



**Cool
Metal
Roofing**



CASE STUDY

Metal Roofing Goes to School
for Big Energy Savings

Baggett and Poole Elementary Schools
Paulding County, Georgia, USA

FOCUS

ENERGY EFFICIENT FOCUS

Cool metal roofing is technology that saves energy and money. Where cooling bills are a large part of a building's energy costs, cool roofing can help generate significant savings. Cool metal roofing uses a highly reflective coating. While light colors have always been reflective, this coating is now available in many colors, including darker ones such as forest green and brown. This variety allows a roof to achieve specific architectural attributes while providing the benefits of lower energy costs normally associated with only lighter colors.

COOL

KEEP IT COOL

As heat builds up on a roof, it infiltrates the building and drives cooling costs up. By keeping the accumulation of heat on the roof to a minimum, the need for cooling is mitigated and energy costs are lowered. There are two factors that result in heat buildup: solar reflectance and thermal emittance. By controlling these factors, heat buildup can be reduced and costs contained.

The most important factor in keeping a roof cool is the reflectance of the surface. The greater the reflectance of a material, the more solar energy will be reflected back into the sky and the cooler the roof will be.

Emittance is also important. This is the ability of material to re-emit energy to the surrounding environment. The higher the emittance of a roof, the cooler the roof. Cool metal roofing combines greater reflectance with higher emittance, to keep the building envelope cooler and costs down.

Metal roofs are included in the U.S. EPA ENERGY STAR Roof Product List and the Cool Roof Rating Council Rated Products Directory.

SAVINGS

TWO SCHOOLS, TWO ROOFS: MAJOR SAVINGS

One unique case from Georgia shows exactly how cool metal roofing can help a building use less energy to cool it and save a significant amount of money over time.

In 2002 and 2003 the Paulding County School District (GA) constructed two new elementary schools that are virtually identical: Bessie L. Baggett Elementary and Lillian C. Poole Elementary. They are the same size (90,000 SF), have the same HVAC units and each has the same orientation to the sun.

Each school has a metal roof manufactured by Architectural Metal Systems (AMS) of Eufaula, Alabama. The roofs of both schools have an R-15 vinyl-faced blanket insulation over the purlins and six inches of R-19 batt insulation at the ceiling.



Photo credit: Robert Scichilli Associates, Inc. and Green Metal Consulting, Inc.

Without Cool Roof: Bessie L. Baggett Elementary has a conventional metal roof with Hunter Green Kynar® 500-based paint.



With Cool Roof: Lillian C. Poole Elementary features a cool metal roof with Hunter Green Kynar® 500-based paint.

Working in tandem with architects Roy Denney and Steve McCune of Southern A&E, Austell, GA, AMS decided to use these two schools to serve as test sites to study the value of cool roof technology in a real world situation. While there have been studies done to show how effective cool metal roofing is, particularly by the Oak Ridge National Laboratory, this would be a real-life, real-time study to prove the benefits of cool metal roofing.

Poole Elementary was constructed with cool metal roof technology, that is, paint with infrared (IR) reflective pigments, while Baggett Elementary was constructed with a conventional coating. Both schools had the same Hunter Green roof color, an attractive and popular choice for many buildings, and the thermostats for both schools are controlled at the district office. The effects of the cool metal roof are clear. In the school year 2006-2007 alone, the annual savings were close to \$15,000.

ANNUAL ENERGY SAVINGS - NEARLY \$15,000

Greystone Power (2006-2007)	Baggett SR (12%)*	Poole SR (29%)*	Annual Savings
Annual Electric	\$88,352	\$78,045	\$10,307
Annual Gas	\$24,989	\$20,800	\$4,189
Annual Cost	\$113,341	\$98,845	\$14,496

*SR = Solar Reflectance

Over a 35-year period, which is the warranted life of the coating system, the data offers a projected total savings of at least \$525,000, not taking into account future increases in fuel costs. “We were pleasantly surprised by the results,” says Roy Denney of Southern A&E. “Now we are promoting the cool roofs to all our clients.”

Oak Ridge National Laboratory’s Bill Miller, PhD, reviewed the Poole and Baggett energy bills provided by Greystone Electric. He estimates that “If just 10% of the 82,800 schools in the southeast US had this product [cool roof], the schools could save about \$4.2 billion over 35 years. These two schools are an excellent testimony to the value of cool roof technology.”

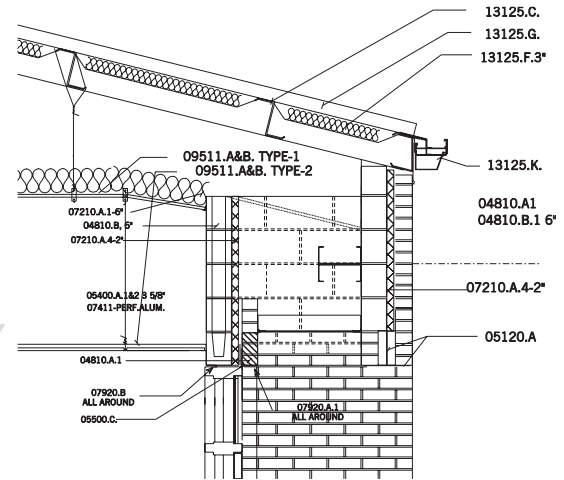
“Today, we only specify cool roofs,” says Steve McCune with Southern A&E. “Because of the low initial cost and quick pay-back we know it is in a client’s best long-term interest. Clients need the architect to be their advocate; to look after their best interest ; and in the case of schools, to assure the best use of the tax payers’ money. We only specify cool metal roofs because they just make perfect sense.”

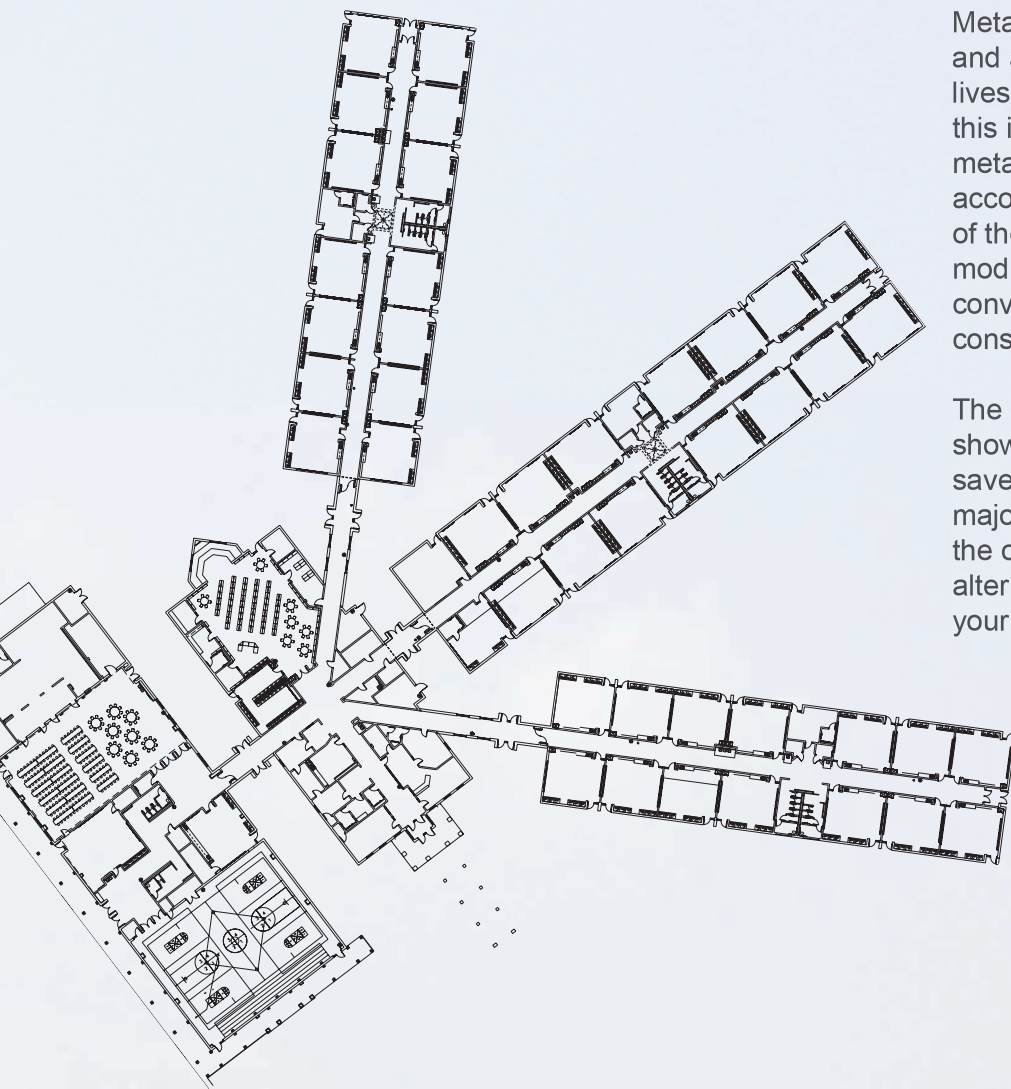
INFRARED (IR) REFLECTIVE PAINTS MOVE TO THE HEAD OF THE CLASS

Metal roofs have a long lifespan and cool metal is no exception. Typically, cool metal roofs have warranties for as much as 35 years. Often, metal roofs last from 35 – 50 years, so over time the savings can be enormous. This compares with much shorter life spans for other roofing material, so not only are there cost savings, but planning and personnel resources can be devoted to other important areas.

In 2004 Oak Ridge National Laboratory’s Building Technology Center completed a three-year study to evaluate the energy efficiency and service life of metal roofing systems. The results are available at www.coolmetalroofing.org, but overall the study showed that metal panels maintain high levels of reflectance even after continued exposure to the elements over many years. The panels also maintained high levels of emittance which, in some cases, increased slightly. Also, both painted and unpainted metal panels maintain their energy efficiency better over time than any of the other roofing systems studied.

According to their report, “All painted metal roofs have maintained their original manufactured appearance. After 3 1/2 years of exposure, rains with a measured pH of 4.3... have not etched the metal finish.” ORNL further observed, “The field data... shows that these types of (PVDF) painted metals maintain their resistance to soiling for at least thirty-five years.”





Metal roofs are made with recycled content and are recyclable at the end of their lives. For those interested in LEED® points this is important. Additionally, because metal is fairly lightweight, most roof types accommodate a retrofit metal roof on top of the original structure without major modifications. When it is time to replace a conventional roof, this can be an important consideration.

The Baggett and Poole elementary schools show exactly how cool metal roofing can save money where cooling costs are a major energy expenditure. Combined with the other advantages of a metal roof, this alternative can offer significant benefits for your building program.



Developed by the Cool Metal Roofing Coalition

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For more information, visit www.coolmetalroofing.org.

The Charter Sustaining Members of the Coalition are the American Iron and Steel Institute, Metal Building Manufacturers Association, Metal Construction Association, and National Coil Coating Association.