



L.E.E.D. - MRP-Support Data

DATE: Thursday, June 10, 2010

SUBJECT: **MRP-Support Data – STEEL RECYLED CONTENT & RECYCLABILITY**

STEEL RECYCLED CONTENT:

The information attached supports Metro Roof Products claim that the Metro stone-coated steel (Tile, Roman Tile, Shake & Shingle) roof system has a recycled content of at least 25%.

Sources:

AISI - American Iron & Steel Institute

SRI – Steel Recycling Institute

MCA – Metal Construction Association

STEEL RECYCLABILITY:

The information attached supports Metro Roof Products claim that the Metro stone-coated steel is 100% recyclable with its stone-coated finish applied.

Sources:

ASR - Advanced Steel Recovery

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Technical Bulletin

Recycled Content of Metal Roofing and Siding Panels

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Metal roofing and siding panels are made with the highest recycled content from the most recyclable materials on earth, making them a great choice not only for your use, but also for future generations' use. Your old car, soup can or washing machine may become part of your new roof! Some states are mandating energy-saving requirements for buildings or giving tax breaks for energy-efficient and energy-saving construction products. Because recycling saves much of the energy required to produce metal products, recycled content is also being recognized and rewarded. So, recycling is done for economic and environmental reasons.

New York, Pennsylvania and California are leading the way in energy-saving initiatives, using the LEED® rating system to certify "green" buildings under the system created and promulgated by the U.S. Green Building Council. LEED stands for "Leadership in Energy and Environmental Design."

Among numerous design considerations, such as landscaping that saves water or highly reflective metal roofs that reduce air conditioning load to save energy, this rating system considers the "postconsumer" and "postindustrial" recycled content of building materials. Although recyclability is not a part of the LEED rating system, it is still good to know that metal panels may be recycled when their useful life ends many years from now and contribute again to future products' recycled content.

Steel recycling

Steel is the world's, as well as North America's, most recycled material. In the United States alone, nearly 70 million tons of steel were recycled in 2002. Every ton of steel that is recycled saves 2,500 pounds of iron ore, 1,400 pounds of coal, and 120 pounds of limestone. New steel made with recycled material uses as little as 26% of the amount of energy that would be required to make steel from raw materials extracted from nature.

Two different processes, the basic oxygen furnace (BOF) and the electric arc furnace (EAF), produce steel. Both processes consume recycled scrap steel to produce new steel. Scrap steel may result from almost any end-of-life product.

According to the Steel Recycling Institute (www.recycle-steel.org) the total recycled content from BOF production of 50,114,300 tons of steel in North America during 2002 was 16,054,800 tons or 32.0% total recycled content. The post consumer recycled content was 22.6% and the postindustrial recycled content was 8.4%.

The total recycled content from EAF production of 49,156,000 tons of steel in North America during 2002 was 47,159,800 tons or 95.9% total recycled content. The post consumer recycled content is 59.0% and the postindustrial recycled content is 31.9%. As you can see, the EAF process uses almost all scrap steel.

One should not make inappropriate environmental comparisons between steel made by the BOF and EAF, because both are part of a complementary, steel-making system.¹

Aluminum recycling

Aluminum is also recycled extensively from both post-consumer and post-industrial sources and provides the most valuable component for most municipal recycling efforts. A survey in late 2003 indicated that the recycled content of domestically produced, flat-rolled products for the building and construction market was approximately 80–85%. In addition, at the end of their long, useful life, aluminum roofing and siding panels can be repeatedly recycled back into similar products with no loss of quality.

Producing aluminum from recycled material requires only 5% of the energy required to produce aluminum from bauxite ore, and every ton of recycled aluminum saves four tons of bauxite. Additionally, using recycled aluminum instead of raw materials reduces air pollution generation such as CO₂, SO_x, and NO_x by 95% and water pollution by 97%.²

Copper recycling

Copper also is a routinely recycled metal with the highest scrap value of any building metal. Copper's high cost makes it a favored product for collection and sale to nonferrous-scrap recycling companies. The scrap is melted down and reformed into a new, appropriate product. This remelting takes only about 15% of the total energy consumed in mining, milling, smelting, and refining copper from ore. The average recycled content of all copper products is 44.6%. Copper wire is the biggest consumer of copper and that copper must be pure. As a result, copper wire production uses little copper scrap. The remaining copper market, including copper roofing, contains 75% scrap. Almost 50% of this is post consumer scrap.³

Zinc recycling

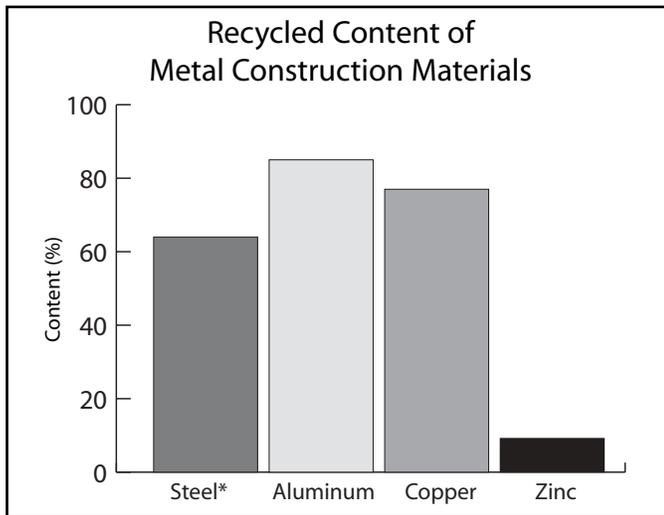
Over 30% of zinc used in all applications worldwide comes from recycling. That percentage is expected to increase to 39% before the end of 2004.^{4,5} In building applications, especially in Europe, more than 90% of old, rolled zinc products are recovered and generally recycled into other types of zinc products. At the end of its life, rolled zinc products used in building applications have an attractive residual value of up to 75% of the price for new zinc. The average recycled content of zinc in building products is estimated to be less than 9%.⁶

The amount of energy used to produce zinc from ore is the lowest of all non-ferrous metals on the market. Energy consumption is even lower when zinc is produced from recycled material: between 0.49% and 19.7% of the amount of energy used to produce zinc from ore.⁷

Recycled Content of Metal Roofing and Siding Panels

Conclusions

The high recycled content and recyclability of steel, aluminum, copper, zinc, and other metals allow for metal construction products to be routinely included on listings for “green” or sustainable building materials.



*The steel value is an average of the 2002 recycled content data from EAF and BOF steel as reported on page one of this bulletin.

The LEED program recognizes the importance of the weighted total recycled content of a building project’s materials. Use of recycled metal can contribute greatly toward a building acquiring LEED certification points.

REFERENCES

- (1) Steel Recycling Institute (www.recycle-steel.org)
- (2) The Aluminum Association (www.aluminum.org)
- (3) Copper Development Association (www.copper.org)
- (4) International Zinc Association (www.zincworld.org)
- (5) “UM Recycling Workshop,” Report of proceedings, Brussels, June 10, 1999.
- (6) “Environment and Safety Report of UMICORE Group” 2002
- (7) “Le recyclage des métaux non ferreux” (Recycling non-ferrous metals), M.E.Henstock, Publication of the Conseil International des Métaux et de l’Environnement, May 1996

Founded in 1983, the *Metal Construction Association* brings together the diverse metal construction industry for the purpose of expanding the use of all metals used in construction.

MCA promotes the benefits of metal in construction through

- Technical guidance
- Product certification
- Educational and awareness programs
- Advocating for the interests of our industry
- Recognition of industry-achievement awards
- Monitoring of industry issues, such as codes and standards
- Research to develop improved metal construction products
- Promotional and marketing support for the metal construction industry
- Publications to promote use of metal wall and roof products in construction.

For more information, please visit the MCA Web site at www.metalconstruction.org.

Steel Takes LEED™ with Recycled Content

steel beams and columns

steel studs

steel roofing

steel decking

steel doors

ductwork

steel siding

corrugated steel pipe

other steel components

Designers and builders have long recognized and lauded steel for its strength, durability, and functionality. Increasingly, however, architects are recognizing steel's important environmental attributes—especially its high recycled content and high reclamation rate.

For many years, there has been a strong economic motive to incorporate recycling into the process for making steel, but today's environmental concerns make recycling even more important. Recycling saves money while conserving energy and resources, as well as reducing solid, liquid, and gaseous wastes. Recycling also helps to spread the energy impact of the original extraction and manufacturing of the material over infinite generations of new steel.

The efficiency with which a material is recycled can be measured by either its *percentage of recycled content* or its *reclamation rate*. Recycled content is a measure of how much recycled material is contained in a finished product. The reclamation rate is a measure of how often a product is actually recycled at the end of its useful life. Steel is an exceptional performer by both measurements. In the construction industry, recent interest in recycling has been driven largely by the US Green Building Council's *Leadership in Energy and Environmental Design* (LEED™) rating system. The LEED rating system only promotes the use of materials with high levels of recycled content. The equally important reclamation rate of the materials is not currently considered.

Scrap consumption in the United States is maximized between the two types of modern steel mills, each of which generates products with varying levels of recycled content. One type of mill produces much of the steel for light flat-rolled steel products with about 30% *recycled content*. The other type of mill makes steel for a wide range of products, including flat-rolled, but is the only method used domestically for the production of structural shapes and has about 95% *recycled content*. (These processes are covered in detail on the following pages.)

The amount of recycled content in steel products varies over time, both as a function of the cost of steel scrap and its availability. As the world-wide demand for steel increases, the available scrap will be stretched between more and more steel products, meaning that more raw steel will have to enter the production stream to meet the demand. Fortunately, steel is the country's most widely recycled

material, and as more steel is used for construction and other products, more scrap is available for future recycling. About 88% of all steel products and nearly 100% of steel that is used in beams and plates in construction, are recycled into new steel products at the end of their useful life—an amazing reclamation rate!

In addition to recycled content, steel can contribute toward several other LEED credits, either directly or indirectly. Steel is dimensionally stable and, when properly designed, can provide an exceptionally tight building envelope, for less air loss and better HVAC performance over time. Steel is made to exact specifications, so on-site waste is minimized. Material from demolition or construction can be easily recycled, with the magnetic properties of steel greatly facilitating its separation from other materials. Thus, in addition to steel's outstanding recycled content and an enviable reclamation rate, steel's other functional properties contribute to the material's solid environmental performance.

As with any building process or material, there are areas for improvement. A great benefit of LEED is that it can help the steel industry recover even more scrap as contractors improve their recycling collection methods at the job site, so less incidental iron and steel scrap escapes to landfills. Similarly, commercial buildings and residential housing can have better disciplined recycling systems for increased recovery.

As steel products reach the end of their useful life, we want to see even more recycled into new steel products for future service to society.



**American
Iron and Steel
Institute**

On-Line Steel Recycling Resources

www.recycle-steel.org

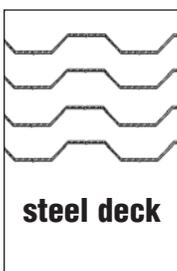
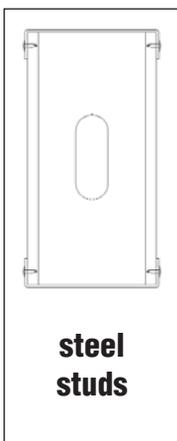
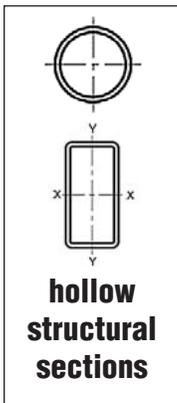
Includes detailed information on recycling rates, recycling databases, and the environmental benefits of steel for homes building, steel roofing, and bridges.

www.aisc.org/sustainability

Includes detailed information on how steel factors into the LEED™ rating system, steel mill recycled content documentation, and articles about the use of steel in sustainable projects.

Modern Steel Production Technologies

Typical BOF Products



plate

purlins

wall studs

Steel is the world's—as well as North America's—most recycled material. In the United States alone, almost 69 million tons of steel were recycled or exported for recycling in 2003. Modern steel production relies on two technologies, both of which utilize old steel to make new steel: the *basic oxygen furnace* (BOF) and the *electric arc furnace* (EAF).

➤ The basic oxygen furnace (BOF) process uses 25 to 35 percent old steel to make new. It produces products—such as automotive fenders, encasements of refrigerators, and packaging like soup cans, five-gallon pails, and 55-gallon drums—whose major required characteristic is drawability.

➤ The electric arc furnace (EAF) process uses 95-100 percent old steel to make new. It is primarily used to manufacture products—such as structural beams, steel plates, and reinforcement bars—whose major required characteristic is strength.

Steel recycling has both an economic and environmental benefit: It is less expensive to recycle steel than to mine virgin ore and move it through the process of making new steel. And today two out of every three pounds of new steel are produced from old steel. However, because steel is such a durable material (that is, cars, appliances, bridges and other steel products last a long time), it is necessary to continue to mine virgin ore to supplement the production of new steel. Economic expansion, domestically and internationally, creates additional demand that cannot be fully met by available scrap supplies.

Unlike other competing industries, recycling is second nature for the steel industry. The North American steel industry has been recycling steel scrap for over 150 years through the 1,800 scrap processors and some 12,000 auto dismantlers. Many of them have been in the business for more than 100 years.

The pre-consumer, post-industrial, post-consumer, and total recycled content of steel products in the United States can be determined for the calendar year 2003 using information from the American Iron and Steel Institute (AISI), the Institute of Scrap Recycling Industries (ISRI), and the U.S. Geological Survey. Additionally, a study prepared for the AISI by William T. Hogan, S.A., and Frank T. Koelble of Fordham University is used to establish pre- and post-consumer fractions of

purchased scrap. (Detailed information on these studies can be obtained from the Steel Recycling Institute (call 412.922.2772 or visit www.recycle-steel.org.)

Individual company statistics are usually not applicable or instructive since available scrap typically goes to the closes melting furnace. This open loop recycling allows, for example, an old car to be melted down to produce a new soup can, and then, as the new soup can is recycled, it is melted down to produce a new car, appliance, or structural beam.

Basic Oxygen Furnace

BOF facilities consumed a total of 15,772,900 tons of ferrous scrap in the production of 50,941,700 tons of liquid steel during 2003. Based on U.S. Geological Survey statistics, 1,738,800 of these ferrous scrap tons had been generated as unsalable steel product within the confines of these steelmaking sites. In the steel industry, these tons are classified as "home scrap," but are a mix of pre-consumer scrap and post-industrial scrap. Estimates by the Steel Recycling Institute identify about 80% of this home scrap as post-industrial scrap, equating to 1,391,000 tons (1,738,800 x 80%). Additionally, these operations reported that they consumed 148,800 tons of obsolete scrap (buildings and warehouses dismantled on-site at the mill) during this time frame. This volume is classified as post-consumer scrap.

As a result of the above, based on the total scrap consumed, outside purchases of scrap equate to 13,885,300 tons [15,772,900 - (1,738,800 + 148,800)]. According to the Fordham University study, the post-consumer fraction of the purchased ferrous scrap would be 83.4 percent, while 16.6 percent of these purchases would be pre-consumer. This equates to 2,305,000 tons of pre-consumer scrap (13,885,300 x 16.6%). This "prompt scrap" is mainly scrap generated by manufacturing processes for products made with steel. It is also considered post-industrial scrap.

Therefore, the **total recycled content** to produce the 50,941,700 tons of liquid steel in the BOF is:

$$\frac{15,772,900}{50,941,700} = 31.0\%$$

(Total Tons Ferrous Scrap / Total Tons Liquid Steel)

Also, the **post-consumer recycled content** is (13,885,300 - 2,305,000) + 148,800 = 11,729,100

and:

$$11,729,100 / 50,941,700 = 23.0\%$$

(Post-Consumer Scrap / Total Tons Liquid Steel)

Finally, the **post-industrial recycled content** is (1,391,000 + 2,305,000) / 50,941,700 and:

$$3,696,000 / 50,941,700 = 7.3\%$$

(Post-Industrial Scrap / Total Tons Liquid Steel)

Electric Arc Furnace

EAF facilities consumed a total of 44,661,700 tons of ferrous scrap in the production of 46,310,300 tons of liquid steel during 2003. Based on U.S. Geological Survey adjusted statistics, 12,124,000 of these ferrous scrap tons had been generated as unsalable steel product within the confines of these steelmaking sites. Again, in the steel industry, these tons are classified as "home scrap," but are a mix of pre-consumer scrap and post-industrial scrap. Estimates by the Steel Recycling Institute identify about 80% of this home scrap as post-industrial scrap, equating to 9,699,200 tons (12,124,000 x 80%). Additionally, these operations reported that they consumed 28,700 tons of obsolete scrap (buildings and warehouses dismantled on-site at the mill) during this time frame. This volume is classified as post-consumer scrap.

As a result, based on the total scrap consumed, outside purchases of scrap equate to 32,509,000 tons [44,661,700 - (12,124,000 + 28,700)]. According to the Fordham University study, the post-consumer fraction of the purchased ferrous scrap would be 83.4 percent, while 16.6 percent of these purchases would be pre-consumer.

This equates to 5,396,500 tons of pre-consumer scrap (32,509,000 x 16.6%). This "prompt scrap" is mainly scrap generated by manufacturing processes for products made with steel. It is also considered post-industrial scrap.

Therefore, the **total recycled content** to produce the 46,310,300 tons of liquid steel in the EAF is:

$$44,661,700 / 46,310,300 = 96.4\%$$

(Total Tons Ferrous Scrap / Total Tons Liquid Steel)

Also, the **post-consumer recycled content** is (32,509,000 - 5,396,500) + 28,700 = 27,141,200 and:

$$27,141,200 / 46,310,300 = 58.6\%$$

(Post-Consumer Scrap / Total Tons Liquid Steel)

Finally, the **post-industrial recycled content** is (9,699,200 + 5,396,500) / 46,310,300 and:

$$15,095,700 / 46,310,300 = 32.6\%$$

(Post-Industrial Scrap / Total Tons Liquid Steel)

The above discussion and calculations demonstrate conclusively the inherent recycled content of today's steel in North America. To buy steel is to "Buy Recycled."

Understanding the recycled content of BOF and EAF steels, one should not attempt to select one steel producer over another on the basis of a simplistic comparison of relative scrap usage or recycled content. Rather than providing an enhanced environmental benefit, such a selection could prove more costly in terms of total life cycle assessment energy consumption, transportation impact, or other variables.

Steel does not rely on "recycled content" purchasing to incorporate or drive scrap use. It already happens because of the economics. Recycled content for steel is a function of the steel-making process itself. After its useful product life, regardless of its BOF or EAF origin, steel is recycled back into another steel product. Thus steel with almost 100 percent recycled content cannot be described as environmentally superior to steel with 30 percent recycled content. This is not contradictory because they are both complementary parts of the total interlocking infrastructure of steel-making, product manufacture, scrap generation and recycling. The recycled content of EAF relies on the embodied energy savings of the steel created in the BOF.

Steel is truly the most recycled material.

Contact Us

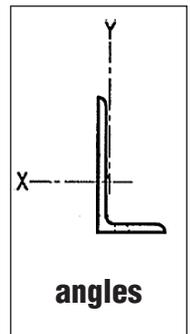
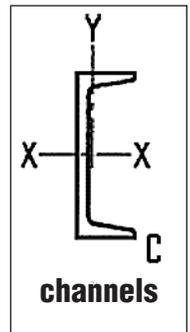
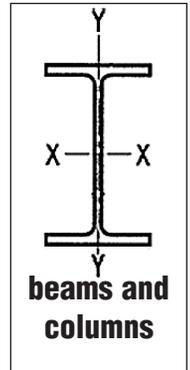
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American Institute of Steel Construction, Inc.

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866.ASK.AISC • solutions@aisc.org
www.aisc.org

Typical EAF Products



plate

steel deck

piling

To: Architects, Engineers, Designers, and Specifiers

Re: LEED™ Version 2.1 Recycled Content Value of Steel Building Products

The U.S. Green Building Council Leadership in Energy & Environmental Design (LEED™) Green Building Rating System aims to improve occupant well-being, environmental performance and economic returns of buildings using established and innovative practices, standards and technologies.

Materials & Resources Credit 4: Recycled Content intends to increase demand for building products that incorporate recycled content materials, therefore reducing impacts resulting from extraction and processing of new virgin materials. As discussed and demonstrated below, steel building products contribute positively toward earning points under Credit 4.1 and Credit 4.2. The following is required by LEED Version 2.1:

Credit 4.1 (1 point) "Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial content constitutes at least 5% of the total value of the materials in the project."

Credit 4.2 (1 point) "Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial content constitutes at least 10% of the total value of the materials in the project."

"The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item." Since steel (the material) and steel (the building product) are the same, the value of the steel building product is directly multiplied by steel's recycled content, or:

$$\text{Steel Recycled Content Value} = (\text{Value of Steel Product}) (\text{Post-Consumer \%} + \frac{1}{2} \text{Post-Industrial \%})$$

The information contained within this brochure provides post-consumer and post-industrial recycled content percentages for North American steel building products. These percentages and values of steel building products are easily entered into LEED Letter Template spreadsheet for calculation. To illustrate the application of these steel recycled content values to LEED, manual calculations are shown below for typical Basic Oxygen Furnace (BOF) and Electric Arc Furnace (EAF) steel building products with nominal \$10,000 purchases, using 2003 data. Steel building products include steel stud framing, structural steel framing (wide flange beams, channels, angles, etc.), rebar, roofing, siding, decking, doors and sashes, windows, ductwork, pipe, fixtures, hardware (hinges, handles, braces, screws, nails), culverts, storm drains, and manhole covers.

BOF Steel Recycled Content Value for Typical Product:

Steel Stud Framing

$$\text{Value} = (\$10,000) (23.0 \% + \frac{1}{2} 7.3 \%) = (\$10,000) (26.65 \%) = \$2,665$$

(Exceeds 5% and 10% goals)

EAF Steel Recycled Content Value for Typical Product:

Wide Flange Structural Steel Framing

$$\text{Value} = (\$10,000) (58.6 \% + \frac{1}{2} 32.6 \%) = (\$10,000) (74.90 \%) = \$7,490$$

(Exceeds 5% and 10% goals)



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L.E.E.D. - MRP-Support Data

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Wednesday, September 02, 2009

Peter Croft
V.P. Sales & Marketing
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Oceanside CA 92054

Ref: Recyclability of Metro stone-coated steel roofing panels & accessories

Dear Peter,

Thank you for your inquiry asking our opinion of whether the Metro stone-coated steel roofing product can be recycled. Recycled steel products are generally divided into two categories, "Coated" (Stone-Coated Steel or similar coating) or "Uncoated" steel. The uncoated steel products have a very high recycle value assigned. This type of steel is consistently marketed to our domestic and international customer base as clean recycled steel.

The coated steel (stone-coated material), has a lower recycle value assigned and although it's still considered to be 100% recyclable, will be processed by feeding small percentages into loads of uncoated recycled steel. The recycled value will be determined by the percentage of coated vs. uncoated steel.

Thank you,

Mark Doram

Mark Doram
Sales Manager