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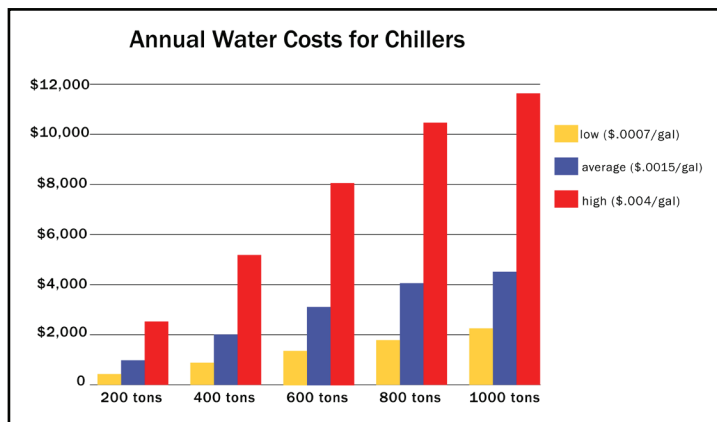
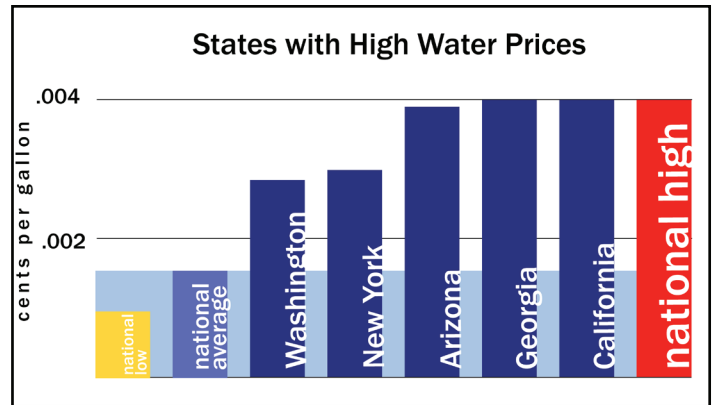
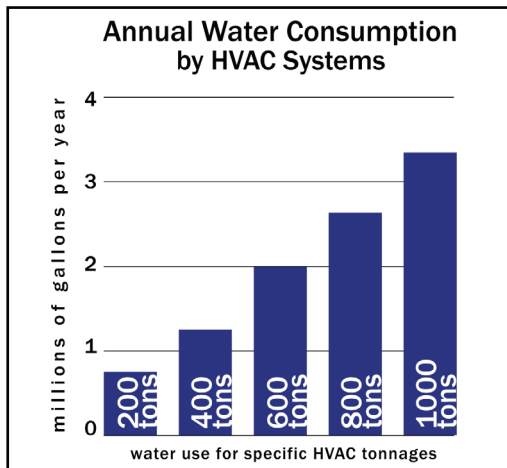
Geothermal heat pump systems' little secret: Big savings on H₂O.

“Water is life’s matter and matrix, mother and medium. There is no life without water.”

—Albert Szent-Gyorgyi,
Hungarian Chemist and
1937 Nobel Prize Recipient

Significant amounts of water are consumed for the operation of air conditioning equipment, resulting in high costs for building owners and driving the price of other critically important products and services.

On average chillers (cooling towers, evaporative coolers) consume 0.03 gallons of water every minute for every ton of cooling required. The chart to the right and the ones below feature estimated annual water consumption for various sized (tonnage) chiller systems and their associated annual water costs, assuming 1825 hours of cooling at full system capacity. (HVAC Water Chillers and Cooling Towers by Herbert W. Stanford, 2003)

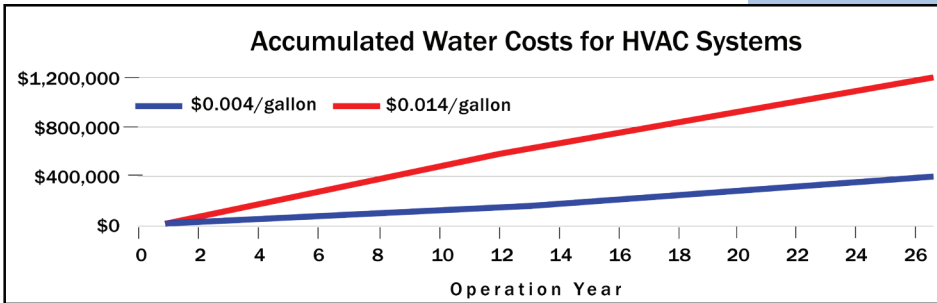


geothermal heat pump systems

Closed loop Geothermal Heat Pump Systems expend **ZERO** gallons of water for cooling purposes.

Using the estimates on this page, a 1000 ton GHP system could save a building owner up to approximately \$350,000 over the life of the system through water savings alone.

It can be seen that millions of gallons of water are consumed for most commercial-grade systems with significant costs to building owners. As water becomes an increasingly scarce resource, these costs are expected to rise dramatically.



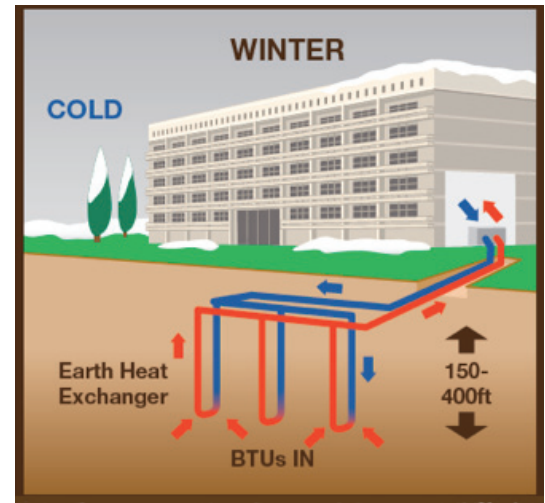
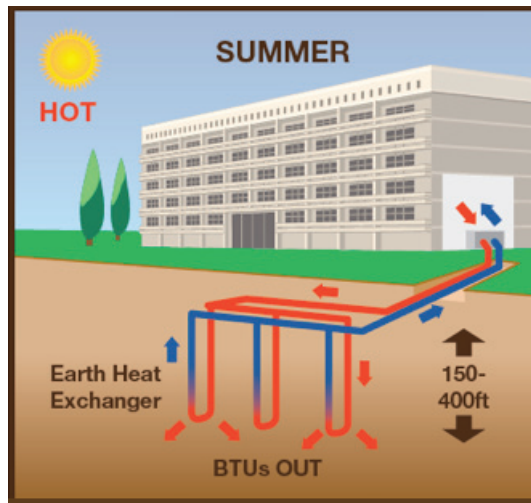
Using our estimated figures, if the price of water increased just 1 cent per gallon a 1000 ton chiller system would incur an additional \$33,000 in water costs annually. However, **GHPs would save close to \$1 million in water costs over its expected 26-yr**

ASHRAE rated life span, using the same 1 cent per gallon figure.

Not included in the numbers above is the fact that, on average, water consumes 2 gal/kWh to produce electricity.

GEOTHERMAL HEAT PUMP SYSTEMS AT WORK

Geothermal Heat Pump Systems (GHPs) utilize the earth's moderate and stable temperature, located just a few meters below the earth's surface, to provide heating and cooling for buildings and homes. The earth is used as a heat sink during cooling mode and a heat source during heating mode.



Instead of having to work with high and low degree ambient air temperatures, GHPs work with the moderate temperature of the water flowing through the systems underground heat exchanger, decreasing energy use as much as 70% compared to a traditional HVAC system. Depending on the region, the water temperature (heat transfer medium) will be in the range of 45-70° F.

◆ **Montrose, CO Health and Human Services Building** estimates 250,000 gallons of water saved each year since installation of the GHPs

◆ **Las Vegas, NV Veterans Tribute Career and Technical Academy** estimates water savings of 750,000 gallons per year

Water is not only costly, but is a valuable resource that should be used wisely and conserved when possible

Demand for water is doubling every 20 years, and it is estimated within the next 20 years demand for freshwater will exceed supplies by over 50%.

Continued use of methods, such as evaporative cooling, can be financially and environmentally costly. This applies to private as well as institutional (public sector) facilities.

Geothermal heat pump systems have Seasonal Energy Efficiency Ratings (SEER) ranging anywhere from 18 - 34 compared to a traditional chiller system that have an average SEER rating of about 13.

These differences in SEER result in an additional amount of water necessary to operate traditional chiller systems that would otherwise be conserved with the use of GHPs.

Did you know?: GHP systems can provide the added benefit of free hot water supply through use of rejected heat in the system. This further improves the economics of the systems by reducing or eliminating the need for using other forms of energy to heat water.

Conclusion: GHPs are not only the "most energy-efficient, environmentally clean, and cost effective space conditioning systems available," as proclaimed by the U.S. Department of Energy, but they also provide significant water savings. Local, state and federal recognition of these combined attributes is needed to ensure a truly sustainable energy future.