

US EPA ARCHIVE DOCUMENT

## Ecovative Design: Greensulate GROWING AMERICA'S GREEN ECONOMY WITH RESEARCH AND INNOVATION

**2009 EPA SBIR Contract Recipient**  
Growing mushrooms for your insulation? This project is one of many ways that EPA is working to promote green building - in this case, by funding the development of an environmentally-friendly construction material.



Ecovative Design, is an environmental start-up company based in Troy, New York founded in 2007. With the help of seed money from EPA's Small Business Innovation Research program (SBIR), the company is developing a new product to replace synthetic foams used in packaging and construction. "We take agricultural byproducts like rice hulls, cottonseed hulls, and buckwheat hulls, and we bond them together using fungal mycelium - you can think of it as mushroom roots" says chief scientist, Gavin McIntyre.

Ecovative Design injects living mushroom cells into a mixture of water, hydrogen peroxide, mineral particles, and agricultural byproducts. The cells grow into a fungal mycelium, a tangled web made up of thousands of root-like strands that hold the hulls and other materials together. The product is then dried to kill the mycelium. Ecovative Design calls the material "Greensulate™." The technology

uses the vegetative growth stage of a benign fungus mycelium: *P.ostreatus*, *I.obliquus*, *F.formentarius* *A.arvensis*. The material has comparable strength and insulation values as basic expanded polystyrene or Styrofoam.

Greensulate™ is made from plant waste and is completely biodegradable. "It takes about one-tenth as much energy to produce as synthetic foams since it literally grows itself" and McIntyre says it's also non-flammable.

Greensulate is also cost-competitive since the raw materials are agricultural wastes. Ecovative Design plans to develop a network of manufacturing facilities that would use only agricultural wastes from nearby farms, to minimize the impact of transportation. Regional production reduces greenhouse gas emissions and energy consumption while taking advantage of domestic agricultural byproducts.

McIntyre says Greensulate™ could replace polystyrene for a wide range of uses including structural cores in wind turbine blades, boats, surfboards, lightweight vehicle panels, household insulation, and packaging materials.

Ecovative Design claims that even though Greensulate™ is designed to decompose in a compost pile or garden, it won't break down or attract pests when used in building construction. Greensulate could potentially retail for one-half the cost of petrol-foams, reducing a customer's initial capital building expense.

Under the EPA SBIR contract Ecovative Design constructed a prototype production line. Several panels were grown and installed in both residential and commercial applications in the Northeast. During this process, typical weather and handling conditions had no impact on the Greensulate™.



**Total EPA Investment**  
\$70,000

### Return on EPA Investment

Ecovative Design has conducted material performance testing of Greensulate. Additional funds have been leveraged. Packaging material is now on the market. Greensulate expected to be produced in 2011. Company grew from 2 to 18 positions after SBIR award.

### OTHER AWARDS:

ASME Grant  
National Collegiate Inventors and Innovators Alliance Grant  
York State Energy Research and Development Authority Grant

### OTHER LINKS:

EPA Project reports:  
<http://www.epa.gov/ncer/greensulate>  
Ecovative Design:  
<http://www.ecovativedesign.com>  
EPA SBIR site:  
<http://www.epa.gov/ncer/sbir>

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