



COLORADO INDUSTRIAL ENERGY CHALLENGE

Improving Efficiency, Reducing Costs and Emissions

PROFILES IN INDUSTRIAL ENERGY EFFICIENCY

Avago Uses Condenser Water to Pre-heat Ultra-Pure Water – a Project with a One-month Payback

AVAGO LOOKS FOR WAYS TO USE ENERGY TWICE

“Ultra-pure water is essential for our wafer manufacturing process” says Avago Technologies’ Workplace Services Manager Steve Wolley. It touches Avago’s semi-conductor material at many different stages. And, since it has a specific temperature requirement which takes energy to produce and maintain, Avago devised a way to use reject heat from a chiller condenser to pre-heat the ultra-pure water—heat that would have otherwise been sent to the cooling towers. This not only saves energy but saves water too: by sending cooler water to the cooling towers, there is less water evaporation.

Avago Technologies, based in Fort Collins, designs, develops, and supplies semiconductor devices that are used in wireless communications, wired infrastructure, industrial and automotive electronics, and consumer and computing electronics.

Quick Facts

LOCATION: Fort Collins, Colorado

MARKET SECTOR: Semiconductor devices

FACILITY SIZE: 1m sq ft, 70,000 sq ft of clean rooms

PROJECT: Pre-heating ultra-pure water from chiller condenser water

PROJECT COST: \$14,000

PAYBACK: 1 month

YEARLY SAVINGS: \$200,000

YEARLY GAS SAVINGS: 28,000 decatherms

ENVIRONMENTAL BENEFITS: CO₂ reduced 1,600 tons per year, lower water evaporation

CIEC GOAL: Reduce energy consumption per unit of production by 40% from 2008 levels by 2013

BUILDING ON ENERGY EFFICIENCY SUCCESS

Wolley is part of Avago Technologies’ Pollution Prevention team, which meets monthly to look for new ways to reduce energy use, water use, solid waste, and hazardous waste. Its search for energy reduction entails increasing the efficiencies of the operation, shutting off systems when not in use, and taking advantage of energy already generated for secondary uses. The improvements are tied into Avago’s ISO 14000 management system for better tracking and implementation.

Since 2003 Avago has completed energy projects reducing annual electricity consumption by 14% or 9.8 million kilowatt-hours (kWh). As a charter member of the Colorado Industrial Energy Challenge and a platinum member of the Fort Collins ClimateWise program, Avago has a new goal of reducing energy consumption per unit of production by 40% from 2008 levels by 2013.

Thinking Systemically Yields Great Benefits



Condenser Pre-heat



Instead of using natural gas to heat incoming city water, Avago redirects excess heat from the chiller condenser to accomplish the same purpose.

This is just one example of Avago's efforts to find secondary uses for existing energy. Avago is also planning to use the reject heat from glycol chillers for air reheat, which is required for humidity control in the clean rooms.



Hot Water Heat Exchanger



Control Valve

More Info

Finding secondary uses for excess thermal energy can yield very positive cost savings and energy reductions.

- *Avago Technologies: Steve Wolley, Workplace Services Manager, 970-288-0317, steve.wolley@avagotech.com*
- *Colorado Industrial Energy Challenge: Neil Kolwey, Sr. Program Associate, 303-499-0213, nkolwey@swenergy.org*

THE PROJECT IN MORE DETAIL

The ultra-pure water is produced onsite at Avago's facility in Fort Collins, requiring approximately 240 gallons per minute of domestic cold water as feedstock. The city water comes into the plant at 35-55°F and needs to be pre-heated to about 70°F before going into the reverse osmosis units. Previously, Avago used natural gas to heat the water and pump it to a heat exchanger, using between 1.5 and 3MBTUH of gas and costing \$350,000 per year.

Instead, Wolley and his team found a better arrangement: the heat exchanger now intercepts rejected heat from the chiller's condenser, and this pre-heats the city water. Water from the condenser comes into the heat exchanger at 83°F and leaves at 70°F. Since they already had the heat exchanger, the project cost only \$14,000 to complete and had a one-month payback. Natural gas still backs up the process, so there's no risk of downtime.

"We've found that projects that make the most financial sense are usually the ones that also save the most resources," says Wolley.