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## Rogers Company Tackles Carbon Footprint of Foam

By Jennifer Joyner

SUSTAINABILITY DISCOURSE OFTEN centers on prominent themes like vehicle emissions and electricity sources, but a local company is focused on petroleum found in less conspicuous locations, including on couch cushions, in car seats and under carpet.

BioBased Technologies LLC's primary product, Agrol, is a soy-based oil that replaces a portion of the petroleum used to make polyurethane foam.

BioBased CEO Amy Sorrell says foam manufacturing is one of the less obvious sources of greenhouse gases.

"We see the cars that eat up the gasoline, but what the consumer doesn't think about is that this foam is actually a bunch of chemicals," Sorrell said, holding up a children's mini-football made of foam.

"People don't understand, and I didn't understand, [before she joined BioBased in 2005] how you make foam. I just took it for granted. It's just something we live with."

The company was started in 2003 by Illinois farmers who were using soy to make spray insulation. Two years later, Agrol was commercialized.

The product can be used to replace a percentage, not all, of the petroleum in various types and densities of foam, from memory foam pillows and mattresses, to molded seats in vehicles, and to flooring underlayment. The material can be dense enough to make fake stone or rigid boards.

Sorrell said BioBased's biggest market is artificial grass. Up to 60 percent of the petroleum found in the turf backing can be replaced with Agrol.

However, the possible applications for Agrol go



Amy Sorrell

far beyond what has already been done.

A broad range of products are made by polyurethane materials.

"What's amazing is, if you just walk into a Walmart store, for example, there's so many things. I went through a few weeks ago, and there were hundreds of things that are polyurethane that you just don't think about, from toys, pillows, mattress toppers, to rugs, to chairs," Sorrell said.

All of those are possible applications for Agrol.

BioBased brand manager Terri Mallioux said, "The key is to getting those companies to realize there's another option out there to what they're currently putting in their bath mat, or what they're currently putting in their office chair, or their baby car seat."

Ford Motor Co. started using soy foam in its vehicle seats in 2007, and it is now part of a broader effort to use renewable materials in the vehicles.

"Soy foam has definitely been a priority for us," Debbie Mielewski, senior technical leader of materials sustainability, said in an email. "There are over 30 pounds of foam on a typical vehicle, so using soy foam allows us to lower our impact on the environment."

All North American-built Ford vehicles have soy foam seat cushions, seat backs and headrests, according to the company.

Mielewski went on to tout the quality of the soy-based products.

"Our soy foam is 'no compromise' to our customers, with equal or better performance, comfort and durability, all while being better for the planet," she said.

Although some businesses have now joined the ranks, Ford was one of the first to embrace soy polyols.

"Ford is a leader in developing bio-based materials. We were told over and over that using soybean oil instead of petroleum just couldn't be

done. It wasn't easy, but we rebalanced the chemistry, removed the odor and compatibilized the materials," Mielewski said.

### 'Like Baking a Cake'

Though at least a few United States automakers might not switch to soy foam anytime soon — because it results in the absence of a "new-car smell —" the BioBased team sees the bedding industry as ripe for the picking.

In 2015, Ikea partnered with suppliers Malfors and Moshult to start offering 15-percent soy mattresses, as part of the company's sustainability efforts.

"The goal is to get more companies to follow Ikea's lead," Mallioux said. "They are a global leader."

Agrol is usually the same price as or cheaper than petroleum, Sorrell said.

However, manufacturers must invest some time in adjusting their processes.

Replacing a percentage of the petroleum might change some of the foam's properties — including weight, buoyancy, cushioning performance, insulation and impact dampening — and some cost could incur through product use in a trial run and also technical support services.

BioBased outsources its manufacturing, freeing up the team to work with individual clients in order to find the right blend of chemicals.

The company's lab, now located in Dalton, Georgia, has equipment that tests a wide variety of foam properties.

"What we've found over the last 10 years is that Agrol is sometimes difficult for clients to use, so what our labs do is we may blend a couple of things in it. There's additives that may help it be more reactive or slow down," Sorrell said.

"Our product isn't just, you take out this and put in this," she added. "It's like baking a cake. You can't just substitute baking soda with salt, for example.

You're going to have a flat cake."

A CPA before she took on the role at BioBased, Sorrell said she often turns to baking terms in order to process and also explain to others how the chemistry around the product works.

In keeping with that theme, BioBased is also now working to develop "cake mixes," which will serve as drop-in products for manufacturers, removing BioBased's technical support element and saving some cost to the customer.

"You can make a cake and just go out and put your flour in and your eggs and your salt and your chocolate, or however you want to make it, or you can buy a cake mix," Sorrell said. "For those that aren't as technically savvy, we can provide that cake mix. We'll take the base oil and add a few things so they can make the foam the way they want to."

### Decreased Carbon Footprint

The amount of petroleum to replace with Agrol depends on the customer's wishes, with an average between 20 and 30 percent, although the company has replaced as low as 5 percent.

"Every little bit makes a difference," Mallioux said. "With every company that says, 'OK, we want to make this little change,' those little changes add up."

Mallioux said the global polyether market demand in 2014 was 14.3 billion pounds.

"If Agrol replaced just 5 percent of the petroleum used in polyurethane products, that would add up to 716 million pounds," she said. "For every pound of soy-based polyol replacing petroleum, approximately 4.4 pounds of carbon dioxide is removed or prevented from entering the atmosphere. That adds up to 3.15 billion pounds of carbon dioxide removed."

However, one obstacle for the soy foam industry is a lack of rules for product labeling. There's no policing the amount of petroleum a manufacturer has to replace in order to call its product soy-based.

The BioBased team believes the key is to educate the consumer, both on the questions to ask when looking for soy-based products and also the possible applications for soy foam.

"As the consumer, you don't see our product," Mallioux said. "You don't see the foam. You see what's over the foam. You're sitting on it and walking on it."

While BioBased does not reach directly to the consumer, its customers do, and BioBased can help them market the product, aided by the fact that Agrol is certified by the U.S. Food & Drug Administration as having 99 percent renewable content.

The percentage is measured using carbon dating, because while petroleum has been in the ground for a long time, soy is new.

"When you're looking at our products, you're also looking at the American farmer," Mallioux added.

### Next Stop, Europe

Europe is the next market BioBased will enter. The company is planning to have product in Europe during the second quarter of this year.

"There's a lot of interest, but we slowed it down a bit because of petroleum prices," Sorrell said. "It's crazy low over there, but it will grow, and it will flip and we're ready to move over there. Our product needs to be price competitive."

In order to sell in Europe, BioBased's products have to undergo rigorous health and safety approval through the REACH Registration process.

"You've got to make sure it doesn't hurt the environment at all. There's a lot of checks and balances, and it's very expensive to register products, especially when they're new and unique molecules," like BioBased's products, Sorrell said.

She added that Europe has outlawed a lot of chemicals and that the testing includes aquatic testing, toxicology testing and more. "That's the expense of doing chemistry," Sorrell said.

Agrol is sold in several different grade levels, based on the percentage of renewable content. Two of the levels — the ones that BioBased decided are the best fit for the market — have passed REACH Registration. Although BioBased is not ready to make the financial investment to register the rest of the products yet, Sorrell is confident that the rest will be deemed safe. "You could eat it, although I wouldn't want to," she said.

Here in the U.S., BioBased saw about 25 percent revenue growth last year, Sorrell said, although she would not divulge specific earnings.

"We're small. There's lots of room for growth," she said.

As far as staff, BioBased employs seven in Rogers and seven in its Georgia lab.

The company moved its lab from Northwest Arkansas to Georgia two years ago, in order to be closer to its manufacturer and to customers, namely the home furnishings market and ancillary industries in North Carolina and South Carolina.

Sorrell said the company's other big customers are in Detroit, accessible to the lab through Interstate 75.

"We are so hands-on with our customers, so it's important to be close," Mallioux said. "We view our small size as an attribute, because then you can just give that customer the high level of customer service."

"We're the only one of the small handful of people that do what we do," she added. Also, BioBased is one of the only companies that focus solely on replacing petroleum with soy in foam.

"This is our baby," she said. ▀