

# Greener Roofs: Innovative Roof Repair Products From Recycled Materials

## Polymer Recycling, LLC Enviro Roof Repair, Inc.

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### Environmental Problem

Green building includes creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life cycle. The rapidly growing field is driven by concerns about climate change, cost and availability of energy resources, and the impacts of buildings on human health and the environment. Green building must be sustainable for the long-term and effectively address environmental and human health issues, such as materials and energy usage. The Leadership in Energy and Environmental Design (LEED) program encourages building owners and operators to increase profitability while reducing the negative environmental impacts of buildings and improving occupant health and well-being.

For existing commercial roofs with compromised integrity, replacement is an expensive operation that involves tearing off the existing roof and replacing defective deck sheathing, insulation, and other materials, thereby exposing the inside structure to climatic elements and increasing vulnerability to water damage. The old materials often are discarded in landfills, contributing to a larger land-use concern. Roofs that require partial repair often are treated

with products that contain cold tar derivatives, which are known to contain carcinogenic polynuclear aromatic compounds (PNAs). A number of roof-repair products adopt an environmentally friendly approach by incorporating large amounts of paint sludge as a polymeric compound, but the inconsistency of the sludge yields variability in the roofing products, which presents challenges. In addition, discarded paint and paint sludge from home, automotive, and other industries are major contaminants in landfills.

### SBIR Technology Solution

With support from EPA's Small Business Innovation Research (SBIR) Program, Aster, Inc. developed the original recycling technology. Polymer Recycling, LLC, with the application company, Enviro Roof Repair Inc., ultimately commercialized the technology to reuse paint polymer byproducts from the automobile industry as well as household paint waste in roof repair products. The roof is restored with far less virgin material than a replacement with tear-off requires, and the normal price of about \$5/square foot is priced far below the typical \$10 or more/square foot for traditional roof replacement. An optional light-colored elastomeric roof coating has reflective quality to reflect ultraviolet, visible, and near-infrared radiation light, providing up to 15% savings in cooling costs. The formulation has approximately 50% solids content.

Polymer Recycling, LLC's approach is based on combining emulsified oil-based paint, water-based paint, a virgin latex polymer, a plasticizer, while displacing mineral fillers. To produce a very low (0.1% or less) volatile organic compound (VOC) content,

the oil-based paint is subjected to agitation under a vacuum, and the solvent is distilled to form a paint residue that is emulsified through the inclusion of non-ionic surfactants. The water-based paint is either incorporated wholesale or screened to ensure the absence of particles and foreign matter.

The addition of water-based paint improves the flow properties of the elastomeric coating and allows air and water to escape more readily during film foundation. The composite roof system is more than 10-times thicker than most saturant roof-repair material, providing greater energy efficiency as well. The process is nonhazardous, and the result is a seamless, water-tight composite overlay.

### Commercialization Information

For more than 20 years since the award of this SBIR contract, Polymer Recycling LLC, has developed and commercialized four products made with recycled paint for various flat roof types, including:



Application of this environmentally friendly roof coating system brings benefits of greener materials, improved energy efficiency, and waste diversion from landfills.



gravel covered and smooth built-ups; rubber and other membrane; and metal roofs. Enviro Roof Repair's Roof Healer® products include: a primer; an elastomeric sealer; a bedding cement; and trowel-grade sealer. The company has been awarded three patents for recycled paint methodology, a patent for the roof sealer, and has two patents pending. The environmentally friendly roof restoration process helps clients gain LEED sustainability points for certification in recycled content, tear-off avoidance, solar reflectance, and local manufacture criteria. LEED is an internationally recognized green building certification system.

The company has restored more than 1,000,000 sq. ft. of commercial, industrial, and government roofs in the Charleston, South Carolina area, including office buildings, hotels, condominiums, restaurants, grocery stores, shopping centers, and churches. Expansion plans include finding an established commercial roofing partner that can exploit the successful market niche that has been developed during its first phase of commercialization by Enviro Roof Repair, Inc.

### Company History

Polymer Recycling, LLC is based in North Charleston, South Carolina, and resulted from the efforts of two research and development companies: Aster, Inc. and Aster Roof Cover, Inc. Aster, Inc. was a general materials research company that developed the original recycling technology, which was commercialized by its affiliated companies. In 2009, sales increased to nearly \$600,000, despite the national economic downturn. Polymer Recycling, LLC and its affiliated companies have

been recognized with a number of awards, including: State of Ohio "Award for Excellence in Energy Efficiency"; Dayton, Ohio Chamber of Commerce's "Enterprise Spirit Award"; Phase I and Phase II Small Business Innovation Research

contracts; U.S. Small Business Administration Tibbetts Award; and nominee for Charleston Regional Business Journal "Innovator of the Year Award" for 2007.

## SBIR Impact

- Polymer Recycling LLC's patent pending technology revolves around the recycling of paint wastes to extend the life of existing commercial roofs through water-based, non-hazardous, low VOC roof coatings.
- Enviro Roof Repair's business model focuses on all stages of the process, from manufacturing the products to installing the roofing system to maintaining the restored roofs.
- This method of commercial, seamless roof repair offers environmentally friendly products at about one-half the cost of traditional roof replacement.
- This roof restoration process helps buildings achieve LEED certification for green buildings through recycled content, tear-off avoidance, solar reflectance, and local manufacture criteria.