



Soy-Based SPF Insulates a

Dream “Green” Home

By Syndee Holt

When Rosemary and Buddy Bisterfeldt couldn't find a contractor in their area to install a soy-based foam insulation in their home, they decided to do the job themselves. Fast forward several years, and the DIY job has become a full-time SPF contracting business. Today, the Bisterfeldts are J&B Foam, a BioBased Insulation Certified Dealer in DeSoto, Kansas. The family-owned business also includes Buddy's son, Jim (the "J" in J&B).

Buddy got a call from BioBased in June 2007, asking him if he would be interested in installing the BioBased insulation product in a 2,100-square-foot, single-family detached home in Omaha, Nebraska. This wasn't just a typical home installation, however; the home was a Partnership for Advancing Technology (PATH) Concept Home. PATH, supported by the U.S. Department of Housing and Urban Development (HUD), is

a public-private initiative dedicated to accelerating the development and use of technologies that radically improve the quality, durability, energy efficiency, environmental performance, and affordability of America's housing. The Department of Housing and Urban Development broke ground on the project in October 2006. It was completed in June 2007 and open for public tours during the summer before finally going onto the market for sale.

The PATH Concept Home is a virtual showcase of the latest advancements and technologies for energy-efficient, affordable housing. It is Energy Star-, NAHB Green Building-, and Environments for Living-compliant, as well as Fair Housing Act (FHA) Accessible. The state-of-the-art "green" home is also being certified under the pilot version of Leadership in Energy and Environment Design (LEED) homes.

Constructing Homes to Save the Environment

The specifications required the construction of the building envelope in just a few days with a minimal amount of construction site waste, while using high tech materials to enhance the quality and precision of the envelope. Pre-fabricated basement panels, flooring and wall systems were all utilized to meet this goal. Explains Buddy, “The owners decided to use prefabricated systems because doing so would allow the builder to create the systems in a controlled, dry environment with high-precision equipment to meet the precise dimensions needed for the job.”

Another goal of the PATH home project was to create flexible systems that the future homeowners would easily be able to adapt to their needs. To this end, the interior walls were designed to be flexible, and wireless electrical switches were used throughout the house – allowing the homeowners to adapt each room for varying uses. The baseboards even had hidden channels built in to handle the electrical cords of computers, TVs, and other appliances.

The plumbing systems also reflected creative, energy-efficient technologies, such as tankless water heaters and a recycled “grey water” system for irrigation, laundry, and toilets.

Since the building envelope was going to be sealed with the soy-based foam, a semi-balanced ventilation airflow exhaust system was built into the structure to both control humidity and introduce

a constant flow of fresh air. The installed HVAC system removed particulates from the air. The exhaust fans were installed in the garage to draw potential contaminants outside the envelope when the garage door was opened.

Cutting-Edge SPF to the Rescue

The job of creating this foam seal fell to J&B Foam; the company volunteered its time to install BioBased 501 in the walls and attic of the PATH Concept Home. Buddy explains, “I’ve worked with other foam companies, and I’ve found BioBased Insulation to have the best customer service for both the homeowner and the contractor, so I was glad to help out on this project.”

BioBased 501 is a soy-based, environmentally friendly spray polyurethane foam insulation product that is applied as a liquid and rapidly expands to over 100 times its original size, effectively filling all voids and permanently adhering to the surrounding building material surfaces.

Jennifer Wilson of BioBased Insulation says, “Spray foam has a higher initial cost up front, but you can save up to 50 percent a month on home heating/cooling (depending on your home’s location and local weather conditions), creating a more positive cash flow.” In addition to the cost savings, the soy-foam insulation

Completed in June of 2007, The Partnership for Advancing Technology (PATH) Concept Home was built in conjunction with the U.S. Department of Housing and Urban Development (HUD). The home is part of a public-private initiative designed to promote the use of technologies that radically improve the quality, durability, energy efficiency, environmental performance, and affordability of America’s housing.



JOB at a GLANCE

PATH HOUSE

PROJECT

Installation of soy-based foam insulation to create air barrier in PATH Concept Home

SPF CONTRACTOR

J&B Foam
PO Box 558
DeSoto, KS 66018
(913) 449-2512

SIZE OF CONTRACTOR

About a 2- to 4-man crew; a 3-man crew worked this project

PRIME CLIENT

The Partnership for Advancing Technology (PATH), www.pathnet.org/concepthome

SUBSTRATE

New wood siding and Oriented Strand Board (OSB)

SUBSTRATE CONDITION

New

SIZE OF PROJECT

2,100 sq. ft.

DURATION OF THE PROJECT

3 days

MATERIALS/PROCESS

- Spray-apply BioBased 501 soy-based spray foam throughout the house using a Graco E20 with a standard 200-ft. hose and a 0.05 tip at about 1,100 psi.
- The material was contained in two 55-gallon drums with a pneumatic-powered agitator attached to the B side of the product during the entire application process.

UNUSUAL FACTORS

- This is a concept home with cutting-edge technologies for energy conservation and low-cost housing.
- Instead of spraying the usual 3" of SPF, the 2x4 rafters were completely filled and trimmed.

- The material used to insulate was a soy-based, environmentally friendly SPF insulation that is certified to be free of VOCs, CFCs, and formaldehyde.

SAFETY CONSIDERATIONS

- This product is water-based with no VOCs, CFCs, or formaldehyde.
- The recommended PPE includes air respirators, protective gloves, and disposable jumpsuits.
- No extra precautions are needed to dispose of cured excess materials.



The soy-based foam's spray-application process is typically the same as traditional SPF application. The J&B crew used a pneumatic-powered agitator to mix the B-side of the product during the entire application process. The separate A and B components were then pumped in a 1:1 ratio into a Graco E20, heated to about 135°F and agitated to equal viscosity. The foam was then sprayed through a 0.05 tip on a 200 foot length of standard Graco E20 hose at roughly 1,100 psi. When cured, any trimmed material can be disposed of in a landfill as it is biodegradable.



helps create a cleaner, healthier indoor environment as airborne dusts, pollens, and fibers cannot penetrate through the wall cavities and ceilings.

BioBased 501 is an open-cell, semi-rigid half-pound foam that creates a continuous air barrier to provide a seal and insulate in one application. Additionally, the foam product doesn't "settle" like traditional fiber-based insulation materials, so the seal remains permanent from stud to stud. As a further protection for the safe and healthy building environment, it contains no fibers or harmful particulates — VOCs, CFCs, or formaldehyde — and offers no food source or nesting materials for invasive pests, molds, or bacterial fungal growth.

The product has an R-value of 3.83/inch, a quantitative

measure of the material's resistance to conductive heat flow. It is a Class-1 rated material against fires, the highest rating an insulation material can receive for both home and commercial structures. Certified technicians can apply BioBased 501 regardless of environmental conditions of temperature and humidity and with little or no surface preparation. Once the product has been applied, curing takes only a matter of minutes. The soy-based B side of the two-component product is manufactured in the United States (a renewable resource benefiting American soy farmers) and must be heated and agitated throughout the spraying process to create an equal viscosity with the A side of the product.

When J&B arrived on the PATH house job site, the roof, windows, and doors had been installed, and the project framing,



Once the soy-based foam has cured, no top coat is necessary, as demonstrated in this photo of the floor of the attic roof. In an occupied area, the sheetrock in the walls and ceiling, applied after the foam has cured, qualifies as the thermal barrier. The PATH house building codes, however, stipulated that the spray foam on the underside of the roof deck did not have to be covered with sheetrock because it is not intended to be occupied.

plumbing, and wiring systems had been completed and inspected. (While the BioBased foam insulation is generally the last system to be installed before the final drywall, it is possible to drill through the cured foam without damaging it.)

The application areas were new wood siding and Oriented Strand Board (OSB). OSB is similar to plywood (and meets the same building codes as plywood), but is created by combining thin strands of ground wood with wax and adhesives in a pressed board. “The advantages of this type of material include greater shear strength with fewer soft spots than traditional plywood, and it’s available in

Since the foam is typically the last system to be installed, when the J&B crew arrived on the job site, the roof, windows, and doors had been installed, and the project framing, plumbing, and wiring systems had been completed and inspected.



larger pieces than traditional plywood.” Buddy continues, “OSB is also generally squarer than its plywood counterpart.” Since smaller farmed trees can be used in the OSB process, old growth lumber need not be used. It also can be significantly cheaper than plywood (\$3-\$5 less per panel). The major disadvantage of OSB is that the edges can swell up to 15 percent if exposed to significant amounts of moisture.

Getting Down to Business

The surfaces were relatively clean and dust-free, so no surface preparation was necessary. J&B’s three-man crew used standard one-part polyurethane “canned” foam to seal around the windows and doors. They then covered the doors and windows with plastic sheeting to prevent accidental overspray. The BioBased 501 two-component material was provided in 55-gallon containers. Buddy explains, “The drums were located on our trailer. This project was completed in the summer, so no heat was needed, but in the winter, we put a band heater around the drums to keep the components at a workable temperature. The optimum drum temperature is around 80°F.”

The J&B crew attached a pneumatic-powered agitator to the B-side of the product during the entire spraying process. The separate A and B components were then pumped into a Graco E20 that heats the product to the correct temperature and mixes the 1:1 proportions. Buddy says, “The two liquids, heated to about 135°F and agitated to equal viscosity, meet at the gun and react with the air to create the foam.” The product was sprayed through a 0.05 tip on a 200 foot length of standard Graco E20 hose at about 1,100 psi.

Buddy’s team, clad in air respirators, protective gloves, and



throwaway jumpsuits for PPE, normally put in three inches of foam, but for the PATH house, they completely filled the spaces in between the wall studs to the depth of the 2x4s. Any excess foam was trimmed off and the scraps removed.

From start to finish, the entire foam insulation project took about three days to complete. Cleanup is simple, as the BioBased 510 is water-based. Once the gun is cleaned with water, it's lubricated for the next use. The scraps of biodegradable cured, trimmed

BioBased 501 is an open-cell, semi-rigid, ½ lb. foam that creates a continuous air barrier providing an air-tight seal and insulation in one application. Common to all SPF, the environmentally friendly nature of the soy-based foam — containing no fibers, VOCs, CFCs, or formaldehyde — was an added benefit in the construction of the green house.

foam can be disposed in the regular trash.

No top coat is needed for the cured foam. In an occupied area, the sheetrock in the walls and ceiling, applied after the foam has cured, qualifies as the thermal barrier. In the building codes for the PATH house, the spray foam on the underside of the roof deck did not have to be covered with sheetrock. Jennifer Wilson of BioBased explains, “If the attic is used for service access only and there is a non-combustible furnace in the attic, no ignition barrier is needed. If the attic is used for service access only and there is a combustible furnace in the attic, an ignition barrier is needed.”

“Efficiency wise, one inch of foam is going to outperform the traditional fiberglass insulation material,” Buddy says. “We end up educating the inspectors sometimes, especially if they haven’t ever dealt with foam before. The R-value codes for foam are extraordinary compared to traditional insulation materials — three inches of foam is about the equivalent of R12.”

By the way, Buddy did get around to replacing his home insulation with the BioBased foam. He explains, “I personally replaced the fiberglass insulation in my home with three inches of foam, and I’m saving up to \$130 a month on my energy bills.” Good for the environment — and the wallet — SPF is ahead of the technological curve. **SF**