

Radiant Barriers

Learn the facts about radiant barriers and reflective insulation products to determine if they are a wise investment for achieving energy and cost savings in your home.

What are radiant barriers?

Radiant barriers and reflective insulation products are installed in buildings to reduce radiant heat transfer, which is one of the ways buildings gain heat in the summer and lose heat in the winter. There are three primary types of radiant barrier products on the market:

- * **Foils and Films** usually reinforced for strength
- * **Coatings** often called radiant barrier paints or sprays
- * **Reflective insulation** such as foil-faced bubble wrap products

Sometimes, products combine more than one type, such as foil-faced bubble wrap installed in an open attic. This is both an insulation and a radiant barrier.

The idea is that by reducing radiant heat gain into the attic, for instance, you will use less energy to cool the house in the summer. If you've ever been in a North Carolina attic in summer, you know how hot it can get. It makes sense that if we can keep the attic cooler, we would need less air conditioning to keep the house cool. It makes sense, but does it actually work?

Do they actually reduce radiant heat transfer?

In a word, yes. Most of the foil products and reflective insulation products reduce radiant heat transfer by about 96 percent. The performance of the paints and sprays is much more variable. Some reduce radiant heat transfer by about 75 percent, some by much less. Some radiant barrier foil and reflective insulation products have qualified for the ENERGY STAR® label, indicating they may save energy when properly installed. None of the paints

and coatings has qualified for the ENERGY STAR label. As of 2010, none of the radiant barrier products qualifies for the Energy Tax Credits from the federal government.

Are they worth it?

The answer to this question is more complicated and depends on cost. How much are you willing to invest in order to save \$45 per year? If you spend \$200 and save \$45 every year, most people would agree that is a worthwhile investment. But if you spend \$1,000, it's not nearly as clear. Are there better ways to invest your money that would reduce your energy bills?

Okay, but do they actually save me energy?

Studies by Oak Ridge National Lab and Florida Solar Energy Center documented, on average, a 2-10 percent reduction in the air conditioning bills of homes with radiant barriers (foil) installed in the attic, but almost no savings on heating costs during the winter. As a rough guide, about half of your home's total energy bill is for heating and cooling. If your total bill averages \$150 per month (\$1,800 per year) about \$900 per year is for heating and cooling. In North Carolina, on average, about half of that (\$450 per year) is for cooling. Obviously, if you're in the mountains you probably spend less for cooling. So if you install a radiant barrier in your attic, you can expect to save \$9-45 per year in this example.

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What other factors should you consider?

- * The more insulation you have in your attic – if it's properly installed without air leaks between the house and the attic – the less you will save with a radiant barrier. In many homes, it would cost less to seal all of the gaps and holes between the house and attic and add additional insulation.
- * Studies have shown that dirt and dust accumulation on radiant barriers degrades their performance fairly quickly and results in less savings over time. Radiant barriers installed flat tend to collect the most dust. Products installed at an angle, such as attached to the bottom of the rafters, probably work better for a longer period of time, but no long-term research has been done on this topic.
- * If the roof is shaded, the savings will be less. The more shade, the less the savings.
- * Some roofing materials – metals, tiles, light colored shingles – give off less heat to the attic. If you have these types of roofing, the savings from radiant barriers will be less.
- * If there is ductwork and/or air handling equipment in the attic, the savings will be higher.
- * If you store valuables in the attic that will be harmed by high temperatures, installing a radiant barrier may help preserve them. This won't save you money, but it might save your stuff.
- * Saving energy has positive impacts on the environment, and many people will put this into the equation as well.

What about moisture issues?

Aluminum foil is one of the best vapor barrier products used in buildings. Neither liquid water nor water vapor goes through it. This can be a great product when there is a roof leak above a radiant barrier, and the foil directs the water to the exterior of the building, reducing the damage from the leak. On the other hand, foil installed over the insulation on an attic floor could trap moisture, which then condenses and drips into the insulation, eventually soaking the drywall ceiling and causing mold or structural damage. Some products are perforated with a lot of small holes to help reduce this potential problem. Little actual field research has been conducted to determine how much of a problem it really is or whether perforating the foil actually helps.

A Word to the Wise

As energy use in homes gets more attention, more people are getting into the energy saving business, creating jobs and contributing substantially to our budgets, economy, security and environment. As in every industry, there are good products and honest people, and not-so-good products and not-so-honest people. Sometimes even the honest people are selling good products with exaggerated claims, not because they are liars, but because they are poorly trained or misled by those above them.

The first rule of buying an energy saving product is this: *If they make a claim that you will save 10 percent, ask them 10 percent of what?* Is it 10 percent of your total utility bill, the heating and cooling portion, or just the cooling portion? Say that you pay an average of \$150 a month for electricity in an all-electric home. That's a total bill of \$1,800 a year. In North Carolina about half of that is for heating and cooling, about \$900 a year, and about half of that will be for cooling, or \$450 a year. If you save 10 percent of that, which might be reasonable to expect from installing a radiant barrier in the attic, you'll save about \$45 a year.

So, how much is it worth it to you to spend in order to save \$45 a year? If your house is a two-story, 2,000 square foot house, you'll have about 1,000 square feet of attic. If you pay \$1 per square foot to install the radiant barrier, the simple payback is the cost (\$1 per sq. ft. X 1,000 sq. ft. = \$1,000) divided by the annual savings (\$45), or a little more than 22 years. If the cost is \$2 per square foot, the payback is more than 44 years.



A Source of Confusion

Some energy saving products might claim "...eliminates 96% of the radiant heat gain in your attic" or "...reduces ceiling heat gains by up to 42%."

These are impressive numbers and are true statements based on the research, but that doesn't translate into energy savings so high. The radiant barrier will only affect the portion of the bill caused by radiant heat entering from the attic. It has no impact on the heat gained by your house from air leaks, windows and doors, walls or floors. The best research to date shows summer air conditioning savings of 2-10 percent. For some, this can be a substantial amount of money, making radiant barriers a worthwhile investment if the price is reasonable.