

A SUCCESS STORY

The EPDM industry makes progress with recycling

by George Evanko



Recycling has entered a number of construction sectors during the past decade, and the roofing industry is certainly one of them. Most construction sectors have taken the first step and developed a way to recycle materials. But the real test is making a recycling process available on a wide scale and within reasonable expectations of cost efficiency to create a viable, ongoing recycling network.

Those involved with the ongoing project to recycle EPDM roof membranes successfully have reached this stage. After launching a recycling initiative in 2006, the EPDM Roofing Association (ERA) with Firestone Building Products Co. LLC, Indianapolis, and Carlisle SynTec Inc., Carlisle, Pa., has seen its recycling project expand from the pilot phase to the point where nearly 5 million square feet of post-consumer EPDM roof membranes have been recycled during the past three years, making it the leading recycled low-slope roof membrane material in North America. In all, roughly 1.25 million pounds of reclaimed EPDM membrane have been diverted from landfills.

With the active participation of roofing professionals throughout the U.S. and portions of Canada, recycling EPDM roof membranes has moved from the “potential” stage to a cost-efficient, environmentally sound reality.

Steps to success

There are several factors driving the success of recycling EPDM materials, a key one being market conditions. According to ERA members, the forecast for new commercial construction looks mixed, at best, for much of 2010, which places greater emphasis on reroofing projects. ERA members say more buildings are undergoing renovation in lieu of new construction, and roof system removal and replacement is occurring more often than during the previous decade.

As a result, greater quantities of roofing materials are being removed and are either headed for a landfill or a new life through recycling.

In addition, the roofing industry is facing higher expectations for practicing green building principles. Those expectations are driven by issues such as sustainability and economics, specifically energy conservation, a decline in available landfill space in some parts of the U.S. and rising disposal costs.

The Environmental Protection Agency (EPA) estimates 40 percent of total landfill waste comes from construction and demolition debris—one-quarter of which is generated by roofing materials. Although overall landfill space is plentiful nationwide, some areas are facing critical capacity issues and have seen disposal costs escalate, specifically the heavily populated East Coast.

As roofing professionals address these expectations for “greener building,” they also are developing a more sophisticated understanding of roof systems’ energy efficiency and overall embodied energy and placing greater emphasis on roofing materials’ life-cycle assessment.

Finally, and most important, a proven infrastructure now exists that simplifies the process and makes recycling economically viable for roofing contractors and building owners. This is a crucial development if the recycling process is to reach the next level where there is a steady flow

of recyclable materials, interested parties capable of removing and recycling them, and other companies ready to make use of the recycled materials in new products.

The initiative

ERA’s leaders envisioned such a scenario when they launched a recycling initiative in 2006 to determine the possibilities of recycling used, in-place EPDM roof membranes. Several pilot projects were executed to help better understand the feasibility and logistical process involved. This resulted in the removal, transportation and recycling of about 1 million square feet of EPDM membranes by the end of 2007.

As the EPDM recycling initiative entered 2008, the program expanded and gained greater viability. This came about because of contractors’ increased involvement as more accepted the concept. One key incentive developed when many contractors discovered recycling EPDM membranes allowed them to achieve lower (or neutral) disposal costs while increasing environmental benefits. ERA also has seen architects and roof consultants specifying that removed materials be recycled, as well as owners, property managers and building managers requiring it.

The program took a major step forward with the formation of ERA’s Recycling Council, which is composed of ERA affiliate members. ERA affiliate members are companies, corporations or other forms of enterprise not eligible for regular or associate membership in ERA. These organizations are engaged in any aspect of the business of recycling EPDM or other single-ply roof membranes. The first two affiliate members, Nationwide Foam Inc., Framingham, Mass., and West Development Group (WDG), LaGrange, Ohio, enabled the program to make significant progress in 2009 in terms of national scope and cost efficiency.

Nationwide Foam is the U.S.’ largest foam insulation board recycler and operates

on a national scale, collecting and hauling roofing materials from low-slope roof system repair and replacement projects of all sizes. Through its nationwide network, Nationwide Foam has created an easy-to-use EPDM recycling program that has been used in 48 U.S. states and several provinces in southern Canada.

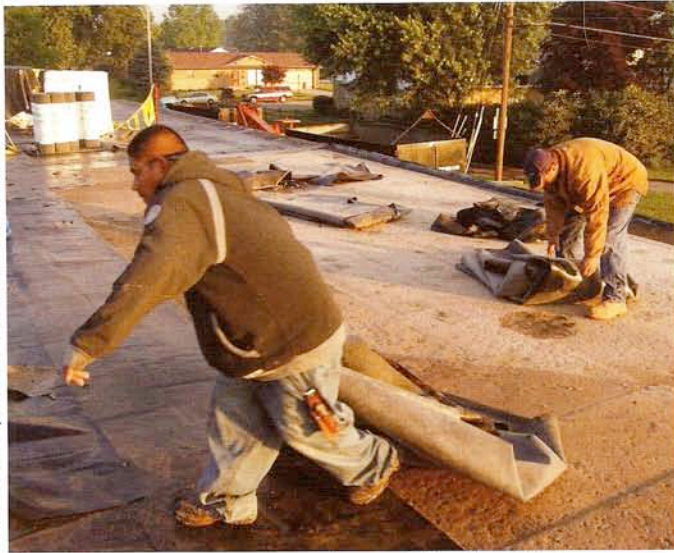
WDG uses recycled EPDM material to add ultraviolet stability to enhance the physical properties of its silicone roof coating products. WDG processes the material and blends it into solvent-free silicone coatings for new roofing projects.

At WDG’s facility in LaGrange, 5- by 5-foot sheets of EPDM membrane are sheared and ground into crumb rubber ranging in size from $\frac{1}{4}$ of an inch to 100 micron (140 mesh) cryogenically ground EPDM. The company grinds about 1,200 pounds of EPDM membranes per hour using an environmentally friendly process that produces zero waste and retains all EPDM’s physical properties.

The company developed a formula for producing an Underwriters Laboratories Inc.-rated silicone roof coating and polyurethane roof and waterproofing coatings with 20 percent recycled EPDM. EPDM’s physical properties serve to strengthen and enhance the physical properties of the silicone top coat and eliminate the need for petroleum-based solvents.

WDG estimates it has recycled about 1 million pounds of EPDM membrane and used it for various products or stored it. Its mill has the capacity to recycle about 5 million pounds, or 20 to 25 million square feet, of EPDM membrane annually. Given that EPA estimates more than 1 billion square feet of EPDM membranes are removed from roofs every year (the equivalent of 33,000 40-yard trash bins or more than 120,000 full-size cars), there clearly is enough product to meet WDG’s capacity, as well as that of other potential partners in the recycling process.

Working independently and with each other, Nationwide Foam and WDG are



Workers remove EPDM membrane from a ballasted roof system.



EPDM membrane pieces before they are transported to a grinding facility

able to respond to virtually all queries from interested parties and provide at least one end use for the recycled material—two key criteria for a successful recycling program.

The process

ERA's recycling program is available for low-slope ballasted and mechanically attached nonreinforced EPDM membranes. It offers job-site collection and transportation directly to a recycling center. One benefit of working with ERA affiliate members is these companies also collect and recycle polyisocyanurate, expanded polystyrene, extruded polystyrene and composite board foam insulation, as well as concrete roof pavers, all of which are

sent to other markets for reuse.

Roofing contractors need no special equipment to recycle EPDM and foam insulation. In many cases, same-day cost estimates are available for contractors to determine the financial viability of recycling as is flexible scheduling to determine the most effective logistics to collect and haul away EPDM membranes.

To prepare an EPDM membrane for pick up, crews will need to remove ballast, sweep the roof surface clean and then cut the EPDM membrane into sections large enough to be loaded onto pallets, avoiding any fasteners, lap seams, base flashing

and areas where bonding adhesive was used (these portions of the membrane will be sent to a landfill). After cutting, the next step is to fold the sections into bundles, stack them and set them aside for transportation to a grinding facility.

During the course of the past two years, participants in ERA's recycling program have determined recycling EPDM membranes is a less expensive option than disposal more than 80 percent of the time. Some contractors have learned recycling EPDM membranes, along with insulation, offers up to 30 percent cost savings compared with traditional disposal. They also have concluded recycling is a viable option for any project larger than 250 to 300 squares.

One additional fact to keep in mind: Even ballast often can be reused in non-roofing applications, adding to the environmental benefits of recycling EPDM membranes.

The demand

Although it is nice to believe all recycling efforts simply are because of the increased level of consciousness of roofing professionals and their customers, in many cases, recycling has (or will soon) become mandatory.

For example, Wisconsin announced all EPDM roof membranes and insulation removed from state buildings must be recycled. In addition, the Denver Public Schools system specifies all materials removed during reroofing projects be recycled. Nationwide Foam has been a partner on 11 reroofing projects involving Denver schools, keeping 20 tons of EPDM membrane and insulation out of nearby landfills. And Chicago requires 50 percent of all construction debris be recycled.

Many cities also require new building construction and major renovations achieve specific LEED® rating levels. LEED points can be earned for waste diversion and recycling; to gain those points, roofing contractors need to institute well-documented waste management plans for all construction and demolition debris.

One pleasant side effect of the institution of these regulatory mandates is more building owners are adding recycling to their specifications for contracts. For example, when *The Columbus Dispatch* needed to replace the roof system on its warehouse in Columbus, Ohio, its director of engineering and maintenance hired WDG to recycle the existing EPDM membrane.

WDG retrieved the 42,000-square-foot EPDM membrane and cryogenically ground it into functional fillers used to enhance the physical properties of its roofing products. The existing stone ballast on the roof was used to create parking lots for youth

athletic fields. This meant 96 percent of the roof system was recycled and diverted from the local landfill.

These efforts resulted in the newspaper receiving the Solid Waste Authority of Central Ohio's 2009 Emerald Award for Environmental Leadership. The prestigious annual award highlights the best green practices of central Ohio businesses, nonprofits, schools and individuals.

Replacing materials

Just as a new mindset was needed to understand the possibilities for recycling roofing materials such as EPDM and insulation, a different way of thinking has evolved regarding the potential for creating an energy-efficient roof system. With oil, natural gas and coal prices high, increasing and often unstable, building owners have been working to keep them in check, in part, through the use of energy-efficient building insulation materials.

In many cases during the past decade, the effort to achieve energy efficiency has focused on cool roofing where light-colored materials, such as TPO, are used to reflect sunlight and solar energy away from a building, keeping the building cooler.

Certainly, numerous studies have shown reflective roofing can reduce a building's air conditioning-related energy consumption. But these studies also show these energy savings most often occur in climates where cooling degree days outnumber heating degree days and air conditioning is more prevalent than heating.

When considering all the data, it becomes clear geographic location, insulation amounts, building type and configuration are key factors to consider when determining which roof system to use.

Reflective roofing materials and darker materials such as EPDM, when designed correctly, can be viable roofing solutions. The choice should be based on what is

best for the needs of a particular project.

The next step in considering a roof system's environmental performance is the life cycle of the materials being used. In its simplest form, a life-cycle analysis will consider how long a product lasts, how much it costs and how to compare that data with similar information for other products.

Life-cycle analysis is best defined as a scientific approach to evaluating a product's environmental effects from a "cradle-to-grave" approach throughout the product's life span. This process will track a product's effects from the initial extraction of its raw materials to the final recycling of the materials into new products.

This approach places great importance and value on recycling. It now means recycling a material such as EPDM not only removes a significant amount of the material from landfills, it meets many municipalities' regulatory mandates and perhaps earns credits for rating systems such as LEED. It also will change the life-cycle analysis of these products and give credibility to their environmental performance.




An EPDM membrane is ground at Midwest Elastomers Inc.'s grinding facility in Wapakoneta, Ohio.




An EPDM membrane following the grinding process

Continued growth

With more than 20 billion square feet installed as part of more than 500,000 warranted roof system installations, the EPDM recycling program will grow as even these materials reach the point of replacement. This growth will offer an opportunity for broad, national participation from all roofing professionals as ERA and its partners continue to research and expand end-use applications of recycled materials.

ERA is seeking additional companies interested in participating in the EPDM recycling program. To find out more, visit www.epdmroofs.org. 

George Evanko is ERA's director of communications.

 For links to another article about EPDM recycling as well as facts about recycling, log on to www.professionalroofing.net.