



[Features](#) - May 28, 2008

Staying Cool: Green Insulation Gets Warm Reception

Greensulate—made from mushrooms and agricultural waste—promises natural protection from heat and cold

By Adam Bosch

Homeowners eager for green ways to keep their houses cool in the summer and warm in the winter may soon have an alternative to the pink fiberglass insulation they have used for decades. Troy, N.Y.,-based [Ecovative Design](#) is testing the ability of its Greensulate—a sustainable building material made from mushroom fibers, rice hulls and recycled paper—to resist temperature change, stop fire and repel water in accordance with [American Society for Testing and Materials](#) (ASTM) International standards.*

ASTM certification is crucial to satisfying building codes found in many states and could pave the way for Greensulate availability in early 2010, joining an array of [sustainable building products](#) gaining popularity as natural resources dwindle, energy costs rise, and consumers try to whittle their negative impacts on the environment.

Ecovative expects to test Greensulate over the next year to, among other things, see if the building material can resist mold growth even if it becomes saturated by water, says Gavin McIntyre, who along with Eben Bayer invented Greensulate in 2006 when both were seniors at [Rensselaer Polytechnic Institute](#) in Troy, N.Y. They later formed Ecovative to continue their work.

If McIntyre and Bayer are satisfied with the results of the tests, they will hire a third-party testing firm to do its own testing and, hopefully, certify that Greensulate meets ASTM standards. The next hurdle will be penetrating the "entrenched building industry," Bayer says. He and McIntyre—who have patented their product—think Greensulate has considerable advantages over competing materials, including cost. "That's the beauty of this whole thing," McIntyre says. "The rice hulls are agricultural garbage. They sell them for about five dollars a ton." The product's fibrous mycelium mushroom roots are free, because Bayer and McIntyre grow them, and recycled paper is readily available. "And our product isn't tied to gas prices, because there's no petroleum in it," he adds. "Our current material projections are equal or below the existing cost of board insulations (like polystyrene)."

Greensulate is also a proved fire retardant: It withstood heat up to 1,112 degrees Fahrenheit (600 degrees Celsius). Bayer says he was able to hold a piece of Greensulate in his hand, blast the panel with an acetylene welding torch, and not feel heat on the other side.

Bayer and McIntyre hatched the idea for Greensulate after realizing there currently is no renewable,

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biodegradable insulation on the market. The duo created the environment-friendly insulation by combining Bayer's agricultural knowledge (acquired growing up on a Vermont farm) and McIntyre's science and business savvy. After tinkering with ingredients such as carbon dioxide that ended in yeast explosions and monthlong setbacks, they created a successful formula.

They incorporated three basic ingredients in a solution of water and hydrogen peroxide: mycelium mushroom roots; [perlite](#), a glassy volcanic mineral used by farmers to aerate soil; and recycled paper. They poured the mixture into a seven-by-seven-inch (17.8 centimeters) plastic container and stuck it under a bed in their apartment (Greensulate must be kept in the dark while it is growing). The mycelium fed off the natural sugars in the recycled paper, causing it to grow, tightly bind the perlite, and take the shape of the plastic container. The perlite created small insulating air pockets within this new rigid, beige-colored panel, which they then baked at 110 degrees F (43.3 degrees C) to remove all water from the finished product and assure that mold and spores do not photosynthesize. Bayer and McIntyre also experimented by replacing perlite with rice hulls, which form similar air pockets. The rice hulls are roughly 10 times cheaper than perlite. Greensulate panel of any size can be grown in five to 14 days, Bayer says, and will last for the life of the building in which it is installed. Manufacturing space should come relatively cheap because all Bayer and McIntyre need is someplace big and dark. "It could be an old Kmart," McIntyre says, "or even an abandoned mine shaft."

Bayer and McIntyre are already getting e-mails weekly from across the U.S. as well as from countries including India and China, where there is a growing demand for renewable building materials. "I've never seen anything quite like it," says Jeff Brooks, a sales manager with [Timberline Panel Company](#) in Cambridge, N.Y., who recently saw a Greensulate demonstration. "I was immediately struck and thought about how our company can incorporate something like this. You can't get any greener than growing your own insulation."

As Greensulate moves from college experiment to worldwide distribution, Bayer and McIntyre say they will measure success on what they refer to as the "triple bottom line"—financial revenue, environmental sustainability and social equity. "We want to make sure everyone can afford Greensulate," McIntyre says. "That's what we're really focused on now."

**Correction (5/29/08): An earlier version of this story incorrectly stated that ASTM would do the testing.*

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