COOLING IT

In Arizona and other dry climates, the evaporative cooler is the best and cheapest way to cool in the summer. It is a simple technology, which has the advantage of making it easy to maintain and repair. To some, however, 'simple' or 'low-tech' means inferior. as a result scientists and engineers consider it beneath them, consumers get the message that there is higher status in owning high-tech, even if it costs them more for the same result.

AC units have gotten more efficient, and for closed spaces and higher humidity may be the best choice.
Evaporative coolers, (swamp coolers) in their basic form work well within low-humidity parameters, found in desert areas. Dry outside air is blown through wet porous pads, which evaporates the water, cools the air, and also adds humidity to the air. They require an air-exit opening, preferably on the opposite side of the space being cooled.
This makes them useful for areas that are not completely enclosed, like patios, providing a constant flow of cool air.

If the air were already very humid, it would not evaporate much water, and would not become much cooler.

Evaporative systems use considerably less power than refrigeration systems because it must only blow the air--at a fairly high volume and speed-- and operate a small pump to recirculate water, whereas AC requires a compressor, which uses more power, and a blower fan as well.

Refrigeration also requires Freon or a substitute gas in a sealed system that must usually be professionally repaired if there is a leak or compressor failure.

I believe that evaporative cooling can be made more efficient so that the humidity parameters and the temperature drop can be increased.

What is needed is to add a stage to the process that dehumidifies (dries) the air. Then the two stages could be "stacked"--multiple times if necessary--to cool, then dry, then cool more. In humid climates, a drying stage could come first.

How can one dry air? If you pass air over a surface cooler than the air, the moisture in the air will condense onto the surface. This happens in refrigeration. If we can cool a metal grid sufficiently to dry the air blowing through (returning the condensed moisture to the water system), we could then pass the air through another evaporative pad, lowering its temperature.

The second cooling would be less than the original, but enough to make a difference. If outside air is cooled from 110 F. to 85 F., then recooled to 70 F., then a lower blower speed could be used, making it quieter and reducing power used.

It is possible that a small refrigeration system could be used for the drying grid, since we only need to make the grid itself cooler than the air, not significantly reduce the air temperature.

However, there has been an electronic cooling technology, developed years ago, that produces a cold surface when electric power is applied. It is not widely known, perhaps because it was not adaptable to large refrigeration applications. For this purpose, however, it may be ideal. having no moving parts, it would not add to noise, and perhaps not need maintenance. Further research is needed. If evaporative cooling can be made more effective in more climates, significant power savings would result.

Recently (April 2014) I received a suggestion that might be useful:

After reading the evaporative cooling entry, I'd like to add my two cents in that area of tech. I live where it's humid sometimes and dry at others, so, I found a trick that even Arizonans might find helpful - especially with central cooling refer a/c. Places like Lowes sell water mister kits and parts - these can be applied to the external part of a refer a/c. Proper placement of misters to allow the mist to be drawn in is quite easy. Getting rid of heat better outside means making more cool air on the inside.

Window unit a/c's are always more efficient than central units because they use the water made inside to help expel heat on the outside. But in very dry weather there's not enough water made.

By slowly pouring water through the cooling coils (might have to remove filter grill) it will tranport to the outside heat exchanger and last a while. Longer term solution is (outside) misters on the side air intakes.

In short, 'If it ain't drippin - It ain't coolin'! Hope this helps you keep your cool!

Thanks for the suggestions, Rick. Combining forms of evaporation with refrigeration might be a useful approach.

--Cosmic Rat