The Benefits of a White "Cool" Roof in Minnesota

What is a White Roof?

White Roofing, commonly known as "Cool" Roofing, features light-colored finishes which reflect sunlight and improve overall building efficiency. In addition to the personal goals of most building managers to reduce cooling costs and increase occupant comfort, many cities, including major Minnesota cities like Minneapolis, St. Paul and Rochester, now have legislation or goals to increase energy saving measures. White roofs help meet those goals in a variety of cost-effective ways from special reflective coatings and paints and special materials that can be added to the existing roof.

In Minnesota's climate, is a White Roof really worth the extra investments?

Our Weather. According the National Climatic Data Center (2015), Minnesota has an average of 189 days of sun annually, or roughly 52% of the year. In the table below, the average number of **Sunny Days** for a city in Minnesota is the total days in a year when the sky is mostly clear. This includes the days when cloud covers up to 30% of the sky during daylight hours. **Partly Sunny Days** have cloud covering from 40% to 70% of the sky during the daytime. The rest of the days are mainly overcast, with at least 80% cloud cover. **Total Days With Sun** is a sum of the Sunny plus Partly Sunny days. All the numbers are annual averages, made from years of weather watching.

Annual days of sunshine

City	Sunny	Partly Sunny	Total Days With Sun
Duluth	77	102	179
International Falls	76	101	177
Minneapolis & St. Paul	95	101	196
Rochester	86	97	183
St. Cloud	97	102	199

However, "sun" does not tell the whole story about the impact of Minnesota weather on the energy efficiency of a building. The DNR Division of the University of Minnesota reports a nationwide record-setting average number of 150 days of extreme weather.

On average Minnesota has 35 days each summer with temperatures soaring over 90 degrees Fahrenheit; on the opposite end of the thermometer, we also experience an average of 55 days below zero and another 60 days below freezing.

Energy Flow. Heat flows naturally from a warmer space to a colder space. Heat that flows into the building is called heat gain, while heat that flows out of the building is called heat loss. When too much heat gain (loss) occurs, your air conditioning system (heating system) operates to keep the space comfortable. A large amount of heat can be gained (or lost) through a building's roof. Cool roofs reduce heat gains throughout the year. This can save you energy on cooling, but it can also increase the energy you need for heating. The U.S. Department of Energy's 2010 report on Energy Efficiency & Renewable Resources reminds us that often, the annual cooling energy cost savings is substantially higher than the heating penalty.

The Bottom Line. The United States Environmental Protection Agency reports that although costs will vary greatly depending on location and local circumstances, cool roof coatings on a low-slope roof might cost $0.75-$1.50 per square foot, while single-ply cool roof membrane costs vary from $1.50-$3.00 per square foot. The cost premium for cool roofs versus conventional roofing materials ranges from zero to 5 or 10 cents per square foot for most products, or from 10-20 cents for a built-up roof with a cool coating used in place of smooth asphalt or aluminum coating.

A federal study confirmed that cool roofs provide an average yearly net savings of almost 50 cents per square foot. This number includes the price premium for cool roofing products and increased heating costs in the winter as well as summertime energy savings, savings from downsizing cooling equipment, and reduced labor and material costs over time due to the longer life of cool roofs compared with conventional roofs.