LSU architecture Professor Jason C. Shih explains the benefits of installing a radiant barrier while standing in his South Baton Rouge home, which is under construction.
Professor says radiant barrier saves a bundle

The first thing you notice when you walk into Jason Shih's house, under construction in a South Baton Rouge subdivision, is how cool the air is compared with the 95-degree outside atmosphere.

"I've had workers tell me they've never worked in such a cool house in their lives," Shih says.

The walls aren't even up, though. The roof is, and that's what makes the difference. This house has been equipped with a thermal radiation barrier system designed by Shih, an LSU architectural engineering professor. Shih says installing a radiant barrier can save home or business owners a bundle in cooling costs.

A radiant barrier is a material that prevents the transfer of heat by infrared radiation, according to the non-profit Louisiana Solar Design Association. In Shih's model, thin, shiny aluminum foil panels are installed in attic air spaces at the same angle as the roof. For the barrier to work properly, there must be at least three-quarters of an inch of airspace between the panels and the roof.

When sunlight hits the roof, the heat radiates inside, to the attic. But the presence of the panels immediately reflects most of the heat back.

Air in the space between the barrier and roof heats up and rises, moving up along the airspace and out from an open ridge vent along the roof's peak.

"When the air gets hot and moves up to the ridge vent, this creates a pulling force," Shih explains. "Therefore, the hot air already in the attic goes out too."

Shih's experiments show this type of barrier can reduce by 40 percent the amount of heat radiated into a home on a sunny day. This translates into a savings in air-conditioning costs of as much as 10 percent to 12 percent in Southern homes, according to data provided by Shih.

Because of the radiant barrier, the professor estimates attic temperature will be 20 to 25 degrees cooler in his house than in a standard home. This means his air conditioner will not only have to work less in the daytime, but also at night.

Source: Dr. Jason Shih, LSU School of Architecture  Advocate graphic by Margaret Austin
Radiant

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"That's why it's important to have reflective material on both sides of the thermal barrier," Shih says. "Some people try to save money by putting it only on one side, but it will cost them in the winter."

The thermal barrier system is far more efficient in warm weather than cold, which is why Shih stresses it "absolutely" would not be feasible in cold climates. It was designed specifically for hot, humid climates.

Shih, a native of Taiwan who has been teaching at LSU for 14 years, devotes his professional life to studying cooling systems for hot, humid climates. He finished his research on the application of radiant barriers in buildings in 1981, but was denied a patent, he says, because his system was too similar to NASA's design for cooling the space shuttle.

How much does it cost to install a radiant barrier in a new home? Shih says it will increase the cost of a home by less than 1 percent of the total cost. "We figured you got your money back in utility savings in three years," he says. Shih says some utility companies may give homeowners a break for building energy-efficient homes.

Older homes can also be retrofitted with a radiant barrier. Shih estimates reflective material sufficient to retrofit a 2,000-square-foot house will cost around $550, plus labor.

There are quite a few sources for reflective material used in radiant barriers, but none in Louisiana, where the use of radiant barriers still hasn't caught on. Shih cautions the consumer interested in purchasing radiant barrier material. "Since radiant barriers have become popular, we've seen lots of cheaters on the market," he says. "When checking a material out, make sure its reflectivity is rated 92 percent or better. Also, its emissivity rating must be less than .05 percent."

About 50 houses in the Baton Rouge area are outfitted with thermal radiant barriers, Shih estimates. The professor receives calls all the time from Florida, California and from as far away as Singapore, where he says people have been enthusiastic about radiant barriers for years. Shih thinks it's just a matter of time before his ideas catch on locally.

"I predict that, 10 years from now, this will be standard construction material for hot climates," he says.

For more information about thermal radiant barriers, contact Jason Shih at 388-6885.