/yr
4.2 gpm	252.00 gph	2,207,520 gal/yr

Make-up Volume: (Evap Vol + Blow down Vol)

Evaporation: Rule of Thumb #2: 1.8 gph/ton of cooling

Blow Down Volume: (Evap Vol / (Cycles-1) {Drift & Splash-out Losses included}

Drift (Water): Rule of Thumb #3: Drift Uncontrolled release of chemically contaminated water (est.)

Sewer Usage

\$ 0.44 \$/hr	\$ 10.48 \$/day	\$ 3,825 \$/yr
\$ 0.07 \$/hr	\$ 1.75 \$/day	\$ 637 \$/yr
\$ 2.15 \$/hr	\$ 51.59 \$/day	\$ 18,830 \$/yr
\$ 2.15 \$/hr	\$ 51.59 \$/day	\$ 18,830 \$/yr
\$ 0.12 \$/hr	\$ 2.88 \$/day	\$ 1,051 \$/yr

Fan Only Electric Cost

Sump Pump Only Electric Cost

Potable Water Cost (Make-up)

Sewer Cost (Un-Metered Blow Down)

Chemical Cost (Blow Down)

Hourly Costs \$	Daily Costs \$	Annual Costs \$
\$ 4.93 \$/hr	\$ 118.29 \$/day	\$ 43,174 \$/yr

Est. Cooling Tower Cost

\$ 0.00 \$/hr	\$0.00 \$/day	\$ 0.00 \$/yr
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Est. Slim Jim® / Geo Lake Plate® Cost

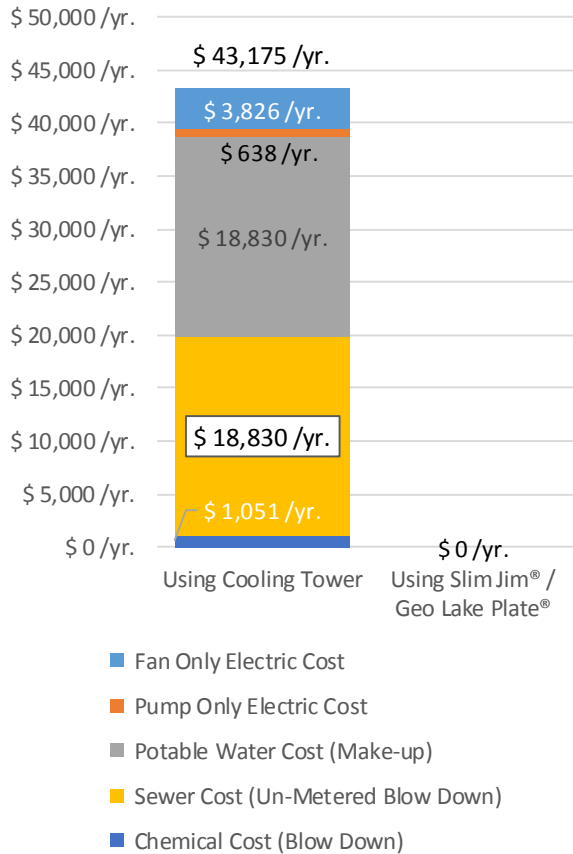
Fig 2

Cooling Tower vs. Slim Jim® / Geo Lake Plate®

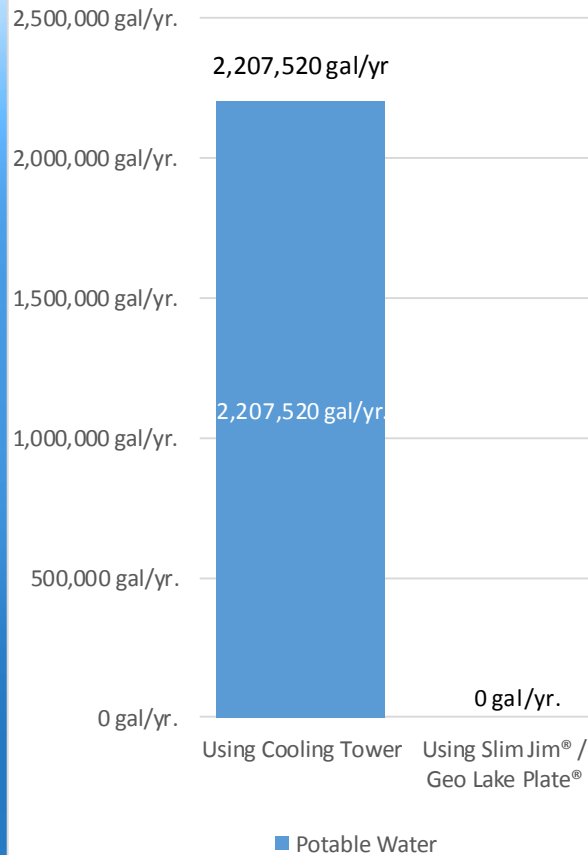
Operating Cost Comparison



Annual Cost
Electric, Potable, Sewer
& Chemical



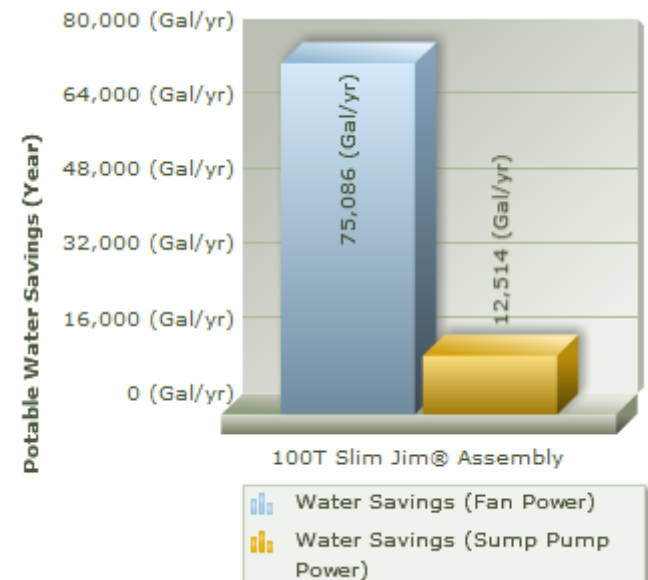
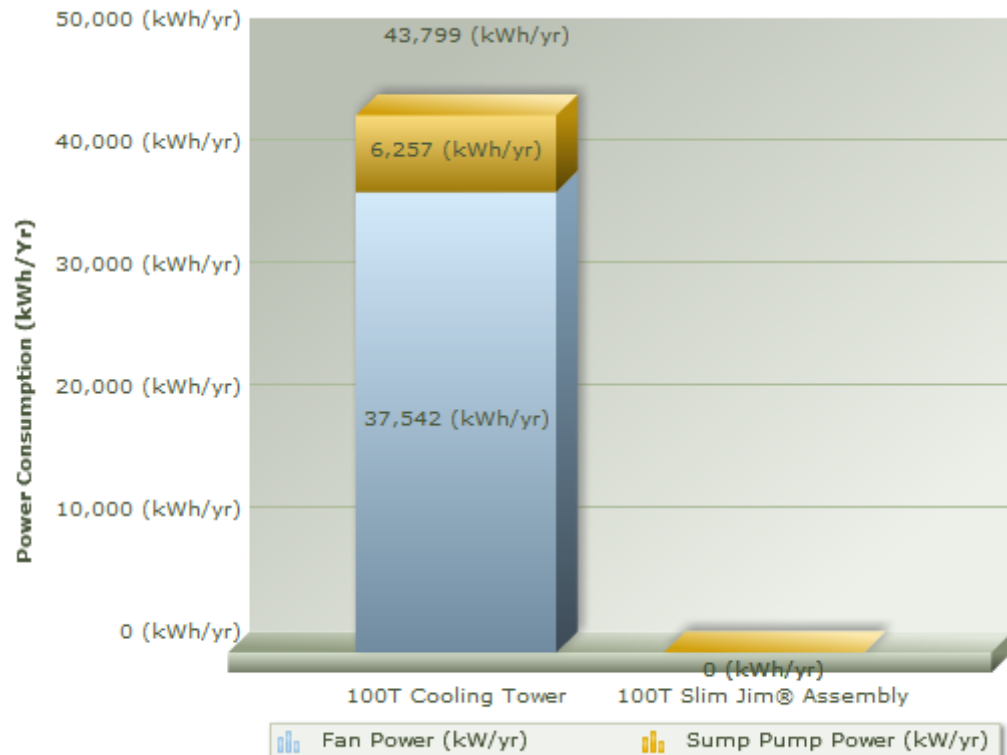
Annual
Potable Water Usage



Additional Water Save through Energy Reduction



¹It takes an average of 2 gallons of water to produce 1 kilowatt-hour of electricity



¹www.epa.gov/region9/waterinfrastructure/waterenergy.html

100
1,500,000 Btu/hr
100%
3.5

Tons of Cooling

(HR) Btu's of Heat removed per hour of operation

Run Time (per Day)

Cycles



Important Fact

*100 Tons of Cooling Tower capacity
uses/evaporates 252 gallons per/hr.*

This calculates out at:

- *Day*: ~6,048 gallons of potable water*
 - *Month: ~183,960 gallons of potable water*
 - *Year: ~2,207,520 gallons of potable water*
- *Replacing this cooling tower with a Slim Jim® / Geo Lake Plate® 100 Ton assembly would conserve ~2,207,520 gallons of potable of water on an annual basis.*
- *For every 1,000 tons, consumption could be reduced by ~22.1 Million gallons of potable water annually.*



**Running 24 hours a day / 3.5 Cycles*

Additional Benefits!

- All Seasons Savings includes Heating when used with a Heat-Pump or Reversible Chiller thru Geoexchange
- Costs become more predictable
- Easy to install & labor friendly
- Maintenance free
- No:
 - *Media to change*
 - *Blow-down chemicals needed*
 - *Desalination required for Seawater or Brackish applications*
 - *Potable water is required once the system is installed*
 - *Moving parts*
- Zero emissions



Variety of Applications

- Non-Potable Water
 - Gray water
 - Rain/Storm Water
 - Sewer treatment
 - Water treatment
- Manufacturing supply/discharge use
- Dual use of irrigation system
- Saltwater applications – no desalination required



Some See A Pond...



**We see a natural rainwater retention device
that can function as an
Eco-friendly cooling tower**

Central Florida Hotel

360 Tons Rejection Capacity

Conserves 720 gal per hour of potable water at full load run time!
Approx. \$235.00 savings per 24 hr day in water & sewer costs alone!



(Using \$13.60/1,000 gal combined water & sewer)

31st St. Harbor, Chicago



**550 Tons Rejection Capacity
In Operation**



Fort Knox, KY

Hybrid Project – (In operation)

2,000 Ton Cooling Tower with Two - 100 Ton Assemblies as 1st Stage



Conserves 4,204,800 gal of potable water per year at full load run time!
Approx. \$50,457.60 savings per year in water & sewer costs alone!



Rain/Storm Water Retention Pond In operation

(Using \$12.00/1,000 gal
combined water & sewer)

Kings Mill Hospital – UK

1,400 Tons Rejection!

Conserves 3,360 gal of potable water per hour of full load run time!
Approx. \$1,130.00 savings per 24 hr day in water & sewer costs alone!



1 of 7 @ 200 Tons each



(Using \$14.00/1,000 gal combined water & sewer)

Kingsmill Hospital Geothermal System Energy & CO₂ Savings



SKANSKA - Report on the impact of the Geothermal System on Energy Usage

The report showed a energy savings of \$204,528

**The Carbon (CO₂) emissions where also reduced by
2,078 tonnes**

Conversion: £1 = \$1.62 (10/2014)

TEA Technical Review Report (Kingsmill Heat Pump Energy) – July 2012/CG

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Kingsmill Hospital Geothermal System Potable Water Savings



Estimated Potable Water and Sewer usage

Using a estimated 60% run time:

- 17,660,000 gallons of Potable Water is saved each year
- Saving \$247,470 in combined Potable Water & Sewer costs
- This savings exceeds the net Energy Cost savings of \$204,528

(Using \$14.00/1,000 gal combined water & sewer)

The Dollars

- Water savings in \$Dollars, when included in **return on investment**, make any substantial Geoexchange project more attractive!
- Savings on water costs alone can actually surpass energy savings!



Benefits of Pond Loop Coupled Geoexchange



- Conserves Potable Water
- Conserves Energy
- Improved Cash Flow
- Escalating Costs = Increasing Savings
= Inflation Resistance

Shut Off The Flow Stop the Waste



Makes Sense

Most Important...



Our future...

Explore the Vast Untapped Opportunities



***"Do Not Go Where the Path May Lead,
Go Instead Where There is No Path and Leave a Trail"***

Ralph Waldo Emerson

THANK YOU!



Questions?