Stockbridge Drinking Water Plant Massachusetts

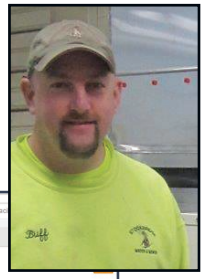
The Town of Stockbridge's drinking water plant treats and delivers 55–60 million gallons of drinking water to 1,548 customers every year. In 2015, the facility installed an open-loop, water-source heat pump that replaced its electric resistance heating system installed when the plant was constructed in 1996. The new system consists of two 6-ton heat pumps capable of air conditioning and heating, and the open loop has a recycle feature that sends the used water to their plant filters to be retreated. The total project cost was $44,000. The town received a $39,000 grant from the Massachusetts 2014 Gap Funding program.

Annual Cost Savings	Percent Reduction in Electric Bill	Annual Energy Savings	Pay Back Period*
$19,600	33%	83,300 kilowatt hours	2.24 years

*3-month pay back achieved with GAP Funding

"The money we saved by installing the new system was used to add an HMI (human machine interface) to our existing setup so we can view what's going on with all the plant processes when we are off-site."

—Michael Buffoni, Water Superintendent, Town of Stockbridge Water Department



Energy Efficient Water Plants around the Nation

Many other utilities also have turned to heat pumps and other innovative technologies and processes to save money and reduce energy use. The Philadelphia Water Department, the Metropolitan Water Reclamation District of Greater Chicago, the Washington County Wastewater Treatment Plant in New York, and many others have put wastewater to use in their heating and cooling systems. In addition to water-source heat pumps, electric air-source heat pumps can be cost-effective and lower your carbon footprint, especially when coupled with solar panels to increase system performance.

In addition, changes to blower technology and usage, optimizing dissolved oxygen control set points, and reducing UV lamp usage are other ways utilities lower energy costs while also lowering greenhouse gas emissions and nitrogen levels in plant effluent. When used in combination, these improvements can significantly reduce energy consumption and cut costs.

For more information on heat pumps and other energy-efficient technologies visit:

U.S. Department of Energy Heat Pump Systems
www.energy.gov/energysaver/heat-pump-systems

U.S. Environmental Protection Agency Sustainable Water Infrastructure
www.epa.gov/sustainable-water-infrastructure/energy-efficiency-water-utilities

Database of State Incentives for Renewables and Efficiency
www.dsireusa.org

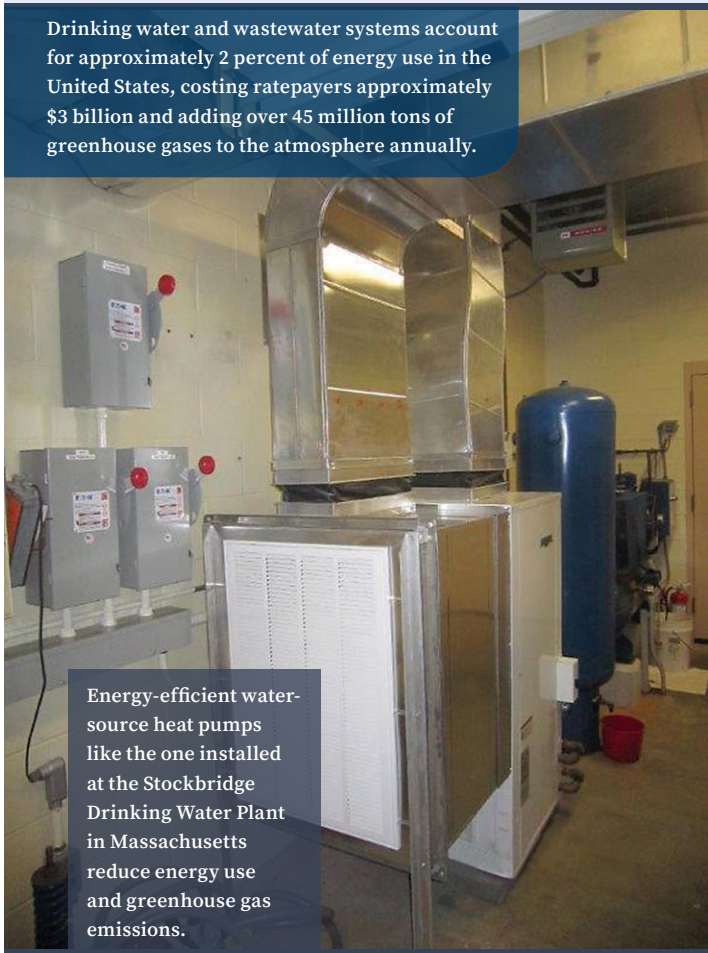
EPA United States Environmental Protection Agency

Reducing Operating Costs and Energy Consumption at Water Utilities

with Water-Source Heat Pump Systems

Homeowners aren't the only ones looking for ways to reduce their heating and cooling bills. Water utility managers face the same financial challenges. Due to their unique combination of high energy usage and potential for significant savings, utilities are turning to energy-efficient technologies to help save money.

Drinking water and wastewater systems account for approximately 2 percent of energy use in the United States, costing ratepayers approximately $3 billion and adding over 45 million tons of greenhouse gases to the atmosphere annually.



Energy-efficient water-source heat pumps like the one installed at the Stockbridge Drinking Water Plant in Massachusetts reduce energy use and greenhouse gas emissions.

Reducing Operating Costs and Energy Consumption at Water Utilities with Water-Source Heat Pump Systems

Drinking water and wastewater treatment plants are the largest energy consumers in many cities, often accounting for 30–40 percent of total energy consumed by the city. A large portion of the facilities' operating costs goes toward energy bills—making it very important to find ways to lower costs.

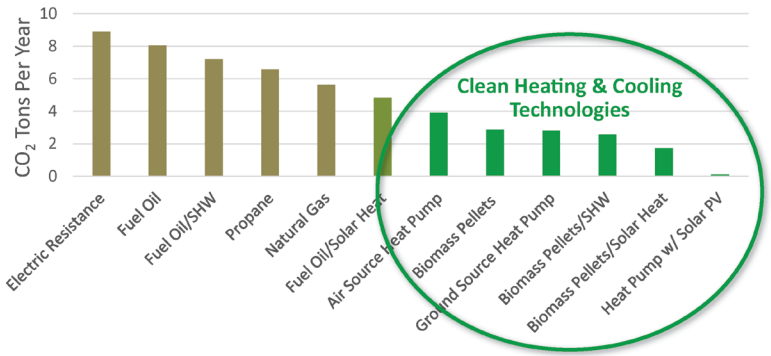
By incorporating energy-efficient practices into water and wastewater plant operations, municipalities and utilities can save 15–30 percent, saving thousands of dollars with payback periods of only a few months to a few years.

Many utilities are turning to innovative, energy-efficient technologies and operational improvements to help reduce costs while still meeting environmental requirements and customer expectations. Water-source heat pump systems are one way utility managers are saving money. As an added bonus, reducing reliance on fossil-fuel generated electricity also reduces their carbon footprint.

MASSACHUSETTS CLEAN ENERGY CENTER

Renewable Heating & GHG

Estimated Annual Greenhouse Gas Emissions in Massachusetts – Example Residence



* Please note that actual GHG emissions vary by specific technology, installation, climate zone, biomass sourcing, and electricity mix. These results represent an example home in Massachusetts.

** Solar hot water is abbreviated as "SHW".

Water-Source Heat Pump Technology 101

Water-source heat pumps work in the same way as air- or ground-source heat pumps—by moving heat from warm areas to cool areas. Instead of extracting heat from the air or ground a water-source heat pump extracts it from groundwater or wastewater. At a drinking water plant, processed drinking water heated by the ground from which it was removed is used as the source. This type of system is also called a *geothermal heat pump*. At a wastewater plant, some of the plant's wastewater effluent is diverted to a heat exchanger, where heat is extracted or added.

Because heat pumps *move* heat instead of *generating* heat, they are cost-saving alternatives to furnaces and air conditioners. Although they are more costly to install, water-source heat pumps have lower operating costs because the heat transfer rate from water is higher than from air or the ground. In addition, the temperature of the water used as the heat source (whether groundwater or wastewater) generally stays constant throughout the year, which leads to higher efficiency. Water-source heat pumps can reduce energy use by 30–60 percent, control humidity, are sturdy and reliable, and can work in a wide variety of buildings.

Heat pumps, especially when coupled with solar panels, can dramatically lower greenhouse gas (GHG) emissions.

Freeport Wastewater Treatment Plant Maine

In 2010, the Freeport Sewer District conducted an energy audit and discovered that the wastewater treatment plant was using a huge amount of heating oil, costing them a whopping $26,000 per year. The district installed a new water-source heat pump in 2011 that uses treated wastewater as its heat/sink source to heat and cool their buildings. Although initial installation costs were high ($170,000), the new system saves them approximately $20,000 in energy costs each year. By the time the district's state revolving fund loan is paid off (2021), the system will have paid for itself and then some. That savings will go toward other infrastructure improvements, such as rehabilitation of the collection system, while allowing the district to minimize customer rate increases.

"If you are not doing this already: Why not?! This effluent is just running right by you. It is a no-brainer to use it as a low-cost heat source."

—Leland Arris, General Manager, Freeport Sewer District