

Selling a Green Roof 101

Residential construction has a significant impact on the environment. Houses consume half of our energy, produce one-fifth of carbon dioxide emissions, consume three-quarters of the water, and represent more than 40 percent of construction waste/debris. All of those factors have an effect on the environment.

In the residential construction market, the retrofit roof market is three times greater than new construction. The average size of a home is 2,300 square feet, according to the most recent census data. That means the average roof measures 2,800 square feet, using standard factor for 6:12 slope.

According to F.W. Dodge and Metal Roofing Alliance statistics, metal's share of the residential market is greater than 8 percent. The MRA estimates there are 5-8 millions U.S. homes with a metal roof and that number is growing by 150,000 every year.

Can metal eventually claim 60 percent of the residential roofing market?

Interestingly enough, six out of 10 U.S. homeowners say they would consider sustainable design practices in a future home improvement project, according to a survey conducted by the American Society of Interior Designers, reported in *Rural Builder* magazine, September 2005.

Metal and its list of sustainable attributes should be a natural fit for the residential green push. A lot of these green qualities have been common sense selling tools for many metal manufacturers and contractors already.

You know the benefits of metal, but when you think about it, many of those benefits are green benefits. When it comes to being green, metal boasts durability, resistance to weather (wind,

hail, ice, and snow), and a service life of more than 30 years. Metal is manufactured from recycled content, in fact a minimum of 25 percent recycled content, and it's 100 percent recyclable when removed, which means there is no landfill waste stream. Metal roofing systems weigh one-third to one-eighth less than conventional asphalt shingles and can be installed over old roofing material. Finally, metal ranks high in energy efficiency by reducing heat gain on the roof and in the attic space, so it can lower cooling energy costs, which in turn mitigates the heat island effect.

Selling a metal roof to Mr. and Mrs. Homeowner

It may be a bit of an over-generalization, but the concerns of the husband and wife are different when making a decision on metal roofing. The husband is concerned with the installed cost and will be sold on metal's strength, light weight, and its resistance to wind, hail and fire. The wife is looking at color, texture, profile, and its aesthetics with her house.

Believe it or not, there are some selling points that will ring true to both Mr. and Mrs. Homeowner. They both want to hear about lower electric bills, higher resale value, better mortgages and home loans, utility rebates and incentives, tax credits, and lower insurance premiums.

Here's a bit of information to walk into a meeting with: Most people have an idea of what their annual electrical costs are, but the average household spends approximately \$1,500 per year on electric bills. Peter Turnbull of Pacific Gas and Electric Company says, "The cheapest, most reliable source of new energy is saved energy."

Cool metal roofing

Average homeowners may not understand or even be aware of cool metal roofing, but it can save those homeowners money on air conditioning bills. Some may want to or need to understand the concept before committing to the purchase of a metal roof. There may be no easy way to explain it, but a good rule of thumb to start with is that for every 0.01 increase in roof reflectance, temperature decreases 1 degree Fahrenheit. For every 0.10 increase in roof reflectance, cooling/heating energy costs drop 2 cents per square foot in warmer climates.

The combination of total solar reflectance and thermal emittance results in roof surface temperature differences. That leads to environmental and energy savings features associated with cool roofing.

Is the homeowner missing out on heat coming into the house in winter because the roof is reflecting it away? Maybe, but it's almost insignificant. Cooling costs are about three times heating costs. Also, cooling is most always accomplished with electricity, which requires power plants that pollute the air, while heating is generally a "clean" process that is non-electrical. The peak demand for electricity occurs when temperatures are highest and the sun is the harshest. In the winter, days are shorter and the sun is hitting the rooftop at lower angle. Also, snow cover often interferes with roof reflectance.

Case study

Bessie L. Baggett Elementary, Dallas, Ga. vs. Lillian C. Poole Elementary, Powder Springs, Ga.

One of the best case studies of how cool metal roofing can actually save

money was based on two schools of equal footprint and usage in Georgia. The only difference was the total solar reflectance of the roofs used for the two buildings. Both schools are in Paulding County, with electric HVAC with gas-fired heating and thermostats controlled at the district office.

The Baggett school has a standard BASF roof coating system in the color Evergreen, which has a total solar reflectance of .12, or 12 percent. The Poole school has BASF's cool roof Evergreen with a total solar reflectance of .29, or 29 percent.

Both roofs are 90,000 square feet and have the same design. Roof construction consists of R-15 vinyl-faced blanket insulation over purlins and R-19 six-inch batt insulation at ceiling level.

Keeping in mind the only difference between the two buildings was the reflectivity of the paint, it is not surprising to learn the energy bills for the two schools were quite different.

The top table shows actual electric and gas bills over 12 months for the two schools. The Poole school with the cool roof realized more than \$8,000 in savings for cooling/heating compared to the Baggett School. Note that even though there was a slight heating penalty for the school with a cool roof, the electricity savings dominated the overall cost reduction. The projected savings in utility bills over 35 years exceeds \$.25 million dollars.

A recent demonstration project found that a cool metal roof reduced the amount of heat penetrating into a home's attic by as much as 36 percent, leading to a potential 20 percent reduction in air conditioning costs. (Source: Custom-Bilt Metals)

Until recently, cool metal roofing was restricted to white or light colors. The development of reflective pigments has allowed the coating manufacturers

ELEMENTARY SCHOOL STUDY RESULTS

James R. Townsend, Architectural Metal Systems

Greystone Power (2004)	Baggett SR (12%)	Poole SR (29%)	Annual Savings (\$)
Annual Electric	\$67,251	\$58,447	\$8,804
Annual Gas	\$16,837	\$17,587	-\$750
Annual Savings	\$84,088	\$76,034	\$8,054

EXAMPLE OF AN ENERGY MORTGAGE WHERE HOME QUALIFIED FOR \$4,816 IN ENERGY EFFICIENCY UPGRADES

Home Price	\$150,000	\$154,816
Loan Amount*	\$135,000	\$139,334
Monthly Payment	\$991	\$1,023
Energy Bill	\$186	\$93
True Monthly Cost of Home Ownership	\$1,177	\$1,116
Monthly Savings		\$61

*90% mortgage at 8% interest

to produce a darker finish that has a higher reflectivity. These pigments reflect visible light the same as normal pigments and we see the same color. The difference is they reflect more infrared energy, and more than 50 percent of the solar energy striking earth is infrared. Solar reflectance is a weighted average from energy received at each wavelength.

EPA and energy costs

Americans spend \$40 billion annually to cool buildings. Energy Star labeled cool roofing can lower roof surface temperatures up to 100 degrees. That, in turn, can reduce air conditioning needed and can reduce peak cooling demand by 10-15 percent. Currently, there are almost 1,200 labeled Energy

Star roof products.

Purchasing a metal roof, along with other energy efficient improvements, can qualify a homeowner for Energy Efficient Mortgages, which credit a home's energy efficiency in the home loan, allowing the homeowner to pay for energy improvements through the mortgage. Up to 100 percent of energy improvements can be financed and monthly savings are directly applied to borrowers' maximum monthly mortgage payment. It qualifies the borrower for a larger mortgage and a larger tax deduction. It can lower the down payment required on mortgage/loans for existing homes or new construction.

Home energy ratings

The Residential Energy Services

Network offers onsite inspection by energy efficiency professionals, trained and accredited by RESNET. These professionals can identify energy characteristics in insulation, window/door efficiencies, etc. Data is entered into the RESNET computer program and translated into a score, with the rating recognized in the mortgage industry. (For more information, visit www.natresnet.org.)

The RESNET components used in baseline calculations include above-grade walls, basement and crawlspace walls, floors over unconditioned spaces, ceilings, roofs, attics, foundations, doors, glazing, skylights, thermally isolated sunrooms, and air exchange rate.

Granted, roofing is only one factor, but remember, 60 percent of homeowners say they would consider sustainable design practices in a future home improvement project.

Contractors can locate raters on RESNET's national directory. State and local governments recognizing home energy ratings in energy codes are in the following states: Alaska, Massachusetts, Arkansas, Ohio, California, New York, Florida, Texas, Iowa, Vermont, and Kansas.

Energy Star mortgages are available for a rating score of 86 or higher on the purchase of new or existing homes. The estimated annual utility savings allow the lender to increase the maximum principal, interest, taxes, and insurance amount and qualifies homebuyers for larger loans. Additional financial incentives to buyers include a lower down payment on mortgage/loans, discounted loan origination fees, cash back at closing, a higher qualifying debt-to-income ratio, assured appraised values, and competitive interest rates and free interest rate locks. Those factors can all translate into more money to invest in roofing.

Tax credits are available to contrac-

tors as well as homeowners who install a cool metal roof, along with other energy efficient components.

Energy Policy Act of 2005

This policy was signed into law by President Bush on August 8, 2005. Section 1332 of the Act provides a \$2,000 tax credit to eligible contractors for construction of new energy efficient homes, and guess what — metal roofing can contribute. Section 1333 extends a \$500 tax credit to homeowners for certain qualified energy efficiency improvements to residential property, and cool metal roofs are specifically referenced for the credit in Section 1333.

Metal roofing is referenced under home improvements as "Qualified Energy Efficient Improvements." It recognizes any energy efficient building envelope component that meets the prescriptive criteria for such components established by the 2000 IECC, or in the case of a metal roof, with appropriate pigmented coatings that meet the Energy Star program requirements. Building envelope components are listed as insulation, exterior windows, exterior doors, and any metal roof installed on a dwelling unit, but only if the roof has appropriate pigmented coatings which are specifically, and primarily, designed to reduce the heat gain of the dwelling unit.

The Department of Treasury and Internal Revenue Service will simplify the language into new tax code for taxable year 2006. The metal roofing industry is working to qualify cool metal roofing technology for the tax credit in Section 1332, which pertains to new construction.

Metal adds value

A metal roof can add to the appraised

value of a home and increase its resale value. In fact, the value of a home increases \$1.45 per square foot with a metal roof. The resale value increases and the Energy Star label is a strong selling advantage to the savvy homebuyer. According to *Appraisal Journal* (October 1998 and 1999) "the market value of a home increases \$20 for every \$1 decrease in annual utility cost." The average home built to exceed the Model Energy Code shows annual savings of \$170-425. Applying the Appraisal Institute figures to these savings, that increases the home market value between \$3,400 and \$8,500, in an analysis by Pacific Northwest National Laboratory, reported by RESNET.

A cool metal roof may comply with energy/building codes, but you have to know your locale. It's important to know your jurisdiction, city, county, and state, including state building and energy code updates.

Tools at your disposal

- **Metal Roofing Alliance**
www.metalroofing.com
- **Cool Metal Roofing Coalition**
www.coolmetalroofing.org
- **ORNL steep slope roof energy calculator** www.ornl.gov
- **LEED-Homes (pending)**
www.usgbc.org
- **Built Green** www.builtgreen.org
- **NAHB Green Home Building Guidelines** www.nahbrc.org
- **DOE Energy Efficiency and Renewable Energy Program**
www.eere.energy.gov
- **Environmental Home Center**
www.environmentalhomecenter.com
- **Green Seal Certification Program**
www.greenseal.org/certproducts.htm

Adapted from a presentation by Scott Kriner of Akzo Nobel Coatings at METALCON 2005 in Chicago.