Cool Roofs Initiative Helps Agencies Achieve Energy-Saving Goals

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By: Michael O'Connell

Jennifer MacDonald, Sustainability Performance Office, Energy Department

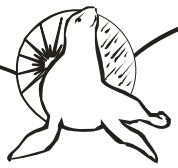
President Barack Obama signed Executive Order 13514 in October 2009, which established goals for agencies to reduce greenhouse gas emissions and increase energy efficiency.

One of the ways agencies could do that is to install "cool roofs" on their buildings.

When a building has a regular, darker roof, it absorbs heat from sunlight. "The more reflective and the lighter the color of the roof, it actually increases what's called the 'albedo,' the reflection of the sun off of the building's surface," said Jennifer MacDonald, the director of DoE's Sustainability Performance Office. "So, it reduces the need to then cool the building further, especially as you are trying to maintain cooler temperatures in higher buildings."

According to MacDonald, the cost of installing a cool roof is comparable to installing or replacing a standard roof. "There are special requirements in terms of the materials and the labor, but it's typically a comparable cost," she said.

As roofs come up for repair or new buildings are constructed, the Energy Department will typically install a cool roof. For example, the National Nuclear Security Administration has set aside a roof asset modernization program.



"They have about 2.5 million square feet that have been turned into cool roofs, at a savings of about half a million dollars and up to $10 million over the next 15 years," MacDonald said.

Chu introduces Cool Roofs Initiative

In July 2010, Secretary of Energy Steven Chu issued a memorandum directing that all DoE sites install cool roofs when it was cost effective, when a roof needed to be replaced or repaired.

"It's only when it's cost effective," said MacDonald, whose office was established to help DoE meet all of its sustainability goals and requirements. "These roofs ensure that we're gaining energy efficiency savings."

DoE has installed approximately 160 cool roofs, adding roofs when new buildings are being built or older roofs are being repaired.

"About 50 percent of the buildings at the National Renewable Energy Laboratory are cool roofs, which is a 27 percent increase from 2010," MacDonald said. "A number of our other laboratories have also redesigned their building specifications to include cool roofs, such as the National Energy Technology Laboratory in Pittsburgh and Morgantown, W.Va."

Those facilities have about 10 percent cool roofs, but they are ensuring that any new buildings or any buildings that need new roofs are going to have cool roofs installed.

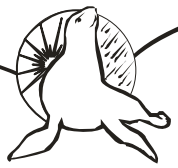
When Chu issued his memorandum, he also sent out a letter to other agencies encouraging them to work on cool roof initiatives. DoE helps agencies to do that via the Federal Energy Management Program (FEMP).

"They are specifically designed to help assist other agencies in meeting all of the energy and sustainability goals," MacDonald said. "So FEMP has additional resources on their website about the types of roofs that can be installed, potential service providers and also helpful tips."

Going white and green to save money and energy

One agency that has seen the installation of cool roofs help it meet its energy sustainability goals is the National Archives.

"The Department of Energy has been pushing white roofs for several years, and we were at a confluence of factors," said Mark Sprouse, the director of the National Archives facilities



and property management division. He is responsible for building operations at the National Archives facility in College Park, Md.; the main National Archives building in downtown Washington, D.C.; and the energy conservation projects at all of the presidential libraries across the country.

"Our roofs were getting to be 25-years old, we needed to replace them anyways and it just sort of made sense to do that with a white roof and put the solar on it to meet the greenhouse gas reduction goals that we had set," he said.

Sprouse authored the National Archives' 2011 Strategic Sustainability Performance Plan, which encourages the implementation of the cool roof initiative.

"Our policy is we're mirroring pretty much what Executive Order 13514 says," Sprouse said. "We've tied it all to greenhouse gas reductions. We set a goal two years ago for a 10 percent, across-the-board greenhouse gas reduction and that's how we're moving forward with our strategic energy conservation policies."

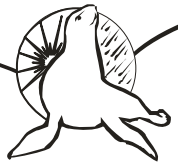
The National Archives' efforts already have proved to be a success, according to Sprouse. "As of last year, we'd already reduced it by 8 percent and we hope to reach the goal by the end of this year," he said. So far, the Archives has reduced its energy consumption by about $3 million per year. Of that, 3-5 percent is attributable to the green and white roof intitiatives, along with the solar panels placed on the white roof.

The National Archives has installed cool roofs at two facilities — one is the National Archives II in College Park, Md., and the other is The William J. Clinton Presidential Library in Little Rock, Ark. White and green roofs have been installed at both facilities, as well as solar panels to generate to electricity.

"By the time we removed the old roof and put the new roof on and put the solar panels in and tied them into the building electrical system, it took about six months," Sprouse said.

"It saves energy by two ways," Sprouse said. "It reduces the heat load underneath the roof and so we don't have to cool as much. It reflects the sun and the solar panels are producing about 30 kilowatts of power on a bright day, which we feed back into our building electrical system."

In addition, all of the roof drains at College Park empty into a 6,000 gallon tank in the building's central plant, which is used to irrigate the 33-acre compound. "We don't use any city water to irrigate the plants at Archives II," Sprouse said.



The rainwater also helps to keep the green roof green and, in turn, the green roof cuts down on stormwater runoff.

"When it rains, if you stand up on the green roof and watch, it takes almost an hour for water to start flowing off the roof and into the drains because the plants are absorbing all that water," Sprouse said. "That just cuts down on the stormwater that we're sending to the Chesapeake Bay."

Agencies have a number of considerations when choosing to install a cool roof, MacDonald said, but studies show that chief among them is the energy the roofs save.

"They think there's about a 15 percent decrease in annual air conditioning costs that are associated with installing these roofs," said MacDonald said, adding that there is no single solution that applies to every building or every department.