

EPS Insulation Life Cycle Study Shows Significant Environmental Benefits

A new study shows that expanded polystyrene (EPS) provides a substantial reduction in greenhouse gas emissions when used to insulate homes in North America. This study, Energy and Greenhouse Gas Savings for EPS Foam Insulation Applied to Exterior Walls of Single Family Residential Housing in the U.S. and Canada, calculated the resources used and emissions produced in the manufacturing and delivery of EPS and concludes that EPS insulation will reduce the operational impact of the building to an extent that far outweighs the environmental impact caused by its manufacture.

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“Green” Stimulus Bill Includes Tax Credit for Insulation

The 2009 stimulus bill, the American Recovery and Reinvestment Act of 2009 (ARRA), provides tax credits for the private sector and increases public sector spending on infrastructure and buildings. As the federal government continues to unveil its green stimulus plans, the consumer and business community already have a variety of new tax credits available.

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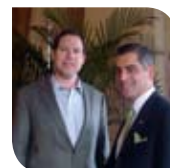
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Recycling Polystyrene

for Construction Materials

In the construction industry, one important step when selecting materials for projects is to understand their lasting effects on the environment. With today's movement toward 'green' or sustainable design practices, architects are considering not only the more obvious qualities of the materials they specify, but also the long-term environmental impact over a building's life cycle.

Increasingly, product development has been geared to meet these demands. For example, Grace Construction Products—an operating segment of W.R. Grace & Co.—has developed innovative insulation materials that help reduce environmental risks. In the interest of using recycled materials wherever possible, the company adds shredded expanded polystyrene (EPS) to its Monokote® fire-resistant insulation products.

Expanded Use

Like many other plastics, polystyrene is all around us, whether it is used in packaging materials, food trays, or a wide variety of other products.

Styrene is the primary raw material from which polystyrene is made. First commercially produced in the 1930s, it played an important role during the Second World War in the production of synthetic rubber. After the war, much of the use of styrene shifted to the manufacture of commercial polystyrene products.

Polystyrene's high volume and low weight, while beneficial to product packaging (e.g. in the form of foam 'peanuts'), have traditionally given it a low scrap value for recycling. Despite this challenge, however, innovative technologies have made the recycling of EPS possible—and, indeed, economically viable in such applications as EPS protective packaging or cushioning.

Win-win

The direct benefit to Grace of using scrap EPS is saving money without sacrificing quality. Previously, most of the company's suppliers had to pay to send polystyrene to a landfill. Now, Grace typically pays the freight to have the material delivered to its plants

in Santa Ana, Calif., and Irondale, Ala. Polystyrene's low weight—it's approximately 95 percent air—keeps shipping costs low.

Using a proprietary process pioneered by in-house engineers, Grace has recycled EPS at these two plants since 1997. Post-industrial rather than 'virgin' EPS avoids the production of some emissions, while retaining the same level of polymer performance. The density of the material is a critical factor and the majority

of available scrap EPS falls within this acceptance criteria.

Monokote's main ingredient is gypsum, one of the most widely used construction materials. Commonly found in wallboard and plaster in homes and offices, it provides strength, durability, and thermal resistance. The shredded EPS adds volume to products like gypsum board while reducing its weight, and helps improve speed and efficiency of installation.

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EPS Insulation Life Cycle Study Shows Environmental Benefits



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EPSMA commissioned Franklin Associates, an independent consulting service known for its work in solid waste management and life cycle assessment, to conduct a life cycle impact assessment on EPS wall insulation. The Franklin study quantifies the energy use and emissions associated with EPS foam production and compares these with the savings in energy and greenhouse gas that result from the added R-value of the foam during the life of a building. Franklin used data from the U.S. Life Cycle Index (LCI) Database and data collected from the EPS manufacturing industry. The thermal performance evaluation of the homes was based on R-value data from Oakridge National Laboratories. Homes were evaluated in all climate zones in the U.S. and Canada.

The life cycle assessment looked at the energy and resources used during the extraction, manufacturing, processing, delivery, use and disposal of EPS insulation, and the greenhouse gas emissions produced throughout the process. This is particularly important in the area of construction, as buildings are responsible for 40% of all greenhouse gas emissions. The energy and greenhouse gas savings were determined by comparing the heating and cooling energy requirements for the modeled home with added EPS insulation to a similar structure without added insulation. This provides the 'net' footprint or the environmental payback that is achieved by using increased insulation.

The study proved that when EPS insulation was added to the exterior walls, using R-4 and R-6 foam, the energy payback periods in Canada are less than one year in all Provinces. In the U.S., the energy payback time for R-4 insulation is less than two years with shorter payback times in colder regions. R-6 payback times for energy are slightly longer but ultimately result in higher energy savings over the life of the building. These energy values directly correlate to the resulting greenhouse gas reductions.

EPS insulation can return up to 200 times the amount of energy required to produce it and reduce emissions by up to 100 times the amount produced during the manufacturing process. The life cycle study concluded the savings from adding EPS insulation are not only substantial but also rapid, providing a 100% payback in all of North America in less than two years.

According to the U.S. Department of Energy, heating and cooling account for 50 to 70% of the energy used in the average American home, and inadequate insulation and air leakage are the leading causes of energy waste in most homes. While ongoing research is aiming to identify renewable energy options, immediate green house gas reductions and efficiency upgrades can be achieved with added insulation, and most importantly, adding insulation allows homeowners to take action now.

The exceptional performance of EPS insulation offers the construction industry a way to achieve new energy efficiency goals while providing an environmentally responsible choice when selecting EPS to insulate their buildings.

A new brochure, "Expanded Polystyrene Reduces Global Warming", was developed to provide an overview of the information in the life cycle study. Designed specifically for architects and specifiers, the brochure is an environmental profile analysis that characterizes the long-term benefits of EPS insulation in a condensed format ■



The "Expanded Polystyrene Reduces Global Warming" brochure is available on the EPSMA website, <http://www.epsmolders.org>, or by calling the Association at 800-607-3772.



“Green” Stimulus Bill

Includes Tax Credit for Insulation

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The new tax credits reinforce the message that retrofitting the nation’s older homes is the best way to reduce overall energy consumption. A 2008 California study showed that homes built before 1983 produce 70% of the greenhouse gas emissions related to single-family envelope energy consumption. Retrofitting existing homes with energy-efficient features is four to eight times more carbon- and cost-efficient than adding additional energy efficiency requirements to new houses.

Consumer Tax Credits

ARRA extends consumer tax benefits through 2010; triples the available tax credit from \$500 to \$1,500; and increases the tax credit to 30 percent of the cost of each qualified energy efficiency improvement installed. Beginning in 2009, homeowners can get an income tax credit for installing energy-efficient windows, insulation, doors, roofs and/or heating and cooling equipment. There is a total lifetime cap on the tax credit amount of \$1,500; thus the credit applies to up to \$5,000 in total costs.

The overall \$1,500 cap can be reached in several ways with the purchase and installation of energy-efficient products (materials only, labor may not be included) that meet certain efficiency criteria:

- Exterior windows: Includes skylights and storm windows.
- Insulation, exterior doors, or roofs. Insulation must meet International Energy Conservation Code (IECC) standards (see sidebar) .
- Central air conditioner, heat pump, furnace, boiler, water heater.

Insulation installed between January 1, 2009 and February 17, 2009 must meet the 2001 or 2004 International Energy Conservation Code (IECC), and insulation installed between February 18, 2009 and December 31, 2010 must meet the 2009 International Energy Conservation Code. Required insulation levels will vary by region and existing insulation already installed in a home counts toward the total level. For insulation to qualify, its primary purpose must be to insulate (example: insulated siding does not qualify).

To be eligible for the federal tax credits

- Windows, doors, insulation, and roofs must be expected to last at least five years (a two-year warranty is sufficient to demonstrate this).
- Manufacturers need to certify (in product labeling or on the company’s web site) which of their products qualify for the tax credit.

Be sure to check for state incentives for energy efficiency in addition to the federal credits.

Adding insulation to an existing structure is one of the easiest ways to achieve energy savings. In the U.S., Department of Energy figures show that homes consume 21% of all energy used, more than cars or planes or commercial buildings, and that heating and cooling account for 50 to 70% of the energy used in American homes. However, homes commonly waste 30% of the energy they use. About one-third of that energy loss could be stopped by preventing air leaks, simply by caulking and insulating.

The U.S. Department of Energy’s Weatherization Assistance Program will provide more than \$453 million to states, helping to weatherize more than 165,000 homes, lower energy costs for low-income families and create green jobs across the country. Weatherization projects, available to families making up to 200% of the federal poverty level – about \$44,000 for a family of four – will allow low-income families to save money, an average of 32% in heating bills, by making homes more energy efficient. States will spend approximately \$6,500 to weatherize each home.

Regarding spending in the public sector, funds are targeted at the federal, state and local levels. While the funds are initially targeted to improve government owned infrastructure and buildings, the private sector will need to provide the labor, technical, and manufacturing base for implementation. For federal agencies, considerable funds will be provided to retrofit and upgrade existing facilities to meet energy use requirements placed on federal agencies and alleviate maintenance backlogs.

Building Sector Credits

Of particular interest to the engineering and construction industry, ARRA would delay until 2012 a provision set to begin in 2011 that would require federal, state and local governments to withhold 3% of all payments for goods and services to ensure proper taxes are paid.

ARRA extended through 2009 provisions allowing a business' capital expenditures to depreciate faster by permitting the immediate write-off of fifty percent of the cost of depreciable property (e.g., equipment, tractors, wind turbines, solar panels, and computers).

For more information on the American Recovery and Reinvestment Act of 2009:

Energy Star, <http://www.energystar.gov/taxcredits>, has an excellent summary of the federal tax credits, including consumer information and tax credits for home builders and commercial buildings.

Summary information also is available from The Tax Incentives Assistance Project (TIAP) at <http://www.energytaxincentives.org> and the Alliance to Save Energy, <http://www.ase.org>.

A credit of \$2,000 is available to home builders who build homes (both site-built and manufactured) projected to save at least 50% of the heating and cooling energy of a comparable home that meets 2003 IECC standards. Building envelope improvements must account for 1/5th of the 50% energy savings. A \$1,000 credit is available to manufactured home producers for models that save 30% or qualify for the Energy Star Homes Program. These credits are available for buildings placed in service from January 1, 2006 through December 31, 2009.

More information about the tax credits is available from the Internal Revenue Service. See Fact Sheet 2009-10, Energy Provisions of the American Recovery and Reinvestment Act of 2009, at <http://www.irs.gov/newsroom/article/0,,id=206871,00.html>

Details of the Small Business Administration's Business Stabilization Program will be posted on the SBA website, www.sba.gov as soon as program details are finalized. A listing to help companies determine if they meet SBA size requirements is available, at <http://www.sba.gov/contractingopportunities/officials/size/index.html>

Small Business Provisions

As part of the stimulus bill, the U.S. Small Business Administration (SBA) was charged with creating the Business Stabilization Program. This program will provide small business loans up to \$35,000 to be applied against existing debt resulting from bank-issued loans. A small business that receives a stabilization loan can use the money to make payments on pre-existing loans for up to six months and the stabilization loan, essentially interest-free, will not be due for one year following disbursement of funds (must be fully repaid in five years) ■

[contractingopportunities/officials/size/index.html](http://www.sba.gov/contractingopportunities/officials/size/index.html)

The American Chemistry Council created a short video explaining how the stimulus funding works for builders, architects and company owners. The video explains which websites have specific information, where builders can register and find out what is available. Go to the ACC's Green Building Solutions website, www.greenbuildingsolutions.org to see the video.

THE CUTTING EDGE

Architects and designers are uniquely positioned to have an enormous positive impact, not only on their individual projects, but on shaping their clients' thinking around sustainability. While the economic portion of the triple bottom line remains tangible, the ecological and societal values are often more abstract in nature. This is where education and awareness are really vital.

In this issue of EPS Newsline "Recycling Polystyrene for Construction Materials" (page 2) explores creative solutions that maximize resource efficiency through recycling. While recycling is one part of the equation, manufacturing emissions and other *unseen* environmental impacts can be more difficult to quantify. While information is the basic starting point for any endeavor, action is the key. To help make a positive change for sustainability, here are some basic guidelines to start the process:

1. Educate yourself, educate others.
2. Beware of the simple answer.
3. Choose partners, not products.
4. Make wise material choices.
5. Don't assume it costs more.

While awareness of sustainable building is growing, many still don't know quite what that means. Helping to put things in perspective can be as easy as offering an example, which is the main thrust of our lead story, "EPS Insulation Life Cycle" (page 1), which showcases an indepth research project that highlights the intangibles of life cycle analysis to help envision the potential outcomes dealing with the unseen elements of sustainability.

Betsy Steiner
Executive Director

Kemper House

Demonstrates EPS Wall Panels Save Energy and Installation Time



While the use of expanded polystyrene (EPS) in construction has been fueled by the residential market for decades, the incorporation of insulation system panels into commercial structures is gaining momentum. As design professionals attempt to respond to building requirements for energy efficient design, lower operating expenses and rapid construction, the engineered panelized approach creates economies of scale.

The Kemper House, a residential Alzheimer and dementia care facility in Mentor, Ohio, shows the value of EPS insulated wall panels. The Mentor facility opened in 2002. Owned by Betty Kemper, the two-story facility has a front porch, grand staircase and living areas designed to provide residents with a comfortable, residential environment. A 15,600 square foot addition was made to the assisted living facility while occupied.

The expansion, begun in November 2007, needed to blend with the existing structure, to allow for alternative future uses and to be constructed without disturbing the operation of the facility. Kemper selected a general contractor familiar with emerging energy-efficient building methods. The new section needed to conform to existing design while meeting new code and handicap requirements. Insulation system panels adapt to various architectural styles.

The biggest challenge for the construction crew was working through the cold and wet winter months. The building design allowed installation of the building shell, walls and roof system first so a controlled work environment could be managed with heaters. The entire addition was framed in just three days.

The rigid EPS wall panels eliminated drafts and provided a more consistent, controllable temperature. The use of steel structural elements eliminated problems with warping, twisting, moisture content and waste associated with conventional wood framing.

Joe Westfall, vice president of sales and marketing for Green-Source Products LLC, says the construction team was surprised by how quickly and easily the wall panels were installed. Green-Source's proprietary tradename High Performance Green Building

System™ (HPGBS) product is a light-gauge galvanized metal wall and roof framing system that integrates the strength and rigidity of traditional steel framing with the ultra-efficient, rigid insulation characteristics of EPS. HPGBS walls can contribute to LEED Certification and its use may help qualify for tax incentives and special funding.

At the Kemper House, the exterior load-bearing wall panel had an R-30 insulation value and was designed to structurally support a large truss roof system. The high R-values from the use of EPS reduces HVAC system requirements as well as air leaks, allowing for a more even temperature of the building and ultimately contributing to the overall comfort of occupants. With the addition, the owners' utility costs increased less than 30%.

Another EPS systems panel project currently in design is an 80,000 square-foot, two-story medical office building in northeast Ohio. The building, slated for construction this fall, is being designed and built to a LEED® Silver certified level. An independent energy waste specialist hired to perform an energy analysis determined the use of EPS insulated panels along with high efficiency windows, doors and HVAC system will reduce monthly utility costs by 81% or from \$6,511 per month to \$1,482 per month versus traditional construction.

These wall panels are fully engineered and pre-assembled in sections up to 40'. They are delivered to the construction site with factory-cut and framed window and door openings, as well as pre-routed electrical and plumbing chases. This pre-production allows for exceptionally fast and easy installation on site and has gained advocates in the hospitality, healthcare and retail markets.

With predictable and proven results, engineered EPS wall panels will be a leading player in the next generation of energy-efficient commercial construction ■

The expanded polystyrene insulation used to make Green-Source HPGBS® panels is manufactured by Cellofoam North America, a founding member of the EPS Molders Association.



Preventive Insecticide for EPS Building Materials

EPS materials used in an energy efficient house – exterior walls, Insulated Concrete Forms (ICFs), Structural Insulation Panels (SIPs) and foundations at or below grade – can be termite safe.

Termite prevention is the key goal when installing below grade or slab insulation, especially where a visual inspection of the foundation is not possible. Expanded polystyrene (EPS) foam insulation around or beneath building foundations can provide hidden entryways that cannot be detected by inspection. The most effective method of eliminating termites is treating the EPS with a preventative insecticide during the manufacturing process.

An EPSMA member, LANXESS Corporation, has developed an effective, new treatment method using PREVENTOL[®]™ Preservative Insecticide. This product is supplied in a powder form and contains 98% imidacloprid, a neonicotinyl pesticide that has been used successfully for long-term protection of wood against damage by termites and other wood boring insects. Imidacloprid is rated in the EPA's 2005 Carcinogen Risk Assessment Guidelines as group "E," which indicates no evidence of carcinogenicity for humans. The product is safe to handle by EPS manufacturers and insulation installers.

PREVENTOL[®]™ insecticide is a systemic insecticide which acts on

the termite's central nervous system and kills the insect instead of simply repelling it. It is safe, easy to use and effective at low concentrations (100 – 500 ppm). The low concentration required for effective termite control is easily incorporated into the EPS manufacturing process. Added prior to or during the expansion process, the powder coats individual polystyrene beads and is evenly distributed throughout the polystyrene matrix. The insecticide surrounds each bead with a layer of protection. EPS insulation treated with this insecticide requires no special handling or labeling.

LANXESS Corporation has completed laboratory and field testing of PREVENTOL[®]™ insecticide to show

compliance with ICC-ES AC 239, Acceptance Criteria for Termite-Resistant Plastics. Compliance with this criteria is necessary for use of foam below-ground in "very heavy" termite areas as defined by the U. S. Building Code.

As insulation markets continue to grow, termite resistance is yet another benefit EPS offers the built environment. The EPS industry is constantly working to find new methods to protect structures from termites and other destructive insects. Adding PREVENTOL[®]™ insecticide during the manufacturing process is one way to insure EPS insulation's high R-Value and integrity over the years.

Recycling Polystyrene continued from page 2

The net result of this recycling is win-win: the industrial suppliers no longer have to pay to send scrap EPS to a landfill; and it costs less for Grace to use than virgin material.

Building Success

Monokote spray-applied cementitious insulation is specified by architects and used by applicators to protect a building's structural steel from failure in the event of fire. It can be found in all types of buildings, including high-rise towers, manufacturing facilities, schools, hospitals, and sports facilities.

For example, it was used in the 48-story Condé Nast Building in New York, N.Y., which incorporated sustainable construction practices and materials, with a focus on durability, performance, and occupational health and safety.

The architects selected materials with a preference for those that contained the maximum percentage of recycled content and low-to-zero volatile organic compounds (VOCs), while avoiding those that could be harmful to workers' health or the environment. Given its performance characteristics and high level of recycled content, Monokote MK-6 met or exceeded the environmental performance guidelines for the Condé Nast Building.

Good News

As mentioned, Grace began using scrap EPS around 1997. In the last five years alone, the plants in Irondale and Santa Ana have used more than 20 million pounds of it.

Statistics published in 2006 showed EPS had achieved a 19.3 percent recycling rate for U.S. post-consumer and post-commercial applications of EPS packaging.

The other good news is the amount of scrap has been steadily decreasing over the last few years. Manufacturers have been able to improve their processes to reuse more scrap internally. This has made it challenging to meet the demand at plants, but as more scrap is now used in virgin board, material costs have gone down, as well ■

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For more information, visit Grace Construction Products at www.graceconstruction.com and the American Chemistry Council Green Building Solutions at www.greenbuildingsolutions.org

EPS Member Companies

AFM Corporation
 Alamo Foam, A Division of HFP
 Arrron, Inc.
 ARXX Corporation
 BASF Corporation
 Beaver Plastics Ltd.
 Cellofoam North America, Inc.
 Comel S.N.C. Di Aldo Beccarao & C.
 Concrete Block Insulating Systems, Inc.
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 Progressive Foam Technologies
 Quad-Lock Building Systems Ltd.
 Reward Wall Systems
 StyroChem
 Styro-Tek of Alabama, A Division of
 Superior Metal Products Co., Inc.
 The PCF Group
 Tri State Foam Products, Inc.
 TRUEFOAM Limited

Industry News



More than 200 EPS molders and equipment manufacturers attended EPS EXPO 2009 in Milwaukee March 25-27. The keynote address by Ralph Avallone, president of the International Green Energy Council (IGEC), shown, right, with David Bolland, president of the EPSMA Board of Directors and president of Plymouth Foam, Inc. IGEC is an international non-profit comprised of individuals and companies that promote sustainable forms of energy production. Avallone's presentation focused on energy efficient building materials and practices, green energy sources, sustainable design practices and the importance of jobs development in this field.



Each year one individual is honored at EPS EXPO for outstanding work on behalf of the Association as the recipient of the Roberts Service Award. This year the award was presented to Jim Whalen, chair of EPSMA's Technical Committee. Whalen, left, is shown with EPSMA Board Member Bruce Carruthers, president of PFB Corporation. Whalen, with PFB since 1992, is a professional engineer, registered in Alberta, BC, Manitoba, Ontario. In addition to his work at EPSMA, he is active in the American National Standards Institute, the Underwriters Laboratory of Canada, Construction Specifications Canada, Construction Specifications Institute in the US, ICC-ES and is chair of ASTM C578 committee.

EPS

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