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White roofs aren't so cool

In a northern city like Baltimore, the energy savings from an 'eco-roof' may not be so great

By Samir Ibrahim

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One of the latest trends in home energy efficiency is the white roof, as described in a advertisement recent Sun article ("Push urged for more cool roofs in Baltimore," Oct. 15). Indeed, they can be useful in certain climates, but I would urge careful consideration before jumping on the cool roof bandwagon in a northern city like Baltimore.

I work for a Pennsylvania-based roofing material manufacturer that produces both black and white roofing membranes, so I am offering what I believe is an informed and unbiased perspective. The idea that white roofs always save energy and reduce pollution is, unfortunately, a green myth.

"Cool," or reflective, roofs have become very popular over the past 15 years. They are part of the prescriptive requirements of California's Title 24 energy code, and they are mandated in some northern cities like New York, Chicago and Philadelphia.

However, the perceived benefits of reflective roofs, especially when used in colder climates, is based on sloppy science and self-serving marketing, which led to the belief that white roofs are energy-efficient and more cost-effective than dark ones. White roofs have also been portrayed as a panacea for global warming and the "heat island effect," in which dark-colored building materials raise the ambient temperature in urban areas by a few degrees in summer.

Studies performed at Lawrence Berkeley National Laboratory purportedly show the efficacy of using white reflective roofing anywhere, including northern climates. But they did not account for thermal performance, air infiltration or vapor drive; they only measured surface temperature at the roof level. Echoed by those with vested interest only in reflective materials, these studies gave momentum to the white roof movement.

Newer studies, including [one from Stanford University](#) question the energy savings of white reflective membranes and challenge the hypothesis on which standards and codes have been based. Architects, engineers, building owners and roof system designers also are questioning their scientific validity.

The Stanford study shows that white roofs may actually increase, not decrease, the earth's temperature. White roof membranes have high reflectivity that directs heat upward into the atmosphere and then mixes with black and brown soot particles, which are thought to contribute to global warming.

White roofs may not be the most cost-efficient choice for Baltimore homeowners, who must consider the principles of thermodynamics. In a typical attic environment, the increase in air temperature when using a dark roof facilitates air movement; hot air migrates upward and escapes through the ridge vents. Changing roof color to reflective/white will reduce the attic air temperature and slow down air movement, which can lead to mold infestation or the need for electric fans to increase air flow, thus negating any savings and possibly increasing energy consumption.

Various scenarios were tested using the roof savings calculator (developed by Oak Ridge National Laboratory and approved by the Lawrence Berkeley National Laboratory, the Environmental Protection Agency, Department of Energy and California Energy Commission) for the heat source, square footage and insulation level of a home in Baltimore. In all cases modeled, the increased cost of heating in a house with a white roof outweighed the decreased cost of cooling. In other words, a white roof would cost a homeowner more money.

I am not saying that white reflective roofing doesn't have its place, it certainly does, and we sell it when the environment and conditions warrant, mostly in southern climates.

As a green solution, however, it really isn't as cool as Baltimore officials claim.

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