

Attic Fans—Just Blowing Hot Air?

Forced attic ventilation is a common means of reducing attic heat gains. However, the energy consumption from attic fan motors can easily exceed the air conditioning energy savings, especially if the fans are inefficient and poorly controlled. Previous studies have found that using attic fans does not usually result in a net energy savings unless the attic is uninsulated. But what about attic fans that don't increase metered energy use? A recent study examined whether a new attic fan powered by photovoltaic (PV) energy would be a cost-effective tool in cutting attic heat gains.

The test site was a three-bedroom, single-family, 1,045 ft² home located in Cocoa, Florida. It is cooled by a 2.5-ton split-system central air conditioner with an electric heat strip. The air handler is located in a conditioned utility room. A family of four occupied the house for

most of the day and maintained the interior temperature at a fairly constant 73°F during the summer months.

The house's floor plan is a simple rectangle, with the long axis facing east and west. The blown-fiberglass ceiling insulation has an approximate R-value of R-19. The walls are of frame construction with R-11 insulation. The A-frame roof has a ³/₁₂ pitch with dark brown asphalt shingles over plywood decking. The color absorption is roughly 92%. The home has a radiant barrier (foil stapled to the roof trusses) with soffit ventilation, but no other venting. Even with the radiant barrier, temperatures of up to 136°F were measured in the attic before the retrofit.

Two PV attic ventilators were installed near the peak of the asphalt shingle roof in August 1997, one on the east face and the other on the west. The fans are designed to provide 600–800 CFM of attic ventilation at peak solar irradiance

(1,000 W/m²) depending on the free soffit ventilation area. A five-bladed radial fan coupled directly to a DC motor provides attic air exhaust. The fans were purchased for about \$300 each; installation would add about another \$150 per unit.

The study's authors looked at several weeks of similar weather before and after the retrofit. Once the fans were in, the daily peak attic air temperature dropped by an average of 22°F. Air conditioner energy use was also measured. This consumption was reduced by an average of 6% (2.8 kWh per day) by the addition of the ventilators; the difference was greatest around midday. Space-cooling electricity use, which had been submetered at the home for the entire year before the retrofit, totaled some 7,730 kWh. Annual space-cooling

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savings are on the order of 460 kWh, based on extrapolation from similar periods. These savings have a value of about \$40 at current Florida energy prices. Given that the installed cost for the two units was about \$850, the pay-back period would be more than 20 years. The homeowner did note that the interior seemed more comfortable after the retrofit, even with no adjustment to the thermostat. Generally speaking, however, it seems that other means of controlling attic heat gain are preferable and more cost-effective than forced ventilation (see "Saving Energy with Reflective Roofs," *HE* Nov/Dec '98, p. 9).

—Valerie Fahey

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