



Cool Ways to Save Energy

Sympathy is only part of what many southern Arizonans feel when we hear about our Midwest or New England friends' winter heating bills.

The relief that we feel in comparison, however, begins to dissipate as the heat climbs in May and June. Arizona's desert cities are among the few areas of the country where many households pay more for summer cooling than for winter heating. Where that is true, it makes sense to focus weatherizing efforts on keeping homes cool.

Nationally, more than 5 times as much energy is used for home heating as is used for home cooling. In the Phoenix area, however, homes with electric heat and air conditioning use nearly 3 times as much energy per year for cooling as for heating, according to Salt River Project engineers. Evaporative cooling instead of air conditioning lowers the energy requirement for the cooling season.

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Photograph: Loren Pechtel of northwest Phoenix caulks around windows of his family's home. He has completed many energy-saving 4-H club projects, including a rooftop solar water heater.

Types of Caulking

Most caulk comes in 11-ounce cartridges to fit a standard caulking gun. The cartridge should tell the type of caulk and give instructions for its use.

Elastomeric caulk includes silicones, polysulfides and polyurethanes. They do not harden, so they can expand and contract with any small shifts in the crack they cover. Lifespan: 10 to 20 years. Cost: \$4 to \$6. Some require primers when used on porous surfaces. Some cannot be painted over, but others can. Check the label.

Latex, butyl and polyvinyl caulks last 5 to 10 years and cost \$2 to \$4. Some have a performance guarantee. Check the label.

Oil- and resin-based caulks last 2 to 3 years and cost \$1 to \$2. Prepare bonding surfaces according to instructions.

Plastic foam caulks may be easier to use in hard-to-reach places than other caulks are. They cost \$5 to \$6 for a 14-ounce can. Lifespan: about 10 years.



Mary Ann Easterday of Chandler uses mini-blinds to help control solar heating through a living room window. She and her husband have also planted deciduous trees to shade some windows from outside in summer. She says indoor plants help make the home feel cooler, too.

In the Tucson area, utility companies' estimates say that heating a typical house (about 1,600 square feet with average insulation) costs about \$230 to \$525 in electricity or gas for the heating season, depending on the type of heating. Electricity cost estimates for the cooling season are \$457 for central air conditioning or \$135 for evaporative cooling.

Besides comparing costs of cooling with costs of heating, these figures show evaporative cooling's advantage over air conditioning. That points to one of two basic strategies for saving energy in home cooling: Try to get by with evaporative cooling instead of air conditioning. The other strategy is simply, whatever cooling system you use, try to keep it turned off or turned down as much of the time as possible. Cooling your home by controlling air leaks, shading windows and other means serves both of these strategies.

Both evaporative coolers and air conditioners actually work by evaporation. In the former, the liquid evaporated is water that trickles through fibrous pads. Air conditioners evaporate a liquid refrigerant, but hold onto the vapor and condense it back into a liquid by compression. Compressing takes lots of energy. Heat pumps, which can either heat or cool a home depending on the season, use compression for cooling, like air conditioners.

For Phoenix-area conditions, evaporative coolers use 20 to 30 percent as much electricity as air conditioners, averaged through the cooling season. For a typical 1,600-square-foot home, the annual difference comes to about 4,500 kilowatt-hours, which cost \$270 to \$405, depending on your cost for electricity within the range of 6 to 9 cents per kilowatt-hour.

Outdoor humidity reduces evaporative coolers' ability to lower air temperature. Many Arizonans prefer air conditioners for the relatively humid days in July or August, feeling that evaporative coolers can not give enough comfort. Many who have air conditioners for that reason rely on them for the rest of the cooling season, too, rather than using two types of cooling systems.

Coolers' Popularity Varies

A small difference in temperature apparently makes a big difference in the fraction of people who can get enough comfort from evaporative coolers. Phoenix's summer months average 5 to 8 Fahrenheit degrees warmer than Tucson's. In the Phoenix area, 60 percent of households have central air conditioning, 20 percent have heat pumps and 33 percent have evaporative coolers. In the Tucson area, 32 percent of households have central air conditioning, 7 percent have heat pumps and 72 percent have evaporative coolers. Eight percent in Phoenix and 5 percent in Tucson also have room-size air conditioners. These figures are from 1982 marketing surveys for the major newspapers in each city. Some homes have more than one type of cooling.

The proportions in the Phoenix area may be changing. More people there had purchased evaporative coolers in the year preceding the survey than had purchased air conditioning units.

Weatherizing a home against summer heat may provide those few extra degrees of cooling that make evaporative cooling an adequate substitute for air conditioning. Size, maintenance and operation of evaporative coolers also make a big difference in keeping you comfortable inexpensively.

A step up in cooler size may be more economical than a shift to air conditioning if an existing cooler can't quite do the job. If in doubt, estimate the number of cubic feet in your home (the floor area times the ceiling height) and divide it in half. As a rule of thumb, a cooler with a cubic-feet-per-minute rating of that number or higher should be adequate.

Cooler maintenance is nobody's favorite chore, but an annual re-conditioning extends the machine's life as well as improving its efficiency. The cleaning is easier in fall than in spring. Even if you pay for maintenance labor, you can still save money compared with switching to air conditioning. Replace aspen-wood fiber pads twice a year for better cooling in late summer. Check frequently to see that pads are being wetted entirely; a dry corner lets hot air rush in.

Houses aren't balloons. An evaporative cooler can not blow more air into a house than the amount of air escaping through windows, cracks and other openings. (Air conditioners recirculate indoor air, rather than bringing in fresh air.) Selecting which windows to open helps direct the flow of cooled air through the house. Ceiling vents to an attic space with an exhaust vent in the attic can sidestep the security problem of open windows.

One other point should be made about evaporative coolers: They use water. For a typical home in summer in Phoenix, a cooler uses about 100 gallons per day. That costs about \$1.25 to \$2.60 per month for water priced at 30 to 65 cents per 100 cubic feet. Some Arizonans may feel that conserving water by using air conditioning is preferable to conserving energy by using evaporative cooling. Consider, however, that generating electricity also consumes some water, either as steam or as evaporation from lakes behind hydropower dams.

Stopping Leaks

With either type of cooling system, you save natural resources and money by minimizing hours of use.

Caulking and weatherstripping keep heat out in summer just as they keep it in during winter. More expensive insulation projects are not worthwhile until the cracks and holes are plugged. An eighth-inch crack around a standard door adds up to an opening as big as a 4-by-7-inch hole in the wall. Even in a well-insulated house, air leaks can account for 10 to 30 percent of all heating and cooling costs.

Use caulk for leaks where 2 different materials or different parts of the building meet at a stationary joint, such as around windows, door jambs, water pipes, vents, electrical outlets and the joints where walls meet the foundation. Use weatherstripping to seal air leaks between moving and non-moving parts. The weatherstripping is attached to the non-moving parts.

Air leaks are no problem once an evaporative cooler is switched on, since some air outlet must be provided anyway. However, sealing up the house stretches the portion of the day you can leave the cooler turned off.

Both caulk and weatherstripping come in a variety of types. Tables on these pages describe and compare the choices. Generally, the variables are durability and ease of use, rather than effectiveness.

Window treatments, on the other hand, do vary in effectiveness. Also, the best window treatments for summer are not the same as the best for winter, though the two may be combined.

Types of Weatherstripping

Costs are given for enough to treat one standard exterior door, based on January 1983 prices in Tucson hardware stores. Follow package instructions for installation.

Urethane adhesive-backed foam: Easiest to install. Invisible when door is closed. Lifespan: 1 to 2 years. Cost: 99 cents.

Vinyl weatherstripping: Easy to install. Lifespan: 3 to 5 years. Cost: 99 cents.

Felt: Easy to install. Lifespan 1 to 2 years. Cost: 55 cents.

Sponge rubber adhesive-backed foam: Easy to install. Lifespan: 3 to 5 years. Cost: \$2.49.

Tubular vinyl: Easy to install. Lifespan 3 to 5 years. Cost: \$1.59.

Flat metal: Fairly easy to install. Nail holes are pre-drilled. Lifespan: 10 to 20 years. Cost: \$5.99.

Direct sunlight through glass delivers the most heat through windows. Shading windows from the outside stops that heating best. An overhanging roof on the south side of a home can block sunshine from a window in summer, but let the lower winter sun shine in for free heat. Shade trees that drop their leaves in winter can perform the same sort of seasonally adjusted cooling for west and east windows, as well as south ones. Trees that work well in this role in southern Arizona include Arizona ash, Modesto ash, native and Chilean mesquites, pecan, and fruitless mulberry. Quicker fixes include awnings, other exterior shades, and reflective films. Shades, blinds and curtains on the inside of windows, especially opaque and light-colored ones, will reflect much sunshine back out the window, though the "greenhouse" effect of glass traps some heat inside.

Besides radiant heat from direct or indirect sunshine, windows let in heat by conduction whenever it is warmer outside than inside. The same types of treatments can reduce conductive heat gain as those that reduce conductive heat loss in winter. Double layers of glass work well.

Walls and roofs conduct heat into a house like glass does, especially if sunshine warms them directly. Shade trees and vines can reduce this heat source, too. A vented attic space with a thermostatically controlled exhaust fan helps greatly in insulating a house from the overhead sun. Unvented attics store up the day's heat and fight your cooler well into the night.

For homes still too hot after these basic measures, consider adding to your insulation with blown cellulose, rigid foam or fiberglass.

Timing for Savings

Activities that put out heat cost you extra during the cooling season. Outdoor barbecuing is a traditional way to avoid heating up the kitchen. Microwave ovens offer a newer alternative. Clothes washers and dishwashers that use hot water can be run in late evening or early morning when the house's heat load is lowest.

Using your cooling systems efficiently saves energy, too. Running a two-speed evaporative cooler at the lower setting gives about two-thirds the air flow for about one-third the energy, compared with high speed.

Like evaporative coolers, air conditioners need maintenance for efficient operation.

If you have both types of cooling, try to avoid using an air conditioner within a day after using evaporative cooling, because an air conditioner uses extra energy to remove moisture from the air. There is no need to wait to turn on the cooler after switching off the air conditioner, though.

Lastly, the quickest way to cut cooling costs is to accept a warmer home as part of the Arizona lifestyle. The psychological effects of green plants and cool-color designing might substitute for a few kilowatt-hours on your electric bill. Knowing that you are saving natural resources as well as cash may warm your heart, but that is warmth you can live with.

You can get more information about weatherizing a home from your county's Cooperative Extension Service. Talk with your county home economist or choose among handouts: "Control of Direct Sunlight for Comfort," "Master Those Meters," "Caulk Those Cracks," "Win With Weatherstripping," "Weatherizing Mobile Homes in Arizona," and "Buying Home Insulation."



The Easterdays' daughter Susanne, 4, is about the same age as the shrub shading her bedroom window.