



GREENING YOUR ROOFS



A roof over your head is considered to be one of the basic requirements for human existence but it is not something that most people think about until something goes wrong. For property owners, roofs represent potential maintenance issues or replacement costs, but rarely are they thought of in terms of energy efficiency or as contributors to the Green movement. Even roofing contractors who deal with roofs on a daily basis do not usually think of roofs in these terms.

But the world is changing and within the next few years roofs are likely to be thrust into the forefront of Green Building as more attention is paid to sustainability issues, energy efficiency and using roofs as platforms for solar thermal, photovoltaic or even wind turbines. Clearly, the days when roofs merely kept out the rain are quickly fading and being replaced with things like Cool Roofs that can reduce air conditioning costs by reflecting heat away from the attic or Green, vegetative roofs that control water runoff, reduce thermal flux and lower the carbon footprint of the roof assembly.

During the past thirty years there has been a tremendous amount of research into roof physics to determine how we can start to use this part of the building that can represent up to 50 – 60% of the building's exterior shell, as a contributor to the overall building performance in terms of energy efficiency and sustainability. While there have been numerous studies published on this topic by such renowned organizations as the Lawrence Berkley and Oak Ridge National Laboratories, Florida Solar Energy Center and Lafarge Technical Center, most of this information is only recently worked its way into the mainstream roofing arena and building codes.

A few years ago, this author participated in an Roof Consultants Institute Foundation (RCIF) Research Summit in Washington DC where representatives from all segments of the roofing industry in North America were challenged by a representative of the US Department of Energy to step up the process of getting the new technology incorporated into roofing materials so that America can start to realize the benefits that have been identified in the research programs. By the end of this two day meeting, there was a strong consensus among the attendees, that this move will likely change the roofing industry in ways that no one could have envisioned just a few short years ago.



It will become increasingly important for property owners to understand and recognize the opportunities that should be considered when roof related issues come up. The list below represents roofing related changes that should be understood as they are probably going to enter into any roofing discussions that you are likely to have in the near future.

- Cool Roofing – this term applies to any Cool Roof Rating Council (CRRC) or Energy Star certified roofing material that has a high surface reflectivity and material emissivity. The effectiveness of this material will vary depending on the roofing product’s degree of reflectance and emittance but the overall goal is to prevent heat from entering the structure through the roof. **Green Attribute** – *lowers energy costs by reducing attic temperatures and in turn air conditioning loads. Examples include:*
 - Reflective coatings – typically white colors used on low slope roofs. Extra advantage is that these coatings, in addition to reducing energy costs may also extend the life of the existing roof since they provide a fresh, durable coating to a roof that may be nearing the end of its service life.

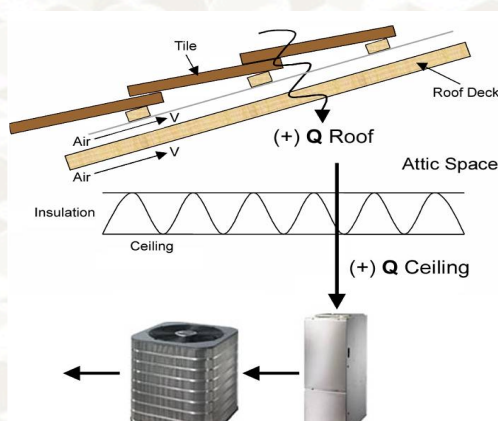


- Infrared Reflective pigments – since steep slope roofs are rarely white, this technology that was originally developed for the military, provides enhanced reflectivity in a wide range of colors. This option which is not widely known is an ideal solution that can be applied during the rejuvenation of older tile roofs.



SR=0.41	SR=0.44	SR=0.44	SR=0.48	SR=0.46	SR=0.41
<i>black</i>	<i>blue</i>	<i>gray</i>	<i>terracotta</i>	<i>green</i>	<i>chocolate</i>
SR=0.04	SR=0.18	SR=0.21	SR=0.33	SR=0.17	SR=0.12

- Green Roofs – this term typically applies to vegetative or sod roofs that are becoming increasingly popular in the Northern and Eastern regions of the US on commercial projects. An excellent new construction option offering the advantages of high thermal mass but probably too heavy to be considered as a reroof solution.
- Above Sheathing Ventilation – this is perhaps the latest and least recognized method of reducing heat gain into the roof but it may prove to be the most practical and sustainable of all the systems since the benefits typically do not diminish as the roof ages. Recognized for years as a natural element of tile roofs due to their high profile and overlapping application, it is only in the last ten years that this aspect has seriously been studied. As a result of testing that was performed on tile roofs at Oak Ridge National Laboratory (ORNL), other materials such as metal and asphalt shingles have also looked to modify their methods of application to include this layer of air between the roofing material and roof deck.



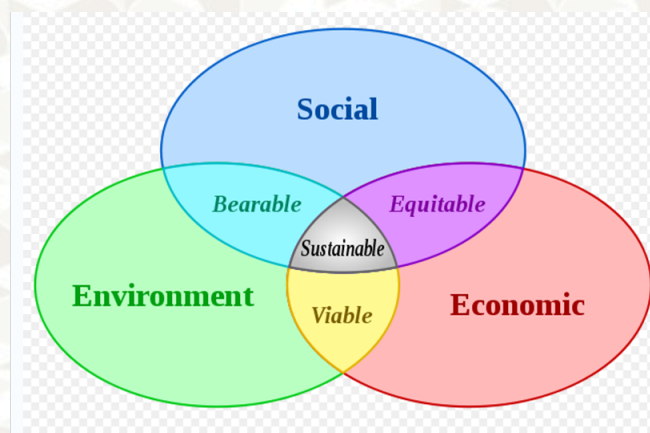
- Solar installations – the concept of placing panels on top of the roof to generate free electricity or hot water is very enticing but it was also the number one topic of concern to virtually all segments of the roofing industry at the aforementioned Roofing Summit in Washington. While you will be hard pressed to find anybody who does not support the idea of clean, sustainable energy, roofers cringe at the



idea of someone drilling holes through their roofs unless that someone is them. This is definitely a technology that makes sense but since the most logical place to put these panels is on the sunny roof top, you must be sure that the installation is compatible with the roof system and does not negatively impact the performance or the warranty of the roof.

So, what makes my roof “Green”?

For anyone who has been involved with Green Building, they know that there can be many different measures of “greenness” and energy saving, although significant, is only one element of the total equation. Whereas energy efficiency was one of the first targets of the movement, the newest buzzword that has already snuck its way into previous portions of this article is “Sustainability”. In essence, sustainability is a measure of how well a material or process serves meeting our current goals without negatively impacting future generations. It is about the responsible use of natural resources.



The measure of sustainability for roofing materials takes into consideration the following issues:

- Life Cycle Costs – this analysis factors in the initial cost of the installed roof and then looks at the expected service life. An inexpensive roofing material that only lasts 15-20 years will have a higher *life cycle cost* than a more expensive roofing material that is expected to last 40-50 years since the cheaper roof will require periodic replacement at additional and inflated future costs.
- Carbon Footprint – “cradle to grave” analysis of the raw materials, transportation and manufacturing impact in terms of fuel, water and overall energy usage will determine the relative “green” value of a product. The smaller the carbon footprint, the “greener” the product.
- Recyclability – “cradle to cradle” analysis that favors products that can be recycled following their service life rather than being dumped in a landfill.



So, the measure of “green” in a roofing product can boil down to asking a few key questions. In many ways, the greener roofing materials will probably end up being your best value since durability and life cycle costs are both key factors that should always be considered when choosing a roof. Asking the right questions about the Green issues is going to be more important than ever in the future since we are likely to see more and more legislation requiring varying levels of compliance to standards. When faced with making roofing decisions, whether for maintenance or replacement, be sure that the contractor you choose has the ability to answer the questions about these new options – otherwise, you may end up doing it again and that’s not Green.

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