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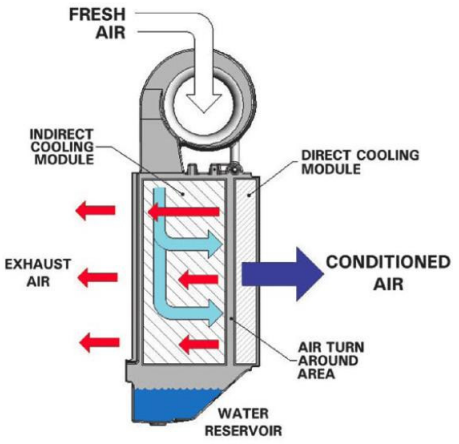
Evaporative Air Conditioning

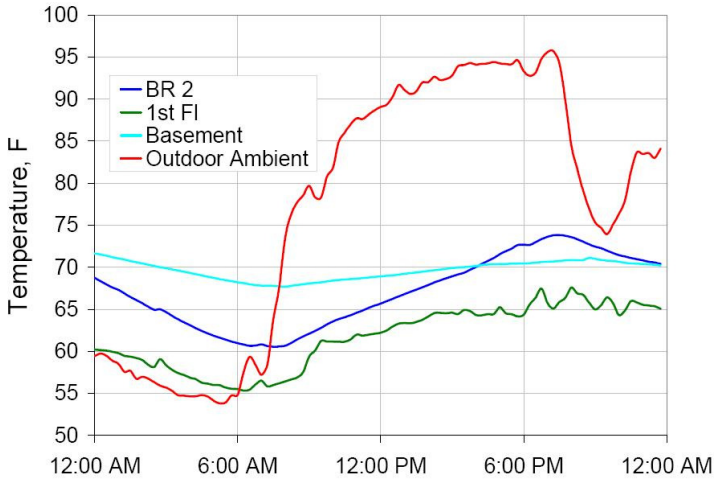
Hey, how about that mini heat wave we had last week? I bet that got you thinking about how to stay cool this summer. Well, as promised in my last article in Going Green, today I'm going to cover "Advanced Evaporative Air Conditioning Systems".

When most people hear the term "evaporative cooling" they think "swamp cooler"! You'll be pleased to know that with today's advanced systems – and not just the equipment but the system as a whole – they're being called by a different name for good reasons.

Today's systems are far more efficient at reducing the temperature of the air they deliver. They typically don't involve running around and opening closing windows. They are controlled by a thermostat instead of an on/off switch. And instead of wasting lots of water with the constant "bleeding off" of water typical of most swamp coolers, they have sophisticated water-management systems to maintain high water quality. They even have highly efficient, variable speed fans to deliver just the amount of air flow needed to stay comfortable with as little electricity as possible. These systems do use a few ducts – maybe four or five tops – just to get the air to each major room or area. As a result, they aren't noisy like a swamp cooler. And to reliably exhaust the waste air out of the building we use exhaust vents in the ceiling, exhausting the air out of the attic, which cools the attic in the process too. Let's look at three examples of these new coolers starting with my favorite.

The Oasys unit is an example of an "indirect-direct" or "two-stage" cooler. It first cools down the outside air in its "indirect stage", in which no moisture is added to the air, before the air passes through the "direct stage".





It's also a stellar performer as can be seen by the graph showing that it kept various rooms in a home cool under temperature and humidity equal to our local "0.5% design conditions" (ie., these conditions

only occur about ½ of 1 percent of the time). Its variable speed blower was operating at about 1,000 CFM (cubic feet of air flow per minute) on the 95 degree day shown in the graph, less than it's maximum of 1600 CFM, and it delivered air between 55 and 60 degrees (these are measured results from the U.S. Department of Energy). At an average installed cost of about $9,500 it's not inexpensive but it uses about one fourth the electricity of a SEER 13 air conditioner, making it an excellent investment.

A company called Breezair makes a less expensive unit that we've installed for an average of around $7,500. This single-stage advanced cooler brings in outside air, passing the air over an extra thick pad, before supplying the air through ducts to your home or office. In our climate this cooler can deliver air at around 70 degrees under design conditions. Because the air it supplies is a little warmer and more humid than that supplied by the Oasys we use about 3 to 4 times more air flow to get the same cooling. It's extremely quiet and has a high-efficiency variable speed blower and advanced water quality management system included. It also exhausts air automatically through pressure-activated vents into the attic so windows don't need to be manually opened and closed; this assures proper exhaust air flow to avoid humidity buildup and it also keeps your home secure while you're away.

The Coolerado is an example of an entirely "indirect" cooler – no moisture is added to the air at all. It's very expensive, however, and probably best suited to pre-cooling fresh "makeup air" for a commercial building application. In a commercial building, outside air must be constantly brought in at the rate of about 15 CFM per person. On a 100 degree day the Coolerado can supply 78 degree air, dramatically reducing the cost to run an air conditioner.

In order for these systems to provide comfort it is critical that the ducts be properly sized, sealed and insulated. As mentioned in a past article, this is the number one reason why many (conventional) forced air heating and cooling systems don't provide comfort – and, unfortunately, the typical "fix" is to put in a larger unit which typically doesn't solve the problem (in fact, it makes it worse).

Many people, myself included, actually prefer the fresh, cool, moist air to the cold, dry, re-circulated air supplied by an air conditioner. It should come as little surprise that these systems are becoming increasingly popular given the ultra-low operating costs, ease of use and ability to provide comfort during even the hottest of weather.

Ray Darby is President of Sustainable Energy Group Inc., a Grass Valley company offering energy efficiency and solar services for residential and commercial buildings, from comparing the alternatives through installation and servicing of energy systems of all types. You can reach him at 530-273-4422, via email RayDarby@SustainableEnergyGroup.com, or visit their web site at www.SustainableEnergyGroup.com.