

KEEP COOL

Install a Solar Attic Fan

John Patterson

©2006 John Patterson

Solar-powered attic fans are cool! I've worked in attics for many years, running plumbing for solar water installations, and I know all too well how hot it can get up there. I've measured temperatures up to 140°F (60°C)! Most homes have manual roof vents, which allow some air movement, but they can't keep up with the sun pounding down all day.

A single solar attic fan can cool about 1,500 square feet (140 m²) of attic area. The fan should be installed more or less in the middle of the attic to serve the entire space. The fan will draw outside air from the eaves and from other vents. The idea is to draw air from all outside sources equally.



Step by Step

Solar attic fans are very simple to install. My crews do them in an hour or two. The biggest challenge to the do-it-yourselfer is psychological—“Do I dare cut a 14-inch (36 cm) hole in my roof and trust that it won’t leak?” If you have a tile, metal, or cedar shake roof, you may wish to defer to a professional. If you have a conventional composition shingle roof, it’s not as scary as you think. You can do it!



1

First you need a few tools, which most do-it-yourselfers will have. Your attic toolbox should contain a measuring tape, drill with a 1/4-inch (6 mm) or smaller drill bit, and a light. On the roof, you’ll need chalk or crayon, a short string, a flat pry bar, a caulk gun, a tube of clear silicone caulk, a cordless drill/driver, utility knife, and a reciprocating saw, saber saw, compass saw or keyhole saw.



2

Determine the general location of the fan. It should be installed in a sunny location, near the roof’s peak, and in the middle of the attic space to be cooled. Next, determine the exact location of the attic fan. Measure 12 to 18 inches (30–46 cm) below the peak and make a mark centered between two rafters.



3

Drill a hole from the attic through the roof. Leave the drill bit in place so it can be easily found from the roof.



4

On the roof, locate your drill bit. Using a 7-inch (18 cm) string around the bit, draw a circle 14 inches (36 cm) in diameter. Always double-check the dimensions of the particular fan model you're using.



5

Drill a hole large enough to insert your saw blade, if necessary, and then cut around the circle's perimeter with your saw. Be sure to catch the cut-out plug rather than letting it fall in.



6

To allow the unit to slide all the way into place, you will have to trim away about a 2-inch-wide (5 cm) arc from the first course of shingles directly above the fan unit. Mark the roof at the centerline of the hole for the up-and-down axis to help determine the position of the fan when centered over the hole. You can go back into the attic to make sure.



7

Try to slide the solar attic fan into place, making sure the top edge of the unit slips under at least two or three courses (horizontal rows) of roofing. The opening of the fan should be directly over the hole in the roof.



8

Inevitably, you will hit nails or staples holding shingles in place as you attempt to place the unit. Do not force it! Instead, try to locate the obstacle by gently lifting shingles, and looking for the nail or staple in the way. If the obstacle is a nail, remove the nail with a flat pry bar. If a staple, drive a large, flat-head screwdriver under the staple and pry up. Repeat the process until all nails or staples in the way are pulled.



9

Now that the unit fits directly over the hole, you're ready to fix and caulk it into place. Lift the bottom edge of the base and caulk all the way up and a few inches beyond the point where the unit goes under the shingles.



10

Using gasketed roofing screws, fasten the base to the roof. The screws should pass through the caulked perimeter. Caulk over the screw heads and you're done.



Keep Your Cool

Now, that wasn't so nerve wracking, was it? Notice for yourself how much cooler the attic is with the fan working.

Standard, 120-volt AC attic fans have been around for a long time. They are often big and boisterous, and require an electrician or knowledgeable homeowner to do a hardwired hookup. Costs can easily exceed US\$600.

For the same price or less (if you do it yourself), the more elegant solar-powered attic fan can do the job. Using a simple, 10-watt photovoltaic module directly powering a 12-volt DC fan, these self-contained units can quietly and effectively move 800 cubic feet (23 m³) of air per minute. This is enough to cool a typical attic by 30 to 50°F (17–28°C).

Solar attic fans do not rely on batteries to get the job done. Instead, they simply operate when the sun is shining on the fan's PV module, and effectively cool the attic during the time of the day that heat would otherwise build up. In some places, it can eliminate the need for air conditioning.

No matter how well insulated your ceiling is, excessive heat in the attic will find its way into your living space. Insulation simply slows it down. By midday, an army of millions of Btu have marched through your insulation and are assaulting your living space. Solar attic fans reduce the air conditioning load in the living space below, and make hot summers more endurable for those who don't use air conditioning.

Success Stories

"Our house used to bake in the summer! We have a long, south-facing roof that would make the upstairs unbearable for months of the year. The temperature in the attic would build through the day and continue to radiate heat well into the evening. When we installed a solar-powered attic fan, it changed everything. Now, the upstairs temperature never exceeds the outside air temperature, and cools rapidly after sunset. I enthusiastically endorse solar attic fans. For such a tiny device, and such a small investment, it makes such a big difference. It's better than the conventional AC fan, which rumbles noise through the whole house. Mine does the job in total silence. I love my solar attic fan!"

—Jeff Michael, Portland, Oregon



Judith Ris proudly points to her new solar attic fan.

"We've had our solar attic fan installed for about a year. For years, our family has used air conditioning to maintain the home at the same comfortable level. We're on an equal pay program with the electric utility. Since the attic fan went in, our monthly payment has gone down US\$10 per month. No other energy conservation measures were employed last year, so it appears that the attic fan deserves the credit. We love how it quietly and unobtrusively saves energy and money."

—Dr. Judith Ris, Vancouver, Washington

There are a handful of solar attic fan manufacturers. Most have fixed PV modules, which means that the unit has to be placed in the location most favoring the sun. One manufacturer offers a module that can be tilted. On a roof whose peak runs north and south, this unit can be placed near the peak on either side, with the module tilted up and oriented to the south. This is accomplished first by tilting the module, then spinning the base to face the module south before caulking and fixing to the roof. I've even placed these on north-sloped roofs, with the PV module tilted to face south.

Most solar attic fans have optional thermostats. The manufacturers claim that it's good to vent the roof year-round, which means no need for a thermostat. But, if you're worried that on cold winter days you may be expelling warmer air from the attic and increasing your heating load, a thermostat is advisable. Thermostats snap in place in the wiring between the module and the fan, and dangle freely into the attic space.

I've been asked about solar attic fans to cool upper level living areas finished to the rafters. Generally this is not an acceptable use, since in winter months the hole in the roof allows heat to escape even if the fan motor is disabled. If a well-insulated and sealed cover is used, however, it could work.

Few solar energy technologies are more simple, elegant, and cost effective than solar attic fans. The significant benefit for relatively low cost makes it an excellent investment both in terms of energy savings and personal comfort.