This winter was a mild one. But there are plenty of years when heating costs can be a pain. Especially in operations of large business operations such as greenhouses and turkey producers. As consumers look for alternative, renewable energy, AURI has been working closely with businesses that want to use biomass.

The feasibility of using biomass depends on the surrounding resources. The 10 counties surrounding the Twin Cities Metro Area have extensive resources of biomass feedstocks — such as wood chips, corn stover, and even manure — that are readily available to heat local operations. AURI also has worked with the University of Minnesota and the Department of Energy and Environment to create the Minnesota Biomass Heating Feasibility Guide.

"This guide shows the positive economics and returns on investment of using a biomass boiler for thermal energy, especially when compared against propane," says Deroz. "The guide shows that the system will pay for itself in six years in fuel savings alone."
Research finds biodiesel-based preservative compares well with petroleum-based product

BY JONATHAN EISENTHAL

Most people don’t give a second thought to the wooden poles that line the roads from town to town, carrying phone, cable and power lines to our homes and businesses. And that’s because they’re so well made.

“Utility poles should last 30 years—they take a lot of punishment out in the elements so they need a top-performing preservative,” explains Glenn Larkin, one of the Michigan Tech scientists who conducted the research. “We looked at brown rot fungi, which affects timber, and then Larkin and his team compared the final weight to the initial weight. Weight loss greater than five percent indicates thriving fungal infection, and the more the weight loss the worse the rot.

For the past five years, a national utility pole manufacturer has used biodiesel as the base or carrier for the active ingredient pentachlorophenol, which is used as a wood preservative, in order to address odor problems caused by the petroleum-based preservatives. Here again the performance of the biodiesel-based treatment hadn’t been thoroughly tested, they said. Their research aimed to evaluate if biodiesel “would cause chemicals to leach into the environment, affecting water quality.”

Biodiesel passes tests with flying colors

First, researchers looked at how well the biodiesel treatment stopped rot. “We used treated blocks, which were put in a jar and inoculated with the fungi,” explains Glenn Larkin, one of the Michigan Tech scientists who conducted the research. “We looked at brown rot fungi, which affects timber, and then Larkin and his team compared the final weight to the initial weights. Weight loss less than five percent indicates fungal infection, and the more the weight loss the worse the rot.

“The performance of the biodiesel test was comparable to the petroleum-based preservative system,” says Larkin. “In the study, there was no apparent disadvantage in substituting biodiesel.”

Competitors have also challenged the new biodiesel wood preservative on the basis of leaching, claiming that water flowing over the wood would leach chemicals into the ground and impact the environment. So MEG Corp brought these questions to Michigan Tech, as well.

“We wanted to preserve an important market for biodiesel, and one that has a lot of growth potential,” says Dennis Timmerman, senior project development director with MEG. MEG Corp worked on the research with one of the premier timber stalks investigators—Michigan Technological University in Houghton, Michigan. According to Glenn Larkin, the MEG Corp staff and experts from Michigan Tech, University and Michigan Soybean Research and Promotion Council partnered to address odor problems caused by the petroleum base. Because the biodiesel-based treatment hadn’t been thoroughly tested, they faced the question: ‘How much biodiesel would act as a preservative, and how would it compare to the petroleum-based product?’

“We asked: ‘What would a biodiesel-based treatment look like under a realistic scenario?’ This would be a 30-year exposure to the elements, much harsher than if it were in the real world,” said Larkin. “We used treated blocks that were the same size as the ones used in the decay test, and exposed them to a much harsher scenario: The blocks were submerged in water, and then the jars were filled with fresh water. At the end of the test we combined all of the collected water samples for each of the preservative systems to measure the total amount of pentachlorophenol leached from the blocks. We compared the leachability of the two carriers systems (biodiesel- and petroleum-based preservative), and once again the performance was comparable.”

Utility pole market could grow demand for biodiesel

The traditional wood preservatives used B20—a blend of 95 percent diesel and 5 percent pentachlorophenol. B50 and Minnesota Soybean hope to test higher levels of biodiesel in the preservative treatment. “In our testing at Michigan Tech, our biodiesel contained 5 percent pentachlorophenol, and the biodiesel and 80 percent conventional #2 diesel,” explains Larkin. “AURI and Minnesota Soybean hope to test higher levels of biodiesel in the preservative treatment.”

In its current rate of consumption, the utility pole manufacturer uses 480,000 gallons of B20 a year. Competitive estimates for the wood preservation market potential at B20 would be 4 million gallons, and at B50, 8 million gallons. If Minnesota currently produces about 62 million gallons of biodiesel, so 75 million gallons represents significant market growth.

It makes sense to look at replacing the whole spectrum of petroleum-based products with plant-based products,” concludes Timmerman. “Products like biodiesel are environmentally friendly, renewable and they come from our own farm economy—there are a lot of positive attributes to consider.”

A special thanks to our funding partner on this project: Minnesota Soybean Research & Promotion Council.
**FIGHTING FIRES WITH CORN**

BY LIZ MORRISON

The fire starts as a small yellow flame licking up from a pile of debris in an old wooden garage. Smoke and flames soon dominate the scene. A hose spews water onto the fire. A firefighter rolls the leaf of a large black plastic bag filled with smoke. The water turns cloudy as it hits the bag. A firefighter turns on the bag again.

The smoke continues to escape until the smoke is extinguished. The bag is then removed and the contents are mixed with water into the water tank. Additional water is added to the tank. The mixture is used to extinguish the fire.

**FIghting fires with corn**

The firefighting gel is being used to fight fires in the United States. The gel is being tested in several locations, including the Twin Cities area. It is being used to extinguish fires caused by wildfires.

**FiGhTing Fores with COrN**

EarthClean, a company based in Minnesota, has developed a firefighting gel made from corn. The gel is being used to help put out fires caused by wildfires.

**FiGhting fIres with CoRn**

The gel is used to put out fires caused by wildfires. The gel is applied to the fire and it thickens the water, allowing it to travel further and extinguish the fire. The gel also helps to keep the fire from spreading.

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No link between distillers grains and E. coli

Findings important for both beef and ethanol industries

Flora Horn

According to research, there is no link between distillers grains (depicted above) and the incidence or prevalence of E. coli O157:H7.

Glycerin boosts growth

In an unexpected finding, the Minnesota experiments showed that adding 10 percent crude soy glycerin to beef finishing diets boosted growth rates by about 15 percent, a significant improvement. Preliminary results from the Kansas State University trials confirm these findings, DiCostanzo says.

Minnesota's three biodiesel plants generate about $60 million in annual sales, DiCostanzo notes. In addition to generating higher returns, liquid glycerin also improves feed handling, he adds.

Distillers grains trials

Two feeding trials were performed — one on calves that were artificially inoculated with the E. coli O157 pathogens, and one on naturally infected calves. Both trials looked at whether distillers grains in the diet affected the prevalence of E. coli O157 in the animal's manure.

In the trials, the cattle were fed a combination of dietary treatments that aimed to tease out potential interactions between feed ingredients, especially the presence of distillers grains, when fed in combination with feed ingredients, according to DTU-STS.

The combination of dietary treatments was designed to tease out potential interactions between feed ingredients, according to DTU-STS. The combination was chosen to be representative of a commercial feeding system.

The results from Minnesota's trials support the findings from the Kansas State University trials.
April 2010; April 2012
2.2 million pounds of rubber from recycled tires has been made into RPM seals and gaskets.
In addition, Ford is working with recycled polymeric materials to combine discarded tires with... in the future.
When you take a seat in a Ford, you may be sitting on soy- and other biobased seat cushions.
AURI Executive Director
BY TERESA SPAETH
April 14, 2012
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AURI’s 2012 Ag Innovator of the Year:
BioPlastic Solutions

BioPlastic Solutions, LLC, led by CEO Gary Boldt, calls their products “the environment-friendly alternative to petrochemicals.” Their raw material, Minnesota-grown corn, is converted to cornstarch and then... to reality.

Soy protein has... benefits

According to a new study published in the European Journal of Nutritional... levels and an increase in dopamine levels. The study adds to a large body of science... isoflavones could help make radiation... effectiveness

Soy compounds may... effectiveness

Adding one new supplement with soy... available products or process, it is critical to have access to industry experts... Learn More

Service Areas: What We Provide

Applied Research and Development
Through practical, applied research we identify emerging opportunities to link agricultural products... production and process development.

Learn More

BioBased materials make Ford vehicles greener

When you take a seat in a Ford, you may be sitting on--or other biobased war materials and seatbacks. Ford vehicles are now 85 percent recyclable by weight. The Ford Taurus is... the right people at the right time.

AURI at tradeshows and much more.

About AURI

The Agricultural Utilization Research Institute (AURI) helps Minnesota farmers, entrepreneurs, and businesses develop new industries... about new research, upcoming events, where to find AURI at tradeshows and much more.

Hands on Scientific Assistance
Services are available to provide consulting and technical services in the areas of:
• Product and process development
• Product evaluation and testing
• Sourcing materials, equipment and services

Learn More

Innovation Networks
When deciding the future of a new product or process, it is critical to have access to industry experts and a science-based network of people.

Contact Us

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朝阳被水雾蒸发，湿气侵入，形成薄雾缭绕。
It’s often said that small businesses are the engine of job creation. AURI helps fuel that engine by offering hands-on scientific assistance to small businesses, along with access to research and resource networks. The goal is to help Minnesota entrepreneurs bring innovative, ag-based products to market, generating economic activity — and new jobs. Small firms provide about half of all private sector jobs, according to the U.S. Census Bureau. And small companies provide the greatest share of net new jobs, according to the Small Business Administration’s Office of Advocacy.

Still, the rate of new business startups fell in 2010 to the lowest point on record, the Census Bureau reported in May. New companies as a percentage of all businesses dropped below 8%, from a peak of 13% in the 1980s. One of the problems: startups have a hard time finding the expertise and resources needed to bring their new ideas to market, says Jennifer Wagner-Lahr, AURI innovation director. That’s where AURI can help, working with entrepreneurs on the nuts and bolts of product development and testing, processing, materials sourcing, market analysis, and business planning. Here are just a few AURI clients who are helping create jobs:

### USA Solutions
Tony Schmidt and Daryl Metcalfe worked with AURI’s coproducts lab in Waseca to develop biodegradable, cornstalk-fiber swine farrowing mats as an alternative to rubber mats in nursery pig barns.
- By the numbers: Sold 320,000 Compost-A-Mats in 2011. USA Solutions’ contract manufacturer, Mat, Inc., employs six workers to produce the mats.
- On the horizon: Working on a deal with a South Korean distributor that could double mat sales and further boost manufacturing jobs in Minnesota.

### Pet Care Systems
AURI helped entrepreneurs Mike, Vonnie and Mark Hughes develop their idea for Swheat Scoop, a renewable, flushable cat litter made from naturally-clumping wheat.
- By the numbers: A $20 million business; employs 24 full-time workers and a national sales force of eight.
- On the horizon: Pet Care Systems is completing a $4.25 million expansion of its Detroit Lakes manufacturing plant, which will add another four jobs, says Don Davis, president of Farmers Union Industries, which now owns Pet Care Systems.

### Suntava
Suntava has commercialized its purple corn and natural red food colorants, supplying Illinois-based Axium Foods with its purple grain for Mystic Harvest Purple Corn Tortilla Chips as well as other grain and color applications.
- By the numbers: Employs eight people in administration, sales, and product development; contracts with about a dozen Minnesota farmers who grow the company’s patented non-genetically modified purple corn.

### BioPlastic Solutions
Bio-Plastic Solutions manufactures BioBest® bioplastic parts for doors, windows, wall trim and office furniture. The proprietary plastic, developed with the help of AURI, is 80 percent renewable carbon.
- By the numbers: Currently a nine-man shop, owner Gary Noble expects this effort to lead to at least three more jobs by the end of the year.