

Aluminum Rises High on a Green Foundation at Greenbuild

By Joseph C. Benedyk, Editor

Managed and organized by the U.S. Green Building Council (USGBC) as the world's largest international conference and exposition dedicated to "green" building, Greenbuild 2010 was held November 17-19 at McCormick Place West in Chicago, IL (Figure 1). This was the site at which Greenbuild 2007 was also held, but this year twice the space was required to house 900+ exhibiting companies and to accommodate the 28,000 attendees, many devoted to not only designing, building, and maintaining green buildings, but also involved with supplying green building materials to the building and construction (B&C) trade.



Figure 1. The exhibition hall at Greenbuild 2010 (top). The Greenbuild logo is the registered trademark of the U.S. Building Council (bottom), used here with permission.

The USGBC is a national nonprofit organization based in Washington, D.C. composed of a coalition of leaders across the building industry working to promote buildings that are environmentally responsible and profitable, and healthy places to live and work. In 1998, the USGBC developed the LEED™ (Leadership in Energy and Environmental Design) Green Building Rating System and held their first annual Greenbuild Conference and Exposition in 2002. Greenbuild has since grown year by year, pacing the growth and interest in the USGBC's LEED certification process, which provides a recognized standard for the building and construction industry in assessment of the environmental sustainability of building designs.

The Chicago venue for Greenbuild in 2007 and 2010 was most appropriate considering that Chicago was one of the first cities to adopt LEED for public buildings and is home to more LEED-certified buildings than any

other city in the U.S. In fact, prior to Greenbuild 2010, the USGBC announced a new award entitled the Mayor Richard M. Daley Legacy Award for Global Leadership in Creating Sustainable Cities. This award was presented to Chicago Mayor Richard Daley at the Greenbuild 2010 conference.

The theme of Greenbuild 2010—*Generation Green Redefining Our Future*—is a visionary statement that architects must heed as an inspiration in their work, designers must use as a guide, and builders and suppliers must recognize as a business imperative. However, what defines a green building and how is its environmental impact assessed? The day before Greenbuild 2010 officially opened, USGBC's LEED team provided one full day of workshops, teaching and guiding attendees in the mathematics of green buildings.

Showcasing Aluminum in Green Buildings

First stop at the Greenbuild 2010 expo was the Aluminum Association booth, where Mandi Ross, manager public relations, and J. Marshall Wang, sustainability specialist, held court (Figure 2). The booth was loaded with information that highlighted aluminum's benefits to the B&C industry, and both Ross and Wang were on hand to answer the more probing questions.



Figure 2. Mandi Ross and J. Marshall Wang at the Aluminum Association booth.

To be sure, aluminum sustainability—from cradle to grave—was the major topic of discussion, and the facts behind the success of aluminum as a green material can be plainly stated. On the primary side, today most aluminum smelters can produce a metric ton of aluminum with only 14.5 kilowatt hours of electricity, and more than 50% of aluminum smelters worldwide use hydro-power generated electricity. Primary aluminum has won high marks among architects and builders for its durability, structural properties, formability, and high recycling potential.

As aluminum producers well know and preach continuously, recycled aluminum takes only 5% of the energy to produce as compared with primary aluminum; aluminum can be recycled over and over without loss of useful properties; and since it was first commercialized in 1888, some 75% of the aluminum produced is still in use. That aluminum is arguably the planet's most sustainable material was made clear in the Aluminum Association handout at Greenbuild: "Sustainability Meeting the

Needs of the Present Without Compromising the Ability of Future Generations to Meet their Own Needs.” Among global aluminum industry sustainability initiatives, Alcoa recently named Kevin Anton, immediate past chairman of the Aluminum Association, as the company’s chief sustainability officer or CSO (see interview with Kevin Anton: “Sustainability is a Business Imperative,” *Light Metal Age*, October 2010, pp. 34-35).

Although the rate of recycling of aluminum varies by industry and country, Wang is spearheading the sustainability drive at the Aluminum Association to analyze and document the life cycle assessment (LCA) of aluminum products. Having completed a major study of the U.S. LCA of the aluminum can (see “Aluminum Can Life Cycle Analysis Helps Quantify the Package’s Sustainability Value,” *Light Metal Age*, August 2010, pp. 42-47), Marshall indicated that he is now working on a comparative LCA of energy-intensive commodity metals. To buttress Marshall’s case for aluminum can sustainability—68% total recycled content, highest of any beverage packaging material—all beverage breaks throughout the expo featured soda pop in aluminum cans.

Sustainable Aluminum Mill Products

Aluminum mill products applications were in abundance at this expo, primarily in architectural cladding for façades and curtain walls, but also for floors/ceilings, portals, roofs, interiors, noise barriers, etc. Of particular note were the displays of aluminum composite panel facings, which are composed of coil coated paint or anodized finish aluminum sheet (typically 0.020” thick 3xxx or 5xxx alloy in a cold rolled temper), securely bonded to cores made of polyethylene (PE) or a fire resistant (FR) core. These panels are produced by Alcoa Architectural Products (www.alcoa.com/aap) under the Reynobond® label (Figure 3), 3A Composites (www.3acomposites.com) under the Alucobond® label (Figure 4), and by Mitsubishi Plastic Composites America (www.mitsubishichemical.com) under the Alpolic® label.



Figure 3. Kimberly D. Harden, architectural services coordinator, Alcoa Architectural Products, showcasing Reynobond aluminum composite.

The Alucobond history is very long, dating back to 1964, when the aluminum composite product was under development at the Aluisse laboratories in Neuhausen, Switzerland. The first continuous production line for Alucobond went into operation in December 1968 at Aluminium Walzwerke Singen and proved to be highly successful over the years with delivery worldwide from Singen. In the U.S., production of Alucobond began



Figure 4. Brandon Wyatt, marketing manager (left), Tom Seitz, national sales manager (middle), and Jason Beaupre, mid-central sales manager (right), of 3A Composites showcasing Alucobond aluminum composite.

in 1979 in Benton, KY, where it continues today. The Aluisse Composites group was founded in the early 1990s and was integrated into Alcan as Alcan Composites in 2000, when Alcan acquired Aluisse. New Alucobond production facilities were built in China in 1997, Brazil in 2002, and India in 2007 for supplying the respective local and regional B&C markets. In December 2009, Swiss based Sweiter Technologies acquired Alcan Composites and changed the name of the business to 3A Composites.

Distinguishing features of aluminum composite panels are mainly due to the surface, which can be natural metal or architectural paint coatings with a wide palette of colors that include metallics, anodized finishes, wood grain finishes, etc. These wall panels can be bent to shape and are attached to building structures by various means. Thousands of projects worldwide attest to the popularity of these panels among architects and builders. Typical of the creative architectural application of aluminum composite is the new 94,000 square-foot Mission Hospital Patient Care Tower and Chapel, created by RBB Architects, Inc. of Los Angeles and built by McCarthy Building Companies, Inc. of Newport Beach, CA, which opened in November 2009 in Mission Viejo, CA (Figure 5). A total of 75,000 square feet of 4 mm Alucobond ACM was utilized to clad the tower and chapel, including 8,000 square feet in the custom Rose Metallic color, 23,000 square feet in Bone White, and 44,000 square feet in Silver Metallic.



Figure 5. The Mission Hospital Chapel is clad in 4 mm thick panels of Alucobond aluminum composite material produced in the 3A Composites' Benton, KY, plant (photo courtesy of 3A Composites).

The Petersen Aluminum Corporation (www.pac-clad.com) booth at GREENBUILD featured its PAC-CLAD® architectural products (sheet and coil, flat panels, and roll formed accessories). Petersen Aluminum, founded in 1965 as a metals service center to the architectural metal industry, is headquartered in Elk Grove Village, IL, and has production facilities, primarily devoted to roll forming, in Maryland, Georgia, Texas, and Minnesota. These production facilities fabricate 22 and 24 gauge 3105-H14 aluminum sheet pre-finished in a spectrum of Kynar 500® or Hylar 5000® colors for use in metal roofing, curtain wall, coping, gutters, downspouts, and trim applications. The Petersen Aluminum roofing panels SNAP-CLAD® feature architectural panel aesthetics as well as structural panel performance. The most recent SNAP-CLAD roofing project, completed this year in late October by Kawkawlin Roofing Co., was the Team One Credit Union building in Caro, MI (Figure 6).



Figure 6. Metal roof on the Team One Credit Union building covering 11,500 square feet and built with Petersen Aluminum's 24 gauge 3105-H14 SNAP-CLAD panels pre-painted in Hartford Green (photo courtesy of Petersen Aluminum).

Sustainable Aluminum Extruded Products

Aluminum extrusions for architectural applications were prominently featured at Greenbuild by many companies. The Hydro booth, hosted by Matt Landis, director of commercial development, Hydro Aluminum Extrusion, was the first stop on the Greenbuild aluminum extrusion tour. Landis was pleased and enthusiastic about the show and described some of the recent architectural applications of Hydro extrusions, including the fact that Hydro supplied over 100 kilometers of formed and painted extrusions for the 200,000 square meter span of the Ferrari World Abu Dhabi theme park (note this building was featured on the cover of the October 2010 issue of *Light Metal Age* and described in the same issue). Besides Hydro sales literature, Matt provided a copy of the CD-based *Hydro Extrusion Design Manual*, which offers guidance to engineers, architects, and designers on extrusion and component design. He indicated that this manual is available from Hydro (www.hydro.com).

Kawneer Company, Inc., an Alcoa company, boasting a century long and successful history, pioneered the first use of aluminum in architectural products with a roll formed aluminum window sash (Easyset Sash) in 1920. As over 25% of energy loss in buildings is due to windows, Kawneer over the years has perfected their fenestration products to be energy efficient, with hundreds of patents to their name. The Kawneer booth at Greenbuild 2010 showcased a wide range of sustainable aluminum products, including their new Versoleil™ SunShade Single Blade System (Figure 7), that allows highly configurable blade options to provide maximum shading and energy saving potential and which will be the next generation of Kawneer's sunshade platform.



Figure 7. Kawneer's Versoleil SunShade Single Blade System in vertical configuration.

The Kawneer booth also featured a storefront façade display incorporating high performance glazing, its new IR (Impact Resistant) 501UT (Ultra Thermal) framing system (Figure 8), and a high performance thermally broken (IsoLock® dual thermal break) hurricane resistant storefront framing system. On display also was the recently launched Trifab® 451UT (Ultra Thermal) framing system as well as the Trifab® SunShade, designed to meet the growing demand for sunshades on storefronts. Kawneer also featured its latest window offering as well as products from Traco, a premier manufacturer of windows for commercial construction. Traco was recently acquired by Alcoa and is now a part of its global Building and Construction Systems business and a division of Kawneer.



Figure 8. The 95,430 square foot Cancer Center of Sacred Heart Hospital in Pensacola, FL, completed in April 2010 as an addition to the original medical office building. The center was designed to meet Florida's coastal building code standards for hurricane and wind resistance utilizing the impact resistant version of Kawneer's 1600 Wall System®1 and IR 501 storefront framing system, with insulating laminated 15/16-inch impact resistant glazing (photo courtesy of Kawneer Company).

Kawneer is a member of the USGBC, and all of its portfolio of products can help contribute to LEED certification points. The Kawneer website (www.kawneer.com) provides resource information on all of their products and a LEED Planning Tool for use in the design development stage. The tool ties specific strategies to specific Kawneer products, with sections for "Potential Points" and "Earned Points" based on the recommended products/principles for each LEED category. This function allows users to estimate the amount of points their projects can earn and track their progress toward certification.

Aluminum extrusion applications in architectural sun controls, louvers, screens, and grills were also showcased at the Airolite booth at Greenbuild 2010 (Figure 9). Airolite (www.airolite.com) was acquired by Greenheck in 2004 but maintains its strong brand awareness, developed



Figure 9. Leight Murray (left), national sales manager, and Bill Lampkin (right), channel manager at the Aiolite booth at Greenbuild 2010.

over 90 years in business. Aiolite joined the USGBC in 2007 and continues to support green building initiatives (Figure 10). Aiolite extruded aluminum products are produced and fully assembled in manufacturing plants in Schofield, WI, Frankfurt, KY, and Rocklin, CA. LEED credits can be earned with Aiolite products, which typically consist of 50% recycled aluminum and help architects and designers in managing the sun's light and energy.



Figure 10. Example of Aiolite sun controls to shade windows at the University of Colorado Hospital in Aurora, CO.

Several other firms at the show featured green architectural extruded products, including in no particular order: Conservatek (www.conservatek.com), designer and builder of architectural and industrial/municipal building spaceframes and dome designs created from 6005A-T6 extrusions; Oldcastle BuildingEnvelope®, formerly Oldcastle Glass® (www.oldcastle.com), offering an integrated system for architectural aluminum and glazing systems for the design, engineering, testing, and manufacture of curtain wall and fenestration; and AGS Inc. (www.agsinc.com) offering aluminum sunshades, light shelves, grills, and trellises made from 6063-T5 and -T6 extrusions and 5052-H32 sheet.

In recent years, green building assessment methods have been developed internationally in response to the recognition that higher environmental standards are necessary in the building industry. These include LEED (www.usgbc.com) in the U.S. and Canada (similar to the U.S. version except that energy efficiency is relative to the Canadian Model Energy Code for Buildings), BREEAM (Building Research Establishment Environmental Assessment Method) in the U.K. (www.breeam.org), CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) in Japan (www.ibec.or.jp/CASBEE/english/overviewE.htm), and Green Star in Australia (www.gbca.org.au).

LEED differs from the other rating systems in quantifying green credits. For example, 10% of the building materials must contain recycled content to achieve the recycled content credit. LEED points are accumulated for seven topic areas, each with a set of goals. The topic area of material selection seeks to minimize construction waste, re-use existing building façade, use locally recycled and salvaged materials, and use renewable construction materials—seemingly giving the nod to aluminum in all its forms. Since it was launched in 2000, over 36,000 commercial buildings and 38,000 single-family buildings have participated in LEED certification, representing over one billion square feet worldwide, with another six billion square feet of projects registered and working toward this certification.

At Greenbuild 2010, the USGBC announced the launch of LEED for Retail, its newest green building rating system, and the LEED Volume program, designed to help businesses get certification for multiple outlets. Although most of these programs apply to retail and commercial markets, the concept can also be applied to many single-family homes based on a single set of plans.

The motivation behind LEED and the other green building rating systems is the result of recognition of the environmental impact of buildings based on data USGBC has compiled from various governmental and private sources:

- Buildings represent 38.9% of U.S. primary energy use (includes fuel input for production).
- Buildings are one of the heaviest consumers of natural resources and account for a significant portion of the greenhouse gas emissions that affect climate change. For example, in the U.S., buildings account for 38% of all CO₂ emissions.
- Buildings represent 72% of U.S. electricity consumption.
- Buildings use 40% of raw materials globally (3 billion tons annually).
- The EPA estimates that 170 million tons of building-related construction and demolition debris was generated in the U.S. in 2003, with 61% coming from nonresidential and 39% from residential sources.

The market impact of green building is substantial and growing. The USGBC estimates that the overall green building market in the U.S. for non-residential and residential is likely to more than double from \$36-49 billion in 2009 to \$96-140 billion by 2013. Although the green market was only 2% of non-residential construction starts in 2005 and 10-12% in 2008, it is expected to grow to 20-25% by 2013.

Editor's Note: Greenbuild 2011, in Toronto, Canada, will be held October 5-7, 2011. For more information visit: www.greenbuildexpo.org.