

Sealed-Attic Retrofit



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Q. I live near Palm Springs, California. However, it is 10°F–15°F cooler in the summer and winter where I live than it is in Palm Springs. My house is a single story and was built two and a half years ago. It has a vented attic. Pulte Homes has recently been building homes that have no vented attic and are much more energy efficient than mine. These new homes have their eaves enclosed using Styrofoam. The house is sealed tight with minimum, if any, air leakage. They also have a fan attached to the heater that comes on periodically to circulate the air. I know they also insulated the roof side in the attic, and not the ceiling side.

I would like to retrofit my house to be more energy efficient, but do not know what I can and cannot do. I have a tile roof, vented attic, insulation on the ceiling, and no recirculation fan. Is there a resource I can use to help me retrofit my house?

Wayne Stanley
Banning, California

A. The principles behind a sealed-attic retrofit are pretty simple. You need to seal all the vents and other leaks between the attic and outside, and then put insulation on the roof instead of the house ceiling. It is the details that are hard to get right.

The air sealing really does need to be very good. This means using lots of caulk or foam at all the joints between the building elements, such as roof decking, eaves, and gable ends, and around plumbing and venting penetrations. This is relatively simple in the attic. For your house, large leaks such as open chases that connect your house to the attic can be easily sealed using foam insulating board and aerosol foam. All the smaller leaks in the house envelope are harder to seal—

mostly because they are difficult to find. This could be time-consuming, but if you are a reasonable do-it-yourselfer, it should be possible.

You should remove the insulation from the ceiling of your house—particularly if your ducts are in the attic (as I assume they are). This brings the ducts inside the thermal envelope of your

products over unvented attics, because they feel that resulting increases in roof deck temperature may degrade the shingles (note, however, that there is little evidence to support their position).

The single biggest problem you will face is with building code officials who do not understand the concept of an unvented attic. A couple of years ago,



house and results in two major benefits. The first is that duct energy losses are reduced because the ducts are surrounded by more moderate-temperature air. The second is that any remaining losses go to the conditioned space below, rather than to the outside (see photo above).

Thinking about potential moisture issues is the trickiest bit. If monthly average temperatures are less than 45°F, there is a chance of condensation on the underside of the roof deck that could lead to degradation of the roofing materials. However, this is not an issue in the Palm Springs area.

Your tile roof is a good candidate, because it is tolerant of high temperatures. Some asphalt shingle manufacturers do not approve of using their

here at Lawrence Berkeley National Laboratory, where I work doing building science research when I'm not editing *Home Energy*, we tried to do a retrofit just like the one you are proposing. But after several weeks of negotiations, we were unable to get permission from the local building code authority. I believe that if we had had more time, we could have got our way eventually—but you need to think about how much effort this might be.

Lastly, if you go to www.buildingscience.com/resources/resources.htm#Roofs, you will find links to plenty more information put together by the experts who worked with Pulte Homes to develop the houses you are talking about.

