DOE Project Goal: Accelerate the Science of Cool-Roof Technology

Source: Durability + Design

The U.S. Department of Energy and The Dow Chemical Company announced plans for a research project aimed at accelerating advances in cool-roof technology, to be carried out in a partnership of Dow and Oak Ridge National Laboratory.

The research, part of a Cooperative Research and Development Agreement (CRADA) between Dow and the Department of Energy's Oak Ridge National Laboratory, will focus on technologies to improve the long-term resistance to dirt pickup and microbial growth on white elastomeric roof coatings.

"The aim of this program is to improve retention of solar reflectance using newly developed and accelerated testing protocols for faster commercialization," Dow said in announcing the program.

Dow Construction Chemicals

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As a critical element of the research agreement, ORNL will partner with DOE's Lawrence Berkeley National Laboratory (LBNL) to bring a broad range of cool-roof technology and experience from their applied research in this field. The research will focus on the development of new solar-reflective technologies that would increase by more than 50% the energy savings that cool roofs offer for new and existing commercial buildings, Dow said.

Reflectivity Retention a Key Focus

Current standards require that after three years of exposure to the elements, cool roofs retain a solar reflectance of at least 55%. The R&D agreement's objective is the development of new technologies that would enable cool-roof manufacturers to meet a standard of 75% solar reflectance after five years, which would increase cool roof energy savings by over 50% compared to current elastomeric roof coatings.

As part of the R&D agreement, Dow and ORNL/LBNL said they also intend to develop accelerated-weatherization testing protocols that will speed commercialization, and conduct studies to quantify the performance of new cool roof-products. This work would potentially allow DOE to propose new standards for cool roof performance, they said.

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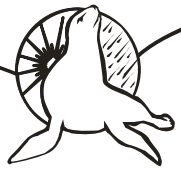
The stated outcome of the agreement is the commercialization of the "next generation" of polymers for roof coatings to save energy in new and existing buildings, and to advance a predictive accelerated aging/dirt pickup testing program for cool-roof coatings.

Colin Gouveia, general manager, Dow Construction Chemicals, North America, told *Durability + Design* that although acrylic resin chemistry for elastomeric roof coatings represents a core competency for the company, various resin and formulation chemistries could be evaluated in the R&D program.

"It could be acrylic, but we're not limiting ourselves to that," Gouveia said, noting that silicone, fluorocarbon and other chemistries participate in the elastomeric roof-coatings market.

"This has the potential to extend over into entirely new polymer technology," he said.



Gouveia noted that resistance to dirt pickup and microbial degradation of roof coatings can be a function of polymer design and the antimicrobial-addtive component in coatings formulations. Dow can draw on its own extensive technology portfolio in both polymer and antimicrobial technology as it seeks to advance the science of roof coatings, he said.

Regarding plans to accelerate testing protocols for the program, Gouveia said the R&D program will seek to exploit the testing-technology capabilities of the two national laboratories and Dow's "high-throughput" screening expertise. "The goal is to know sooner how these technologies will perform," he said.

"Elastomeric roof coating technology has been an essential part of our product portfolio for decades, and we see great potential in that market for the future," Gouveia said. "This alliance is a tremendous opportunity to advance the chemistries that will help create even more robust cool-roof solutions."

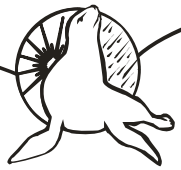
Potential Impact Seen as Significant

DOE says cool-roof coatings offer a cost-effective and relatively non-intrusive means of improving the energy efficiency of existing buildings, which currently account for more than 20 billion square feet of commercial roofing space available for retrofit in the U.S.

DOE estimates that replacing or resurfacing conventional roofing materials with improved reflective elastomeric roof coatings can reduce a commercial building's annual air conditioning energy use by up to 25%—an improvement from up to 15% savings of existing elastomeric roof coatings—and decrease annual CO2 emission by 5 metric tons for every 10,000 square feet of commercial roof area.

These elastomeric roof coatings also potentially offer a one-time offset of 150 metric tons of CO2 per 10,000 square feet of cool roof via "global cooling" (negative radiative forcing). Energy savings are highly variable, based on levels of installed insulation, climate, and other related factors. DOE offers a calculator to help building owners determine the potential savings of their buildings, which can be found at http://www.roofcalc.com.

In December, the Department of Energy completed the installation of a cool roof that covers approximately 25,000 square feet on its Headquarters West Building in Washington, DC. This spring, DOE will install a cool roof on the Headquarters South Building, covering approximately 66,000 square feet. As a result of the new cool-roof installations on both buildings, taxpayers will save a total of $8,000 per year in energy costs, DOE says.



Energy Secretary Steven Chu has also encouraged other federal agencies to take similar steps at their facilities. DOE has released Guidelines for Selecting Cool Roofs, which provides technical assistance on types of roofing materials and how to select the roof that will work best on a specific facility.