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## Solar Reflective Coated Metal Roofs vs. Vegetative Roofs

Energy conservation continues to be an important goal for our society. As a result, metal roofs with a Solar Reflective Coating ("green" metal roofs) are becoming more popular because of the energy savings that can be achieved with these roofs in the industrial and residential markets. Another type of "green" roofing, vegetative roofing, has also been receiving attention because of the potential for energy savings and environmental benefits. This article will examine and compare these two roofing systems.

Metal roofs with a solar reflective coating and vegetative roofs both reduce the urban heat island effect, thus reducing health hazards due to excessive heat in cities. Both systems can reduce electricity consumption, especially during the summer months. With both systems, the energy savings vary dramatically depending on geographic locations.

Vegetative roofs can only be utilized on low slope (flat) roofs; metal roofs with solar reflective coatings can be used for both steep slope and low slope.

Vegetative roofs require significantly more structural support due to the weight of soil, vegetation, retained water, and related materials. Maintenance costs are higher for vegetative roofs, and vegetative roofs are more labor intensive and expensive after installation because the plants require watering, fertilizer, etc. There also can be additional cost involved with drainage, including water treatment (since fertilizer is used), and landscaping may need to be adjusted for the seasons. Leaks are a concern, sometimes due to the plant root system penetrating a water barrier membrane. Besides "normal" water problems, the leakage can lead to structural issues as highlighted in a story about the vegetative roof at Cleveland State University. (Full story in *The Plain Dealer*, July 6, 2014).

The average cost for installation (material and labor) for vegetative roofs and metal roofs are as follows:

Solar Reflective Coating "Green" Metal Roof	\$5 - \$20 per square foot
Vegetative Roof	\$10 - \$40 per square foot

The cost for vegetative roofs includes the material and labor for additional structural support. There is a significant cost difference within the two types of roofs because of the various options and structural considerations. Vegetative roofing, if options are "comparable," is always a larger investment than solar reflective metal roofs.

“Affordable Smart Roof Cost – Benefit, Report Summary – 02/2015” by the JPB Foundation, and authored by Greg Kats and Keith Glasbrook is a study that examined benefit/cost of roofing options for several cities. The study concluded that the roof technology that gave the best benefit to cost comparison was cool metal roofing. The study considered the benefit from the reduction in stormwater run-off that vegetative roofs apparently provide, however, due to longer life, low maintenance, etc. cool metal roofs exhibited the better benefit to cost ratio.

The main driver for this benefit to cost ratio is the considerably higher cost of installation and maintenance for vegetative roofing. This report points out with the benefit cost analysis that vegetative roofing may not be the panacea suggested by many. Vegetative roofs can be beneficial with great aesthetics, if maintained properly. An inadequately maintained vegetative roof can be an eyesore. Vegetative roofs bring plants to the cityscape; however, considering all matters, including economics, a "green" metal roof presents a positive alternative compared to a vegetative roof. With many style, texture, and color options, including "metallic" and variegated colors, "green" metal roofs can be aesthetically pleasing without the high maintenance and installation costs of vegetative roofs.

"Green or cool" metal roofs can be "defined" as roofing that meets certain Energy Star, LEED, ASHRAE, etc. requirements / codes solar reflectivity (SR). The initial requirements for Energy Star is SR 0.65 for low slope and SR 0.25 for steep slope, aged (three years fence exposure) is  $>0.50$  and  $>0.15$  respectively. The newest LEED requirement (LEED v4) is low slope SRI 82 and steep slope SRI 39, aged is SRI 64 and SRI 32 respectively. CRRC guidelines are the same as Energy Star.

Coated metal roofs perform very well regarding aged performance due to excellent weathering. Solar reflectivity is achieved through the pigmentation in the coating that is coil applied over aluminum, galvanized steel or galvalume steel. There are presently no quantitative requirements for vegetative roofs.

More information can be obtained from a coil coater, a paint supplier, [www.coilcoating.org](http://www.coilcoating.org), [www.coolmetalroofing.org](http://www.coolmetalroofing.org), [www.energystar.gov](http://www.energystar.gov), [www.usgbc.org](http://www.usgbc.org), or [www.coolroofing.org](http://www.coolroofing.org) (CRRC).