

AFFORDABLE COOLING AT ITS PEAK



Prompted by the summer heat wave of 1999, during which 52 Philadelphians died of heat exposure in their own homes, the U.S. Department of Health and Human Services (DHHS) released a round of emergency cooling funding. These funds provided \$100 grants to help cover the electricity bills of eligible seniors and disabled persons, and fans or air conditioners for those with medical needs. The nonprofit organization I direct, the Energy Coordinating Agency (ECA), had the responsibility of delivering more than 4,000 air conditioners and 2,000 fans. For many, this assistance will prevent suffering and what health professionals call “excess morbidity” in future summers.

Unfortunately, this cooling equipment was not accompanied by any

*An inexpensive
process for
adding reflective
coatings to
rooftops saves
energy and lives.*

energy conservation treatment to offset the higher electricity bills that the funding was inadvertently causing. Prompted by the experience of delivering all those expensive-to-operate air conditioners, we strove to design a solution that would better help our clients: a passive cooling approach that reduces indoor

by Liz Robinson

temperatures to healthy and comfortable levels without increasing the customer’s energy bills. The keystone in our approach was a light-colored roof, which could reduce summer heat gain. We secured funding to perform a 400-home pilot, called Cool Roofs, from local foundations and DHHS. The Rohm & Haas Company—which manufactures the chemicals used in white acrylic elastomeric coatings—provided additional funding and technical support.

Philadelphia has some of the country’s oldest homes. In poor neighborhoods, much of this housing stock has endured decades of deferred maintenance. The typical low-income home in Philadelphia is a two- or three-story brick row house—essentially a brick box with a flat, black tar roof. In the best of



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An ECA crew applies white acrylic elastomeric roof coating on a Philadelphia building using simple tools—rollers.

times, this roof has a short life span, typically carrying a warranty of five to ten years. On an extremely hot day, the surface temperature of the roof can exceed 180° F, transferring much of that heat to the upper story and to the occupants. When the windows are closed in these homes—as they often are if the elderly residents cannot physically lift the window, or if they believe that closed windows provide more security—the temperatures on the top floor can exceed 115° F on a day when it's 95° F degrees outside.

White acrylic elastomeric roof coatings have the potential to solve

rays while also protecting it from ultraviolet radiation, which breaks down the asphalt roofing material. These roof coatings are also highly emissive, unlike aluminized coatings, remaining relatively cool on even the hottest days. All of the white elastomeric roof coatings used in Cool Roofs meet Energy Star ratings.

These coatings are easy to apply. They are waterborne and are applied like an extremely thick latex paint; they can be sprayed, rolled, or brushed on. They tolerate a wide range of roofing conditions, working well even on highly weathered, all-gated roofing. (Shingled roofs,

the problem of excess heat buildup in houses. The coatings have an initial solar reflectance of more than 80%. While this reflectance does diminish over the life of the coating, it never falls below 55%. The white elastomerics are an acrylic plastic. They form a membrane covering the roof, reflecting the sun's

however, are not suitable for these coatings because the shingles can trap moisture.) ECA has been able to treat roofs in relatively poor condition by carefully preparing the roof, leveling and patching the surface, priming, and then spraying on two coats of the roof coating.

In pushing the limits of these coatings, we have learned to respect their limitations:

- **Ambient temperature.** The coatings cannot be applied when the temperature is below 50° F.
- **Humidity and rain.** They cure more slowly in high humidity and will literally wash off in the rain if they haven't had a chance to cure. The normal cure time is one to six hours, depending on temperature and humidity.
- **Drainage.** Water must drain off the roof. Depressions where ponding can occur must be filled and leveled prior to coating.

Energy savings for the pilot houses are currently being monitored. While applying coatings was the principal objective of the program, Cool Roofs also incorporates weatherization audits, resident education, roof insulation, and some window repairs.

The roof coatings have another important quality that makes them a useful tool in the city's efforts to preserve existing housing. White elastomeric roof coatings extend the life of the roof by at least ten years. They typically cost less than a new three-ply asphalt roof on a row home, and yet they will outlast it.

We also expect that our program will reduce the urban heat island effect by reducing the temperature of the city's roofs. This, in combination with the energy the cool roofs save, may in turn help reduce the rate at which climate change itself occurs.

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The coating that is being applied protects the roof from ultraviolet radiation, which breaks down the asphalt roofing material.

For more information:

www.ecasavesenergy.org