

Michaels Engineering Energy Brief

ECONOMY COOLING FOR DATA CENTERS

SUGGESTIONS...

Do you have certain Energy Efficiency topics you'd like to know more about? Send an email with your suggestion to the author listed below and your topic might become a future Energy Brief!

DID YOU KNOW...

...Air-side economizers simply duct cool outdoor air directly into the space to provide cooling.

...Water-side economizers use chilled water to provide the cooling. The chilled water is created by running a glycol solution through a fluid cooler located outside.

MEET THE AUTHOR



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→ REALITY

So, let's take a minute and focus on what seems to be the hot topic of the year for energy efficiency: data centers. As we become more and more computer focused in our everyday lives, the number and size of data centers will continue to grow.

These data centers are power hogs. Their energy draw per square foot can stand up to all but the largest of industrial users. Putting all this power consumption in a small area means heat, and lots of it. So, how do we get rid of it?

→ REALITY CHECK

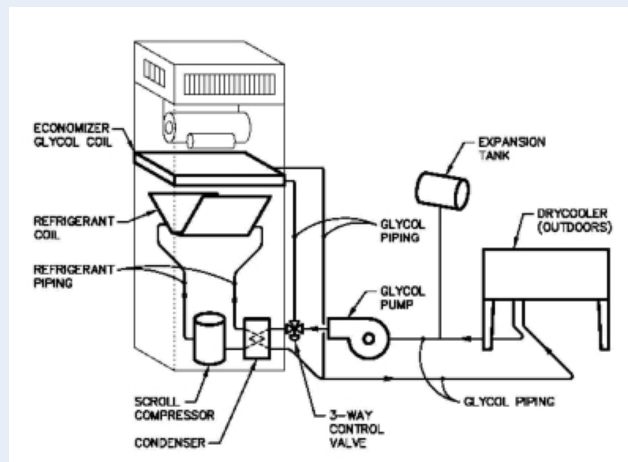
The typical method employed in many data centers involves using split system air conditioners year round, and probably keeping the space too cool - even in new centers. ASHRAE now recommends that the temperature be between 65F and 80F. Just recently I audited a facility where they were maintaining their data center space at 60F. Servers do not need to be refrigerated. Experts tell us a 68F supply temperature and a server exit temperature in the 90s is fine. This warmer temperature makes a big difference in cooling system efficiency, when it is needed!

But, have you ever wondered, "Hey, its cold outside, why am I running air conditioners to keep this place cold?" If you have, then whether you know it or not, you are thinking about economizers.

→ CONCEPT

There are two types of economizers that can be used to supply nearly free cooling: air-side and water-side. Air-side economizers simply duct cool outdoor air directly into the space to provide cooling. While effective and extremely cheap, cold outdoor air holds little moisture. If you keep dumping cold outdoor air into the data center, the humidity in that space will eventually drop below acceptable levels, leading to static charges, a big no-no for electronics. This can be overcome with a humidification system, but that costs money to run as well.

Water-side economizers use chilled water to provide the cooling. The chilled water is created by running a glycol solution through a fluid cooler located outside. The fluid cooler can cool the solution down to near the outdoor air temperature. From this point, the glycol is run through the indoor fan coil, which cools the air. The fluid cooler and glycol pump do use energy, but this is small compared to the energy consumed by the air conditioner.



→ EXECUTION

So what does this all translate to? Well, lets look at a 5 kW server load. Assuming the addition of a water-side economizer to a DX split system data center cooling unit, the annual savings realized could be up to \$300¹ in northern climates. You can scale those savings by the power draw of your data center to estimate your potential savings². These economizers can be applied to existing centers, depending on type of existing system, as well as new construction.

¹The savings are based on an energy rate of 6 cents per kWh.

²The savings are climate dependent, but this technology should be cost effective in most areas of North America.