Evaporative cooling saves energy and money

Overview
Evaporative cooling has long been considered an efficient and cost-effective way to effectively cool buildings in arid climates, making it an ideal choice for Utah. This case study examines how three Utah businesses are keeping cool and saving money with evaporative cooling.

Utah Paperbox
Salt Lake City

At a glance
Projects:
Utah Paperbox has completed several wattsmart Business projects since 2009 – lighting, compressed air and building envelope upgrades as well as installing six direct evaporative coolers. Because of these upgrades, UPB has received more than $107,000 in cash incentives and is saving more than 1.2 million kilowatt-hours of electricity per year.

Annual evaporative cooling energy savings:
$26,460 (294,000 kWh/year)

Incentive payment:
$34,500

Project payback compared to standard cooling:
Immediate since the evaporative cooling costs less than code compliant cooling alternatives

Project highlights:
Six direct evaporative coolers were installed to serve the manufacturing area

Project team:
ETC Group
AD Construction
CCI Mechanical, Inc.

Utah Paperbox produces custom packaging for everything from chocolates to medical devices to golf ball sleeves. And they’ve been in the business since 1914.

Mike Salazar, the company’s vice president of operations, revealed the secret to its success.

“We look at things differently,” he said.

This was especially the case when Utah Paperbox was looking for energy and operational efficiency options for the expansion of its Salt Lake City facility. Before the design process started, Salazar and Utah Paperbox President Stephen Keyser toured the most modern factories in Europe to bring back new ideas.

“We just didn’t want the cheapest way, we wanted the best way, the most energy-efficient way,” said Keyser.

Their efforts resulted in a new 82,000-square-foot office/printing building with energy-saving features that include an innovative fan-cooling system for the printing presses and six direct evaporative coolers to serve the 50,000-square-foot manufacturing area.

Each evaporative cooling unit is controlled by a dedicated thermostat adjustable through a building automation system. Each unit also is coupled with a set of relief dampers located on the wall and near the ceiling of the manufacturing area for proper air circulation.

Evaporative coolers use a small horsepower sump pump to move water over the evaporative media and a supply fan to move air into the facility. They do not use an energy-intensive refrigerant compressor, so they require one-fifth to one-half as much electricity to operate as refrigerated cooling.

As on past energy efficiency projects, Utah Paperbox received high-quality engineering services through Rocky Mountain Power’s wattsmart Business program. The program also provided cash incentives for the project.

With evaporative cooling, Utah Paperbox is saving 294,000 kilowatt-hours per year in electricity and more than $26,460 per year in energy costs from this high-efficiency measure alone. The custom packaging producer earned more than $34,500 in Rocky Mountain Power wattsmart Business incentives.

The new building has also received LEED Gold Certification from the U.S. Green Building Council.

Salazar said, “It’s the right thing to do for our industry, it’s the right thing to do for the environment, and having those monies available, it just makes sense.”
Whitney Properties, LLC

What’s the best way to keep a kennel cool during the dog days of summer? That’s the question Cheryl Lewis-Holt, president of Whitney Properties, LLC, asked when the property management company was looking to add a cooling system to one of its buildings in Salt Lake City. Once a manufacturing facility, the building now houses a 9,000 square-foot dog daycare / boarding business, Camp Barkalot.

The answer came from Lewis-Holt’s brother, David Lewis, an engineer with Mechanical Products Intermountain. “Since the space is a large, open area, the solution involved a single roof penetration and bringing a high volume of outside air into the space,” said Lewis. “Evaporative cooling is the least costly way to cool that outside air.”

Mechanical Products Intermountain connected Whitney Properties to RCF Inc., a Utah evaporative cooling supplier that custom-built an 18,000 CFM roof unit for the space. The system includes a stainless steel wet section with easy access to the water system for long life and low maintenance, and a blower and fan for maximum air delivery.

“I didn’t think we wanted evaporative cooling, but this is so much better than the old typical swamp coolers. This unit is efficient and provides such cool air — it was a really excellent suggestion,” said Lewis-Holt.

She also said maintenance is not an issue. Like other equipment in the building, the system is simply set up for professional yearly service (cleaning the filters, draining the water for the winter) to keep it running efficiently.

Another advantage for tenant Camp Barkalot, which often will keep access to outdoor exercise areas available: with a large volume of outside air coming into the building, when a door or window is opened, the air from inside will move outside. “With a dog kennel, anything you can do to move fresh air through is a plus,” said David Lewis.

Lewis-Holt said, “Our tenant Chris Eley, is very pleased — she has nothing but rave reviews. And the cost-effectiveness is amazing. In fact, I have a friend who has a shop that’s about the same size and I keep saying ‘you need to look at this — you’re spending a fortune on your air conditioning in the summer, so you could benefit.’ ”

By choosing energy-efficient evaporative cooling, Whitney Properties, LLC is saving 9,500 kilowatt-hours per year in electricity and more than $860 per year in cooling costs. In addition, the property management company received $1,080 in Rocky Mountain Power wattsmart Business incentives.

Savings and payback

Evaporative cooling uses considerably less energy than traditional air conditioning. That translates into lower electricity bills. In addition, Rocky Mountain Power offers incentives for evaporative cooling upgrades. So, between the energy savings and the incentives, the payback on your investment pencils out sooner. Also, by installing evaporative cooling you will reduce your environmental footprint and build your reputation as a “green” company.
Natural History Museum of Utah

Natural History Museum of Utah scientists delve into the past to help people make informed decisions about the future. Sustainability is at the core of the museum, as seen in the sustainable choices made for its Salt Lake City home, the Rio Tinto Center.

Open in 2011, the Rio Tinto Center and surrounding grounds have been designed and built according to the standards for LEED (Leadership in Energy and Environmental Design) Gold Certification.

In addition to installing solar panels and energy-efficient lighting and lighting controls, the museum installed an indirect/direct (IDEC) evaporative system. It saves the museum 5,946 kilowatt-hours of electricity and $540 in annual energy costs. In addition, the museum installed high-efficiency cooling plant equipment that included variable speed centrifugal chillers piped in a series-series counter flow configuration. This arrangement enhances the performance of the chillers and decreases the amount of energy needed to condition the building.

How evaporative cooling works

At its core, evaporative cooling is a simple technology that uses moisture to absorb heat in the air to provide cool air to a space. The amount of cooling available from evaporative cooling depends on the temperature and water content (humidity) of the air being cooled. Drier air is able to absorb more moisture than humid air, so evaporative cooling equipment performs best in warm, arid climates. The evaporative cooling process is extremely energy-efficient, generally requiring only a pump to keep the evaporative media wet, and a fan to deliver conditioned air.

There are generally three types of evaporative cooling equipment:

<table>
<thead>
<tr>
<th>Evaporative cooling method</th>
<th>How it works</th>
<th>Common applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>Air is blown across wet media, causing water to evaporate. This process cools the air, but also increases its humidity.</td>
<td>Large, open spaces or spaces with high outside air requirements, such as warehouses, loading docks, garages and dairy barns.</td>
</tr>
<tr>
<td>Indirect</td>
<td>The evaporation process is used to produce cool water that is piped to a coil. When air is blown across the coil, it is cooled without absorbing water. This method of evaporative cooling can reduce the air temperature without increasing humidity.</td>
<td>Areas with high outside air requirements but with temperature or humidity control needs such as data centers, manufacturing facilities, laboratories, or pre-cooling for large HVAC systems.</td>
</tr>
<tr>
<td>Direct-Indirect (IDEC)</td>
<td>Air is first cooled by blowing it across an indirect cooling coil which reduces its temperature, and then the cool air is blown directly across evaporative media, further cooling it. This process provides cooler air, and allows better control of humidity.</td>
<td>Buildings where comfort and outside air ventilation is a priority and precise temperature control is required, such as large office buildings, airports and indoor arenas.</td>
</tr>
</tbody>
</table>

To learn what the best cooling options are for your facility, contact us or find a wattsmart Business vendor at wattsmart.com and discuss your project with a qualified professional.
Evaporative cooling project savings 2010–2013*

<table>
<thead>
<tr>
<th>Customer</th>
<th>Evaporative cooling equipment</th>
<th>Building type</th>
<th>Facility Sq. Ft.</th>
<th>wattsmart Business Incentive</th>
<th>Simple payback after incentives (years)</th>
<th>Annual electricity savings ($/yr)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD</td>
<td>Direct</td>
<td>Laboratory</td>
<td>650,000</td>
<td>$4,914</td>
<td>5.7</td>
<td>$4,150</td>
</tr>
<tr>
<td>Canyons School District</td>
<td>Direct</td>
<td>Multiple schools</td>
<td>569,200</td>
<td>$57,860</td>
<td>Immediate</td>
<td>$46,000</td>
</tr>
<tr>
<td>GENPAK LLC</td>
<td>Direct</td>
<td>Warehouse</td>
<td>25,000</td>
<td>$640</td>
<td>Immediate</td>
<td>$1,530</td>
</tr>
<tr>
<td>Ogden School District</td>
<td>Direct</td>
<td>High school</td>
<td>224,700</td>
<td>$990</td>
<td>5.1</td>
<td>$2,360</td>
</tr>
<tr>
<td>Sevier County</td>
<td>Direct</td>
<td>Office</td>
<td>69,050</td>
<td>$320</td>
<td>Immediate</td>
<td>$380</td>
</tr>
<tr>
<td>Utah Paperbox</td>
<td>Direct</td>
<td>Warehouse</td>
<td>76,500</td>
<td>$34,527</td>
<td>Immediate</td>
<td>$26,460</td>
</tr>
<tr>
<td>Whitney Properties LLC, Camp Barkalot</td>
<td>Direct</td>
<td>Warehouse</td>
<td>9,000</td>
<td>$1,080</td>
<td>Immediate</td>
<td>$860</td>
</tr>
<tr>
<td>Intermountain Healthcare</td>
<td>IDEC</td>
<td>Medical clinic</td>
<td>36,000</td>
<td>$4,298</td>
<td>6.4</td>
<td>$4,840</td>
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<tr>
<td>Natural History Museum of Utah</td>
<td>IDEC</td>
<td>Museum</td>
<td>170,000</td>
<td>$771</td>
<td>8.7</td>
<td>$540</td>
</tr>
<tr>
<td>Salt Lake City School District</td>
<td>IDEC</td>
<td>Office</td>
<td>118,624</td>
<td>$16,978</td>
<td>0.2</td>
<td>$10,000</td>
</tr>
<tr>
<td>University of Utah</td>
<td>Multi-stage, Indirect, Direct</td>
<td>University</td>
<td>449,000</td>
<td>$81,495</td>
<td>5.3</td>
<td>$57,200</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>$203,873</strong></td>
</tr>
</tbody>
</table>

*As of August 20, 2013. Annual electricity cost savings are calculated at $0.09 per kilowatt-hour.

About wattsmart Business from Rocky Mountain Power

wattsmart Business from Rocky Mountain Power is an energy efficiency program that offers technical expertise and cash incentives for qualifying commercial, industrial and agricultural customers. Incentives are available for qualifying high efficiency equipment, including evaporative cooling and other HVAC equipment, lighting, controls, industrial process equipment and more.

Let us help you get started

For more information on how we can assist your facility:
- Inquire online at wattsmart.com.
- Email wattsmartbusiness@rockymountainpower.net.
- Call our energy experts toll free at 1-800-222-4335.

Because there are requirements to qualify for an incentive, it is important to call us before you start your project.