According to the Crofton, Md.-based Alliance of Foam Packaging Recyclers (AFPR), expanded polystyrene (EPS) makes up a small fraction of the solid waste stream at seven-tenths of 1 percent. However, thanks to its bulky nature and ubiquitous use in packaging for a range of products from consumer electronics to dinnerware, it can seem more pervasive.

EPS is the generic name for the rigid material made by expanding polystyrene beads with steam and pressure to bond form blocks or other molded shapes. EPS is also used in the construction industry for insulation and void fill. Those outside of the industry often mistakenly refer to the material as “Styrofoam,” a registered trademark belonging to Dow Chemical Co. for a closed-cell extruded polystyrene product. Styrofoam is commonly used in construction applications as insulation in walls, floors and roofing. Dow also markets the material for use in craft and floral applications.

Betsy Steiner, executive director of the Alliance of Foam Packaging Recyclers, says 71.3 million pounds of EPS were collected for recycling in 2010. This figure represents post-consumer, post-commercial and post-industrial material. The recycling rate is up slightly from 2008, when 69.4 million pounds of EPS were recovered for recycling.

Steiner credits this increase to a growing number of programs that are helping to divert the material to recyclers, such as a Sanofi Pasteur and Helios Biosciences initiative to implement pre-paid return shipping recycling programs for the biomedical coolers. Walmart also has implemented a closed-loop EPS recycling program. From its distribution centers, the company collects EPS, which is being used to create picture frames for sale exclusively in U.S. Walmart stores, she says.

**THE BOX AND BEYOND**

“The biomedical coolers are a unique application,” Steiner says, “because there is no outer packaging.” The research hospitals and veterinary clinics who receive shipments of medication in these coolers simply use the pre-paid shipping label to return the coolers. She says it’s not uncommon for four to five trailer loads of the returned coolers to arrive daily six days per week at participating recycling locations.

In Walmart’s program, the company works with special-needs employers that are located near their distribution centers, Steiner says. These special-needs workplaces house densifying equipment. EPS material collected at the retailer’s distribution centers is processed at these partner locations before being shipped to a company that re-extrudes the EPS to form picture frames, which are then sold back to Walmart.

For residential consumers, the AFPR offers a mail-back program designed to allow anyone with smaller quantities of EPS packaging access to recycling.
transport packaging and loose-fill packaging is used to manufacture new EPS. AFPR, nearly 50 percent of the EPS collected is recycled into new packaging. Currently, according to the AFPR’s website, shipping fees range from $1.50 to $9, depending on total packaging weight and volume. “Since expanded polystyrene is extremely lightweight (98 percent air) it can be economically shipped to a regional location,” the group says.

The AFPR also offers a list of drop-off locations that accept EPS for recycling at www.epspackaging.org/images/stories/Drop_Off_Locations411.pdf.

EPS packaging collected through these programs is recycled into new packaging.

These programs have proven more successful than curbside collection programs, Steiner says. “In the ’90s a lot of communities tried to capture this material in the blue box, but they were unsuccessful,” she says, noting that the EPS material tended to be highly contaminated. In addition, insufficient volume also was a problem, making it economically unviable, Steiner says.

A number of communities, including Los Angeles, recently began collecting EPS at the curbside. Steiner says she was opposed to curbside collection of the material, recalling the problems of the ’90s. “I’m glad to say I was proven wrong,” she says. “In areas where there is a need and enough support from the community and industry, it can work.”

Steiner cautions that because of contamination and cleanliness issues material collected through curbside programs may not be suitable for all end markets, which can include aggregate applications, interior trim, packaging and rigid durable packaging, such as CD cases.

SOUND ECONOMICS

“EPS recycling keeps increasing because it is not built on false economics,” Steiner says. “It is evolving at a sustainable rate.”

She notes that demand for EPS feedstock exists, but adds that many consumers, such as Apple and Microsoft, do not specify recycled content in their packaging. Currently, according to the AFPR, nearly 50 percent of the EPS collected is used to manufacture new EPS transport packaging and loose-fill packaging. The association says new EPS packaging can incorporate from 5 to 15 percent recycled content using a regrind process.

Steinert says Rapac Inc., Oakland, Tenn., has developed EPS with 50 percent recycled content, however the molding community is still learning how to use the material.

“There is a diverse model in terms of EPS recycling technologies available,” she adds, citing regind, densification and re-extrusion and aggregate applications. “All could consume more material.”

A recycling initiative based out of Canada can help companies collect EPS packaging for recycling by offering the necessary equipment as well as a ready consumer.

AN END-TO-END SOLUTION

Two Canadian companies have partnered on a recycling initiative designed to recycle Styrofoam trimmings and rejects. Foam packaging material also can be recycled using the equipment. EPS Molders Inc., Edmonton, Alberta, and Waste Reduction & Recycling Consultants Inc., Alberta Beach, Alberta, are providing what they describe as a “closed-loop Styrofoam recycling solution” that includes electro-thermal densifier equipment, manufactured by Pan Chemical Co., and in-house commodity marketing support services. EPS Molders has been recycling the material for the last five years, according to Jim Donaldson of Waste Reduction & Recycling Consultants.

EPS Molders specializes in designing and manufacturing Styrofoam foundations for building systems that are produced by its sister company, Polycore Canada, that integrate Styrofoam with standard steel building studs.

The process uses an electro-thermal densifier to compact expanded polystyrene (EPS) and expanded polypropylene (EPP) foam by a 50:1 ratio, Donaldson says, which is ready for cost-effective shipment for remanufacturing. The material must be sorted by commodity type prior to densifying.

The program also has established a commodity value for the material. According to Donaldson, the material has averaged a price of $330 per metric ton in the last five years and is currently valued at $430 per metric ton.

“The electro-thermal melt is shipped to our sister company in Japan, where they regound and extrude the electro-thermal melt into new rigid plastic parts and components for companies such as Toyota, Honda, Nissan, Suzuki, Mazda, Mitsubishi, Kawasaki, Yamaha, Toshiba, Canon, Fujiitsu, Hitachi, Nikon, Nintendo, Panasonic, Sharp and Sony, to name a few,” he says.

Jim Ripley and his company Turtle Tanks, Colonna, British Columbia, installs septic tank systems that use recycled expanded polystyrene (EPS) as a drainage material.

Ripley was one of two presenters at a session titled “Recycling as a Business Opportunity,” presented at the third MiaGreen Expo & Conference, held in March in Miami Beach.

Ripley said EPS was “an unexpected form” of drain rock material and that Turtle Tanks “had to prove it would work” to regulators.

The company collects scrap EPS from several sources, including a nearby 15,000-student university campus that generates a healthy amount of discarded EPS from the computers and accessories it buys.

The material is processed through a dual-shaft shredder to a drainage rock size and shipped in bags. The company also offers it to contractors or others seeking drainage material under the name PolyRock. Ripley said PolyRock could be manufactured for $13 per cubic yard—considerably less than the $46 per cubic yard cost of drainage rock in British Columbia.

Ripley has not patented the process and instead encourages other recyclers or drainage system installers to borrow the company’s idea.


– Brian Taylor
EPS Molders and Waste Reduction & Recycling Consultants offer the densifier for sale or lease throughout North America. Under the companies' distribution agreement, all of the densified material becomes the property of EPS Molders and its third-party manufacturing partners, Donaldson says. EPS Molders also manages related shipping, payments and equipment warranty service issues, he adds.

The densifier, which can be used as either a mobile or stationary unit, costs roughly $70,000. Companies incorporating this technology will receive a payment for the material they ship for recycling as well as a tipping/processing fee that ranges from $5 per bag (about 2.5 cubic yards) for pickup truck loads to $275 per tractor-trailer load (about 140 cubic yards), Donaldson says.

Mark Cunningham, president of EPS Molders and Polycore Recycling, told the Edmonton Journal in December 2010 that the return on investment for the densifier is about one year, thanks to the guaranteed buyer.

Donaldson sees virtually no limit to where the program can be deployed. “As we create the emerging North American closed-loop Styrofoam recycling industry, the Styrofoam recycling facilitators will range from manufacturers to distribution centers to material recovery facilities to landfill sites to transfer stations to postal facilities to airport railway cargo secondary commodities and to destroying data, the shredding system also ensures thorough product destruction when that service is requested, such as in the case of returned products.

Synergy also has sought process-control and marketing advantages through certification. (See the sidebar “Certified Success,” on page 45.)

Investing in a high-volume processing system and obtaining certifications positions Synergy to remain competitive in what Clayton sees as a consolidating market.

“Until recently the electronics recycling industry has been characterized by startup, entrepreneurial companies and very low barriers to entry,” Clayton observes. “People could get started with a box truck and a warehouse. That is changing rapidly, though, and we expect to see consolidation and greater sophistication among the largest electronics recyclers.”

Not only does Synergy hope to compete on the basis of its one large plant, but the company’s owners are planning to expand geographically by setting up similar shredding operations in other market regions.

“We plan to roll out our technology across the United States in the next three-to-five years to include from four to six locations,” says Clayton. “Our process can handle up to 30 tons per hour, so our geographic footprint need not have many locations to provide the sophisticated destruction and separation services our clients need.”

The new investments in automation create one path to future growth, but Clayton says there are reasons beyond machinery that have helped Synergy Recycling get to where it is.

“Synergy has a simple and straightforward philosophy: give exceptional service for a fair price and process all materials with a concern for their potential environmental and economic impacts,” states Clayton.

“Transparency with our clients is a key factor, and going the extra mile for them greatly enhances our relationships,” he continues. “We use word of mouth from existing clients as an additional sales force. The value of a peer suggesting Synergy is an incredibly powerful sales pitch. In almost any business, customer referrals are a key to growth in a highly competitive market.”

Clayton is optimistic that Synergy’s people and its processing techniques have positioned the company to thrive among large and small competitors in any business environment or market conditions.

“We believe we are doing things properly,” he states. “We’ll continue to focus on offering high-quality services to our clients while properly handling the environmental impacts and making sure we have a healthy workplace for our employees.”

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