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Producing a Truly Sustainable Roof System Cool Roofing Concept Not New

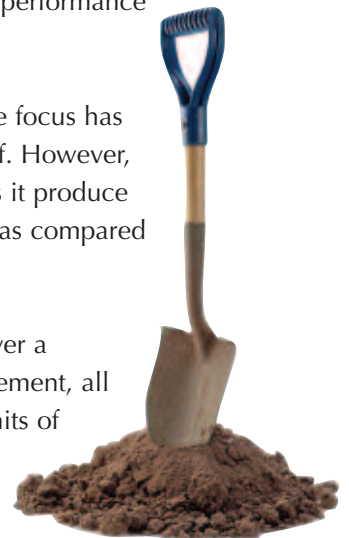
The “cool roofing” concept is hardly a new one, having been recognized by organizations such as the U.S. Environmental Protection Agency (EPA) since the mid-1990s. Much time and effort have been expended to not only educate all concerned parties about this concept, but to encourage them to deploy products that “produce” cool roofing. Regulations and laws have been adopted throughout the country to force the building industry to meet cool roofing performance standards.

Yet in most cases, one word is missing from the discussion of cool roofing: system. Instead, the focus has often been concentrated on a particular product and its performance in developing a cool roof. However, does that product truly produce savings at the point of installation? Or, more importantly, does it produce savings five to 10 years (or more) in the future? Will it work as well in one part of the country as compared to another?

Add to the mix the goal of sustainability. Can the roof maintain a high level of performance over a significant period of time? Will it limit or eliminate the need for maintenance, repair or replacement, all of which not only require additional spending, but also cause the expenditure of additional units of energy?

In many cases, building owners and the professionals working to meet their needs have not found satisfactory answers to all of these key questions.

In reality, as all professionals well know, a roof is a system. Therefore, the best way to produce true energy-saving cool roofing is by focusing on the entire system, each element in it and how they interact to achieve the desired goal.



ESTABLISH FIRM GUIDELINES --->

Before constructing or even developing your roofing system, it is important to create a checklist of guidelines. Those guidelines should include:



- Defining expectations.
- Bringing in consulting help.
- Viewing roofs as systems.
- Enabling the roof to live up to its usage.
- Making sustainability a key.
- Location, location, location.
- Being realistic.
- Viewing insulation as part of the system.
- Practicing proactive maintenance.
- Going beyond the building code.
- Considering all alternatives.

DEFINE EXPECTATIONS --->

In many ways, the most difficult step is the first step: defining the goals and expectations of a roofing system. Turning to official guidelines is not as simple as you might think.

Yes, there is agreement that cool roofing relates to roof surface reflectivity and emissivity (the ability of the material to release gained heat), but various organizations, such as the EPA, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), and U.S. Green Building Council (USGBC), offer different metrics to achieve their recognized standard.

* The EPA has determined that establishing a national emissivity requirement is “not appropriate at this time.” The EPA states, “While buildings in warmer climates benefit from higher emissivity levels, it is possible that buildings in colder climates would experience lower net energy savings.” The EPA has further indicated, as of February 2007, it is pursuing a “regional approach.”

** ASHRAE only applies its standards to geographic locations that have less than 3,500 heating degree days (HDD). A heating degree day represents one degree in Fahrenheit temperature below the mean temperature of 65 degrees. That means to achieve 3,500 HDD, a location would have to average about 55 degrees for the year.

***USGBC has now developed a solar reflectance index (SRI) value, combining reflectivity and emissivity in its LEED-NC version 2.2 rating system.

To further complicate matters, roofing options that are considered viable choices for producing energy savings, such as roof gardens and ballasted roofs, do not fit the standards set by those organizations, which many municipalities are adopting as part of their building codes.

The bottom line? Consider these standards, apply them as appropriate, and certainly meet all legal regulations and laws in effect in your area. But only view them as a starting point in planning a true energy-saving system.



BRING IN CONSULTING HELP -->

A registered roof consultant (RRC) can be a valuable asset when defining the goals of a roofing system project. The consultant can conduct the appropriate roof investigation and make recommendations, detailing the advantages and disadvantages of various systems. The consultant will be able to work with the owner, architects and contractors to come up with a system that works within the project's budget and still achieves desired energy savings.

VIEW ROOFS AS SYSTEMS -->

All building components need to be considered in the design of the roof system. The building's internal function, adjacent masonry walls and HVAC concerns are some of the key components that will be factors in the design. Regarding internal function, a warehouse will require a different approach than an office building. For example, cool roofing provides a much higher benefit in a warehouse, where there is little need for the mechanical cooling and thermal insulation found in a building designed to provide comfort for office workers.

ENABLE THE ROOF TO LIVE UP TO ITS USAGE -->

How do you intend for your roof to be used? How will it really be used? At a minimum, expect maintenance staff, window washers, painters, glazers and workers storing materials to access the roof. In cases of vegetative roofs, the roof may actually be turned into a regularly used part of the building. Consider those usages when developing your system; for example, plan for a sound and stout substrate and protective walkway pads that allow water to migrate below them to assist in the protection of the roof surface.

MAKE SUSTAINABILITY A KEY FOCUS -->

Focusing on sustainability is tantamount in developing an energy-efficient roofing system. Sustainability is often defined as providing at least 25, if not 30 or more, years of service. To achieve this kind of performance requires thinking and planning that goes beyond just the color of a roofing material. It brings into play the idea that energy savings goes beyond reducing a heating or cooling bill.

Lifecycle extension also produces energy savings, since new materials don't have to be constructed to repair or replace an existing roof. It also affects budget considerations. If a more 'expensive' system proves to last four, five or more years longer than a 'cheaper' alternative, is it really more expensive?

There are lifecycle analysis formulae available in the roofing industry and it would be wise to utilize one when developing a sustainability plan for your roofing system.

LOCATION, LOCATION, LOCATION -->

The old real estate mantra has great relevance for roof system development as well. Any roof's expectancy of performance will be affected by location, specifically, regional geographic and climatic conditions. The roof system designer should give full consideration to these local climatic considerations and their effect on the roof system's ability to meet expectations.

BE REALISTIC -->

No two roofs will be installed exactly the same way, or under the same conditions, and building use and occupant requirements differ. There are no shortcuts to achieving performance, and unrealistic expectations as to what your roof can provide will only result in a lack of trust among the designer, contractor and owner.



INSULATION IS PART OF THE SYSTEM --->

Consider for a moment that when replacing your roof the decisions you make will be affecting you for 10, 20 or perhaps 30 or more years. Consider the result if a roof system design shortchanged thermal insulation in the hopes of energy savings to be provided by a roof system component that will change over time and most likely not receive needed maintenance.

One indisputable fact is that, during the past 25 years, the cost of energy has risen and this historical data provides a good idea of what to expect in the future. The cost of thermal insulation is relatively minor in the lifetime cost of the roof system, and it is one roofing component that continually performs its task, regardless of weather conditions, building location or building usage. Multiple layers of insulation are no longer just a recommendation, but a mandate for any roof system desiring long-term performance.

PRACTICE PROACTIVE MAINTENANCE --->

All roof systems, regardless of their physical makeup, require maintenance. In point of fact, most, if not all, roof system warranties require it. Designing the roof to make maintenance easier and safer will help achieve the longer-term performance of your roof. Items such as rooftop hatches, quality protective walkways, safety line davits, water spigots and electrical outlets to assist in rooftop cleaning, if required, are a few of the considerations one should undertake.

GO BEYOND THE BUILDING CODE --->

Most existing building codes provide only a minimum standard of care and as such are at the low end of performance. For those looking to achieve a sustainable roof, they should enhance the thermal insulation and wind uplift and hail performance of their roofs.

CONSIDER ALL ALTERNATIVES --->

There are a number of alternative cool roofing options that deserve consideration:

- 1. Ballast:** The use of self-cleaning ballast and/or pavers. The Oak Ridge National Laboratory has recently found that the use of ballast (ASTM No. 4 or larger gravel and/or concrete pavers) provides the same energy-saving benefits as does a maintained cool roof membrane.
- 2. Coatings:** Quality coatings can provide a potential solution to those existing roofs looking for service life enhancement as well as the benefit of a lighter colored surface.
- 3. Solar and wind:** The technology in regards to both solar and wind generated power is rapidly changing, and for the sophisticated building owner or facility manager keeping abreast of these developments is recommended.
- 4. Garden roofs:** Perhaps no other option is gaining greater attention among the general public than vegetative roofing. Much like ballast, garden roofs provide a measure of protection to the roof surface and may provide a certain amount of aesthetic value.

THE SYSTEM FOR YOU --->

As we have shown, since each roof is a system that is part of a unique overall building environment, there is no singular solution to the needs of a building owner. However, this actually provides an opportunity.

After reviewing all options, applicable codes and requirements, the budget and the long-term plans for the building, it will be possible to develop an environmentally sensitive and sustainable roof system. To achieve that sustainability, budget expenditures may have to be made at the onset that “stretch” the budget but pay off well into the future.

The system will be tested by time and, with appropriate maintenance, will likely pass those tests and provide desired energy savings throughout the life of the roof.

