



AG INNOVATION NEWS[®]

The newspaper of the Agricultural Utilization Research Institute

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The year of innovation

AURI taps a 3M VP for creative inspiration



BY CINDY GREEN

A 3M chemist made a sub-par batch of glue that wouldn't bond properly; another worker used it to stick bookmarks in his hymnal. The post-it note was born. It's a legendary story that brought world fame to 3M — a small sandpaper company that has grown to \$23 billion in annual sales worldwide.

Companies have been trying to duplicate the corporate climate that encourages such accidental brilliance ever since the 1968 Post-It® invention. 3M's Alex Cirillo, who preaches innovation to organizations across the country, from the Coast Guard to major manufacturers, says it's all about mixing up thought patterns to let ideas emerge. "The most creative people are able to bring solutions from all different kinds of sources — apparently unrelated to the problem."

"Children are born with habit of mind to discover. As we grow up, we're taught by our educational system to modify this habit. In some ways, the more education you have,

the less innovative you become because you develop patterns on how to solve problems and how to think. Most innovation doesn't seem to follow a pattern."

"One of most creative people I know at 3M is a farm kid," Cirillo says. "When a tractor breaks down, the farm kid gets the blasted thing fixed ... with whatever he has on hand. That's the way innovators attack a problem. They ask, 'What do I have available that I can bring to bear on this problem?' The most important question in the innovator's mind is, 'what if...'"

Teresa Spaeth, AURI executive director liked what Cirillo said about innovation when she chatted with him at a BioBusiness Alliance meeting last summer. "You hear about farmers or kids from farms being exceptional employees," Spaeth says. "The assumption is it's the work ethic. Yes, of course it is — but they're also able to do anything with machinery. It's the innovation style they are from."

AURI asked Cirillo to lead an innovation workshop for AURI's staff and board, which he did in October at 3M's Innovation Center in Maplewood. The center brings in businesses from across the country — from automotive manufacturers to health-care companies — to find solutions with new technologies and products. "Someone like Boeing may want to solve a problem with rivets — they might find an adhesive that works better."

Managing by inspiring

Cirillo, born in upstate New York, received his masters and doctorate in chemistry at the University of Wisconsin-Milwaukee. He has been with 3M for the past 28 years as a physicist, technical director, 3M Canada president, and various other management positions. He is now vice president of both 3M Community Affairs and the 3M Foundation.

Spaeth says she was intrigued by Cirillo's description of 3M's management style.

"They give permission to scientists to spend 15 percent of their time doing whatever they want to do — that fosters innovation. ... Innovation is not top down — you can't require it; you inspire it."

Spaeth says last year's AURI strategic plan was themed "collaboration and partnership." In 2008, it's "a year of innovation." The two themes follow nicely, she says. "As Alex says, knowledge is power but shared knowledge is ultimate power."

"We're talking a lot about entrepreneurship and opportunity," Spaeth says. "We're looking for ways to inspire and energize Greater Minnesota. Research shows that communities that address innovation — and just have a conversation about innovation — show positive results."

Gasifying biomass like corn stalks and sawdust for fuel — creating opportunity from waste — is a prime example of rural innovation, Spaeth says.

History of innovation

Many new products that AURI has helped bring to market came from unusual ways to solve a problem. In the early 1990s, a frugal cat owner didn't want to buy expensive scoopable cat litters so he started trying his own recipes. Cement didn't work, neither did airplane glue. But the ingredient "semolina" on a spaghetti box got him thinking that the high-gluten content might make litter sticky. Years later, after many refinements and ownership changes, "Swheat Scoop," a wheat-based scoopable cat litter, is thriving in the marketplace. A variation just went on the market for horse bedding. (See Ag Innovation News, Oct-Dec 2007)

Around the same time, a company was looking for a way to make bigger batches of popcorn, used to protect breakables in shipping packages. AURI scientist Bill Stoll suggested going to Malt O' Meal to check out their rice-popping technology. The cereal company, instead, suggested an extrusion process for "popping" starches. The biodegradable packaging peanut was born and is now a standard in the loosefill packing market — although the product name and owners have changed.

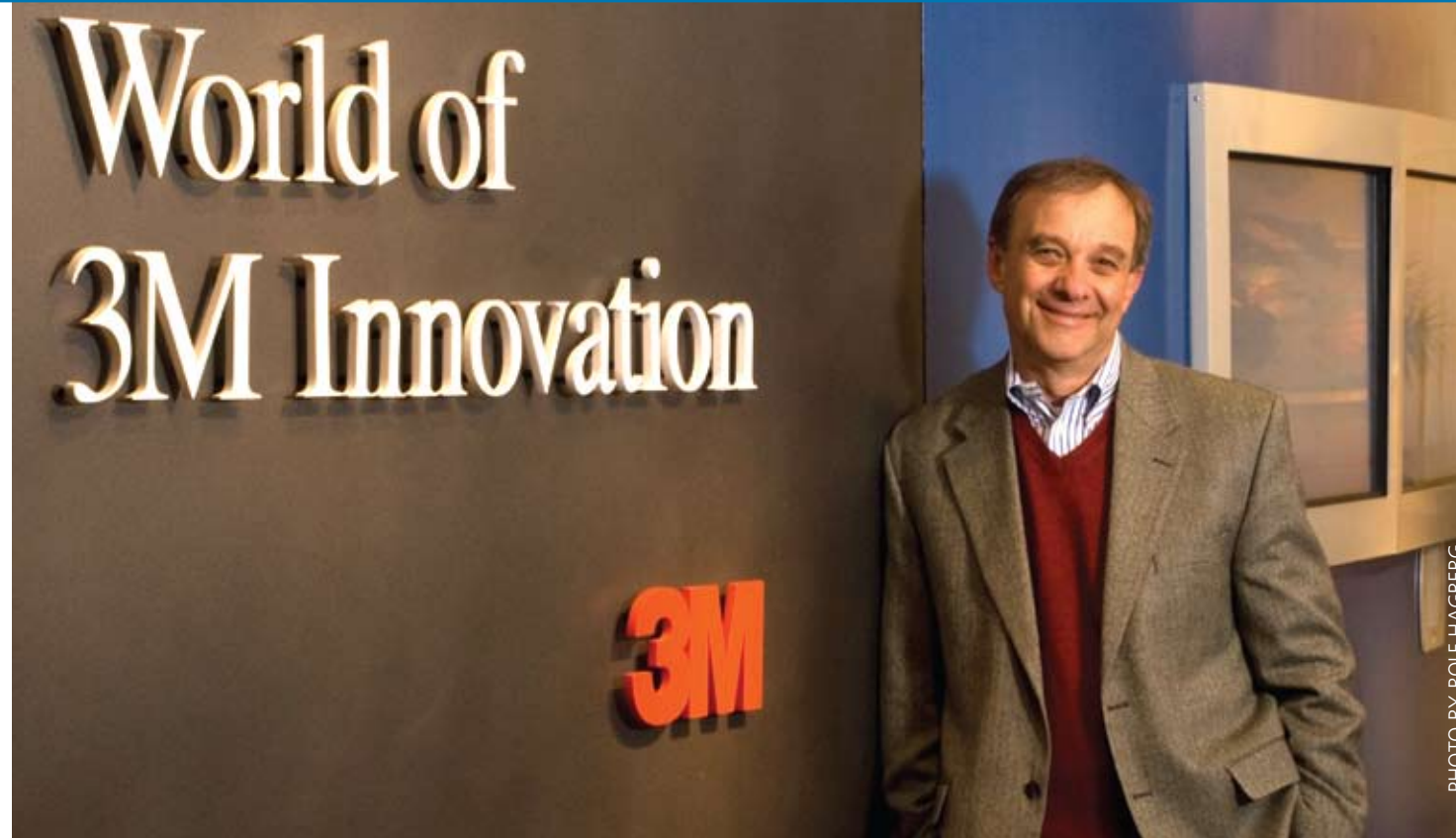
More recently, Bill Lee, an ethanol plant manager in Benson, went far outside the corn-fuel box to tap some unlikely markets. Chippewa Valley Ethanol Company now produces Shakers Vodka, organic and kosher alcohol for cosmetic, food and other markets, and has produced more E-85 in the past five years than any other plant in the country. It is also installing a biomass gasification system to produce its own power and is looking at ways to make ethanol from syngas. (see story page 8)

"The pace of innovation around the world has been tremendous" largely because of global access to the internet, Cirillo says. For example, an entrepreneur who "needs a decal that will stick on a truck for seven years, then can be removed, might look at technology from a wound-care dressing" that he finds on the internet, Cirillo says. "You need to see a problem in a different light."

"Innovation has to do with access to information," Cirillo says. "The Soviet Union hid their scientific information up to the 1980s. Now they share with everyone in the world. When people give and get access to information, they have a leg up."

What is AURI's innovation challenge? "To use Minnesota resources to create energy, to create businesses and economic development, and to create intellectual property that creates investment in Minnesota, Cirillo says.

"The challenge is to bring up innovation and ideas." ■



3M's Alex Cirillo gives presentations nationwide on inspiring innovation in organizations. Creative problem solving doesn't follow a pattern, Cirillo says. "The most important question in the innovator's mind is, 'what if...'"

7 laws of innovation

Alex Cirillo, 3M vice president of community relations and the 3M Foundation, gives presentations across the country on innovation. From observation and experience, he has developed seven laws that are the basis of his workshops.

1 Just because you can doesn't mean you should

To illustrate this point, Cirillo shows a Swiss army couch – a couch expanded from a jackknife. The caption reads "Just because you can doesn't mean you should." It is possible to make this couch, but who wants it or needs it? An innovation needs demand to succeed.

2 There is no such thing as a "long-term quick fix"

"Innovation takes its own time," Cirillo says. "You might have a brilliant idea in the first 3 minutes or never have a brilliant idea. You can't time it ... it's going to take as long as it's going to take."

3 Be multilingual — speak the language of other disciplines

The "languages" Cirillo refers to are different ways of thinking and speaking, "getting ideas and concepts from different sources." Look at a solving a problem from the viewpoints of a mathematician, artist and philosopher, not just a scientist. The real innovator is the one who can translate and understand material from other disciplines.

4 Be clear about the context in which you are working

Keep your perspective: "Don't bring major innovations to small problems and don't bring small attempts to major problems." Cirillo illustrates his point with a cartoon showing one fish saying to the other in a fish bowl, "If I'm right in my guess that this is the Atlantic, then we're the biggest fish in the world."

5 Know when to think in black and white and when to think in color

When approaching a problem, we need all types of people. Creative "rainbow" people know how to innovate but if they are left alone, "you'll never get anything done." You also need the analytical, driven "black and white" people and the "grays" who can see the anomalies. High performing, innovative teams almost always contain a diverse group of people.

6 Work hardest at building confidence in your people

"The worst kind of environment for innovation is censorship. Innovation is built around people taking chances, trying and failing. The last thing you want to teach adults is to put them in a box and make them feel uncomfortable when they get out of the box. Don't start solving a problem from limitations — what I can't do — start from the possibilities. The only way people can do that is if they're confident."

7 Make yourself and others excited about innovating

"Creative organizations are formed by the belief that anyone can be creative. If we don't expect the secretaries and bean counters to be creative, they won't. It's not healthy for any organization to just coddle the scientists."

Nation's first poultry-litter fueled plant opens

BY E. M. MORRISON

Benson, Minn. — Poultry power has come to the prairie.

The nation's first poultry litter-fueled power plant opened in October. Fibrominn is generating enough renewable electricity to serve 40,000 homes. Power from the 55-megawatt plant is being purchased by Xcel Energy as part of a state renewable energy mandate.

Fibrominn will burn 500,000 tons of poultry manure a year, as well as other biomass, according to a written statement from the company. Most of the manure is supplied by central Minnesota turkey producers. Ash from combusted litter is reconditioned for fertilizer at an adjacent plant, North American Fertilizer LLC.

The plant's opening caps nearly a decade of development efforts, which began in 1998. AURI participated in the early planning stages, working with Greg Langmo, a Litchfield, Minn., turkey grower, to explore new uses for the region's abundant poultry manure. Later, AURI assisted with research on processing the ash for fertilizer.

Fibrominn, a subsidiary of Fibrowatt LLC, a Pennsylvania biomass power developer, has created about 100 new full-time jobs, the company says. The plant will spend \$5 million a year on poultry manure and other local supplies and services. Fibrowatt is planning additional biomass power plants in Alabama, Georgia and Texas. ■



PHOTO BY ROLF HAGBERG

Benson's 55-megawatt Fibrominn power plant, fueled by poultry manure and other biomass, started operating in October. The plant is selling enough electricity to Xcel Energy to serve 40,000 homes.

Pellet with caution



While the biomass pellet-fuel industry is emerging, demand is still low and would-be pellet producers should be careful

BY DAN LEMKE

Waseca, Minn. — Businesses hoping to leap into biomass-pellet production should keep their eyes wide open, cautions a recent AURI-sponsored study.

The evaluation by Cooperative Development Services and researcher Ken Campbell looked at the challenges and competitive disadvantages that entrepreneurs and new businesses marketing ag-based biomass pellets could face.

"We've seen a great deal of interest from people who want to produce biomass pellets for home-heating or industrial applications," says Al Doering, head of AURI's coproduct utilization program in Waseca. "There are some real challenges with trying to enter the

market with a product that has to compete with corn or even wood pellets.

"We wanted to produce a guide that includes all the variables that need to be considered before someone purchases equipment or builds buildings with the intention of going into business," adds Dennis Timmerman, AURI project director.

The guide isn't a business feasibility study, rather a reference document that contains technical and financial information, cost estimates, industry data and other relevant information for a commercial enterprise with a stand-alone pellet plant.

While many businesses are interested in such facilities, the study warns that the pellet market is limited. A number of residential

and small industrial pellet stoves and industrial boilers can burn biomass pellets. And currently no companies are selling large quantities of biomass pellets to those markets, but there also doesn't appear to be great demand.

The fuel-pellet industry is emerging, but future growth is not a certainty, the study found. "Economics will always drive the viability of opportunities like biomass pelleting for energy," Doering says.

"We know it is technically feasible to make biomass pellets from corn stover, processing waste, grasses or other sources, but they have to compete economically with things like coal, natural gas or electricity."

The 127-page evaluation assessed permitting

processes, technical feasibility, plant requirements and capital costs, project financing and the political environment. It also assesses issues surrounding various agricultural feedstocks including costs for raw materials, handling and transportation.

"People are enthused about the opportunity to use coproducts and biomass for pellet fuels," Doering says. "Industrial and commercial opportunities will continue to grow; however, we strongly encourage anyone looking to build a plant or start a business to take a good hard look so they don't make an expensive mistake." ■

A copy of the full report is available to Minnesota residents by contacting the AURI Marshall office at (507) 537-7440.

Ash back

AURI research looks at recycling waste ash for fertilizer

BY E. M. MORRISON

AURI is rehashing ash.

The ash left after burning crop residues for energy can be recycled as fertilizer. Biomass ash retains many nutrients, especially phosphorus and potassium.

This spring, AURI will evaluate ash's effectiveness as corn fertilizer. Ash from biomass reactors in Benson, Winnebago and Little Falls, Minn., will be applied to corn test plots at the University of Minnesota's Southern Research and Outreach Center in Waseca.

"One of the criticisms of using biomass for energy is that you also remove nutrients along with the plant residues," says Al Doering, a scientist at AURI's coproduct lab in Waseca. But using biomass ash for fertilizer "returns the nutrients and micronutrients to the land."

Many ag-processing facilities generate ash, which is often spread on cropland. "But every kind of ash is a little bit different," says U of M soil scientist Jeff Vetsch, who will lead the research trials.

So far, there's little experimental evidence demonstrating how field crops respond to biomass ash, he says. "That's why we are doing these trials. We want to see how available the nutrients are compared to conventional fertilizers. We expect to show growers that ash waste is a valuable source of fertilizer, and that there are no negative effects on crop production."

Biomass ash nutrients vary with feedstock and combustion method. In general, though, agricultural ash contains about 200 to 300 pounds of phosphorus (P) and potassium (K) per ton, Vetsch says. Ash also contains important micronutrients, such as sulfur and zinc, but very little nitrogen. Ash's high pH may provide a small liming effect, as well, Vetsch adds.

The upcoming research trials will evaluate ash produced by turkey-litter incineration, wood-chip gasification and distiller's syrup combustion — biomass energy technologies now in commercial use by Minnesota companies.

Ash from each source will be chemically analyzed for nutrient content, then applied to test plots of corn following soybeans. Two different application rates will be evaluated, equivalent to 50 and 100 pounds per acre of phosphate, Vetsch says.

Corn's response to ash will be compared to conventional P and K fertilizers. Besides comparing plant growth and grain yields, corn-tissue samples will be analyzed for P and K concentration and uptake. Soil samples will be taken before, during and after the growing season to assess mineralization — the decomposing of organic nutrients into forms that plants can use.

Keeping it together

The second research phase will focus on ash agglomeration methods.

Biomass ash is fine and light and can be applied with a commercial air spreader or spinner-type spreader. But Doering says compressing ash into pellets would greatly improve handling. Pelletizing would also allow ash to be incorporated into commercial fertilizer blends. AURI will collaborate with Bepex International, a Minneapolis particle processing company, to evaluate ways to densify the material, Doering says.

Biomass ash supplies are becoming available while conventional fertilizer prices are surging. Phosphate fertilizer's price, for example, rose 40 percent between April 2005 and April 2007, according to the USDA Economic Research Service.

As biomass gasification develops, Vetsch says, waste ashes "may become very economical sources of fertilizer." ■

PHOTO BY ROLF HAGBERG



A biomass gasifier, the large cylinder rising in the center of the photo above, will replace about 20 percent of the Chippewa Valley Ethanol Company's energy consumption when it goes online in early 2008. Eventually gasification will supply all of the plant's energy needs.

Innovative companies in an innovative town

Benson, Minn., population 3,300, is home to several agribusinesses doing innovative things with renewables.

Fibrominn, a 55-megawatt power plant, is the nation's first to generate electricity from poultry litter. Another local company, Future Products,

manufactures apparel made of Ingeo, a cloth spun from corn. Chippewa Valley Ethanol Company is the state's second ethanol plant to install biomass gasification. AURI has worked with all three Benson companies. ■



Biomass bridge

Gasified wood chips and corn cobs are replacing natural gas at Benson ethanol plant

BY E. M. MORRISON

Benson, Minn. — A Minnesota ethanol company is building a biomass bridge to an energy self-sufficient future.

Chippewa Valley Ethanol Company will gasify wood chips, corn cobs and other biomass to run its plant. The system will go on line early 2008, replacing about 20 percent of the company's natural gas consumption. Eventually, biomass gasification will supply nearly all of CVEC's energy needs.

Gasification will cut the company's exposure to volatile natural gas prices, says Bill Lee, CVEC general manager. Just as important, Lee says, powering the 45-million-gallon refinery with biomass will produce ethanol that's more environmentally friendly.

Biomass gasification will also set the stage for the transition from starch-based ethanol to cellulosic ethanol. "This is the next step" in the evolution of renewable transportation fuels, Lee says, a "bridge" stage "before we get to cellulosic ethanol."

Three-phase project

Gasification converts solid organic material, such as plant residues, into a low-Btu gas that can be burned like natural gas in a furnace, turbine or engine. CVEC's three-phase gasification system is being designed and built by Frontline BioEnergy of Ames, Iowa. The Phase I pilot plant broke ground last July. It will supply synthetic natural gas, or syngas, to a retrofitted boiler that generates steam for distillation and other processing steps.

The pilot gasifier will consume 35 to 70 tons per day of biomass and will accommodate a range of feedstocks. "Initially, we will use wood chips," Lee says. By next summer, the company expects to be gasifying corn cobs and distiller's grains. CVEC will also experiment with other biomass feedstocks, such as corn stover and perennial grasses, Lee says.

In Phase 2, CVEC will install additional syngas-cleaning technology. In the final phase, the gasification system will be scaled up to fuel the entire plant. The full-size system will consume about 250 tons of biomass daily, furnishing 90 percent of the plant's energy needs.

The entire project will take three years to complete.

Volatile gas prices spark innovation

High and increasingly unpredictable natural gas prices prompted the farmer-owned ethanol-maker to look for alternatives. Natural gas is the plant's second biggest expense, after corn, running \$15 to \$20 million a year. "Two years ago, we were seeing natural gas prices of 8, 10, 12 dollars" per million Btu, Lee says. After falling in the summer of 2007 to around \$4/MMBtu, natural gas prices again climbed above \$7/MMBtu last fall.

"It looked like the less we depended on that energy market, the better," says Brandon, Minn., farmer Gene Fynboh, a longtime CVEC board member. "We have biomass resources in our own backyard that can fire the plant." Instead of sending energy dollars to Canada or Texas, he says, "we thought it would be better to spread \$16 million around our own communities."

CVEC also expects low-carbon fuel standards to emerge, creating demand for ethanol made with fewer fossil fuel inputs. Already, California has set a goal of cutting the carbon intensity of transportation fuels at least 10 percent by 2020.

Running a dry-grind mill on biomass power nearly doubles corn ethanol's "energy balance," the volume of ethanol produced per fossil-fuel unit, according to the Great Plains Institute, a renewable energy policy group. As carbon emissions trading develops, Lee says, "a plant running on biomass will have an advantage."

Developing biomass markets

One of the main difficulties in using biomass power is the lack of an efficient feedstock supply and distribution infrastructure, Lee says.

"The biomass industry is very immature. There's a vast, untapped supply of these materials, but they are hard to handle." Nobody really knows yet what biomass will cost to collect and transport, he says, but one thing is certain: "The marketplace is dynamic." As demand for biomass builds, "smart people will figure out how to manage it well and costs will come down."

Minnesota's farmer-owned ethanol co-ops could serve as a good model for new

biomass-supply ventures, he says, aligning the interests of biomass producers and users.

AURI, the University of Minnesota, and others are now working on improved methods for collecting, pre-processing and storing biomass. AURI and Minnesota Corn Growers and Soybean Growers, for example, are sponsoring research on compacting bulky, lightweight crop residues into dense blocks or pellets that are easier to transport and store.

The USDA North Central Soil Conservation Research Lab in Morris is working on environmentally-sustainable ways to remove corn stover and other crop residues from the soil. Minnesota researchers are also investigating biomass energy crops, such as high-yielding prairie grasses, fast-growing trees, sorghum and miscanthus.

Growing a biomass industry

Minnesota has all the ingredients for a successful biomass-energy sector: feedstocks, research and emerging end users, says Michael Sparby, AURI project director. CVEC is the third Minnesota ethanol plant to adopt biomass power. Corn Plus in Winnebago is burning ethanol byproducts in a fluid bed reactor. Central Minnesota Ethanol Co-op in Little Falls is gasifying waste wood. Other Minnesota organizations are gasifying grass-seed chaff, turkey litter and corn stover.

Pioneering enterprises like these will spur development of a biomass industry and create opportunities for entrepreneurs and innovators, Sparby says. That's a prerequisite for the ultimate goal — making ethanol and other renewable products from cellulose, the woody fiber found in all plants.

"You can't have a cellulosic ethanol industry unless you have a biomass market first," says Lee, who often speaks to farm and industry groups about ethanol trends. By analogy, "15 years ago there wasn't much ethanol yet, but there certainly was an existing corn market and a lot of cheap corn."

It's clear that cellulosic ethanol technology is on the horizon, Lee says, "but it's going to take some time. While we're waiting, let's transition to biomass power." ■



PHOTOS BY ROLF HAGBERG

Chippewa Valley ethanol plant's natural gas

Visionary ethanol-plant leader taps markets like vodka and E-85 to increase company profits

BY E. M. MORRISON

The man behind Chippewa Valley Ethanol Company's move to biomass power is a sandy-haired chemical engineer with a slow Tennessee drawl and a quick eye for new opportunities.

Bill Lee leads the Chippewa Valley Ethanol Company in Benson, a farmer-owned cooperative that has gained a national reputation for innovation. "Bill is looked upon as a go-to guy, a real visionary," says AURI project director Michael Sparby, who has worked with Lee for a decade. "He's highly respected in the ethanol industry."

Lee, 56, grew up in eastern Tennessee. He has spent more than three decades in the grain-processing industry, including stints at Ralston Purina and A. E. Staley, where he managed a corn wet mill in Loudon, Tenn. In 1994, Lee joined Delta-T Corporation, a Virginia-based ethanol plant developer. He was the start-up manager at Corn Plus, a Winnebago, Minn., ethanol plant and oversaw construction of the Benson ethanol plant for Delta-T. In 1996 he became the plant general manager.

Under Lee's guidance, CVEC has expanded from 15 million gallons per year to 46 million gallons. The company posted revenues of \$32 million in 2006. At the same time, CVEC diversified into an unusual array of products — including vodka. "We've become known for doing a few things a little differently," Lee says.

CVEC's E-85 distribution program is one example. The company supplies 115 Minnesota gas stations, serving one-third of the state's E-85 retail outlets. "In the past five years, we have sold more E-85 than anybody in the country," Lee says. In 2006, E-85 sales contributed nearly \$9.5 million to plant revenues, according to the company's most recent annual report.

CVEC also makes industrial-grade, organic and kosher alcohol for use in cosmetics, food and other products. "We're the largest producer of certified organic alcohol in the U.S.," Lee says. These high-margin niche markets are growing rapidly, he says. The plant doubled its sales of industrial alcohol in 2006 to 4.3 million gallons.

The best-known CVEC product is Shakers Vodka, introduced four years ago by Infinite Spirits, a California marketing company. Shakers, available in several flavors, is distilled from wheat and packaged in a distinctive Art Deco-style bottle.

CVEC launched its industrial alcohol and spirits division, Glacial Grain Spirits, as a

hedge against times "when fuel-alcohol prices were low," says Brandon, Minn., farmer Gene Fynboh, a CVEC founder. "It's another market." Glacial Grain Spirits added \$400,000 to the co-op's bottom line in 2005, but lost money in 2006, when fuel-alcohol prices went sky-high.

CVEC's newest venture is a partnership with Frontline BioEnergy LLC to install a biomass gasification system at the Benson plant (see related story page 6). CVEC has taken an ownership stake in the Ames, Iowa start-up company, which is building biomass gasification systems for ethanol plants. Frontline is also developing methods to make ethanol from syngas. "This is where we see our industry heading," Lee says.

Fostering innovation

The CVEC Board of Directors has encouraged innovation, Lee says. The directors have "a sophisticated view of the business and an appreciation for the strength in diversification. They've been very supportive as we've reached out to new areas." Fynboh, who has served on the board from the beginning, recalls a board retreat where "we all took one of those personality tests, and everybody on the board was a 'pioneer.'"

Lee and his board are active in state and national policy work, too. "The time we invest is part of our long-term commitment to build the industry," says Lee, past president of the Renewable Fuels Association, an ethanol trade group. "We don't often differentiate between what's good for our company and what's good for our industry."

Lee also credits his staff. "It takes exceptional ability and dedication to develop and integrate new technologies while maintaining the base operation at a very high level of performance."

CVEC has "taken risks to move the company forward and position itself to take advantage of opportunities," Sparby says. That kind of innovation takes "a lot of leadership and courage," Fynboh says. "Bill is always thinking of things that could benefit the plant or the industry in the future." ■

Bill Lee, general manager of Chippewa Valley Ethanol Company, has built a national reputation for innovation. Besides ethanol, CVEC produces Shakers Vodka, organic and kosher alcohol for cosmetics, food and other markets and leads the nation in E-85 production.

Reputation *for* innovation



PHOTOS BY ROLF HAGBERG



Where are they now?

Editors note: This is the first in a series that will update readers on entrepreneurial ventures featured in past issues of Ag Innovation News. Where are these ventures now? What challenges have they faced? What have they added, deleted and learned about bringing new value-added products to the market?



PHOTOS BY DAN LEMKE

Minn. They recently sold Renaissance to a Massachusetts company, but immediately started another company to promote organic fertilizers.

Getting started

In 1994, Batdorf and Hodges joined a group investing in a Minnesota company producing soybean-based organic fertilizer. Soon after, the investors formed a corporation and Batdorf and Hodges began running the company.

“We were awfully naive,” Batdorf says.

“I didn’t even know what NPK (nitrogen-phosphorous-potassium) meant,” Hodges adds.

She soon learned.

Over the next several years, Renaissance Fertilizers grew and began producing several fertilizer blends containing various NPK levels: 6-0-6, 8-2-6 and 5-5-5 made from soybeans and other ag-based products.

Batdorf, a World War II fighter pilot and former CEO of boat maker Larson Industries and CEO of toymaker Tonka Corporation, became the Renaissance board chair. Hodges, 72, a former physical therapist and author, served as president “because I was the only detail person,” Hodges says.



The company started carrying a line of liquid fertilizers, biofungicides and corn-gluten-meal weed killer. AURI helped the budding business with marketing and packaging.

“The fertilizers were an innovative new way to use significant amounts of a major Minnesota-grown commodity,” says Max Norris, AURI director of projects and technology. Norris says, whether they knew it or not, Renaissance had become a biorefinery — taking agricultural products into a new arena.

Like the roots of the plants they feed, Renaissance Fertilizers has grown markets across the United States. The products are sold in every state east of the Mississippi River, as well as Minnesota, Iowa and the Dakotas. Five U.S. facilities manufacture

the Renaissance line, including two in Minnesota, and plants in Georgia, Indiana and Connecticut.

Growing pains

Before Renaissance became a success, the owners had a few market lessons to learn.

Immediately they targeted what seemed a perfect fit — golf courses. The all-natural fertilizers provide slow-release nitrogen, are made without phosphorous, which in excess can run off and cause algae blooms in waterways, and they are safe around pets and children.

“We thought courses would be very willing to try our products,” Batdorf says. “But then we learned that greens keepers aren’t about to take risks.” Golf course greens cost tens of thousands of dollars and superintendents weren’t willing to take a chance on the unproven product.

Hodges and Batdorf knew they needed independent research results to convince potential buyers their products were safe and effective. Turf research at Iowa State University helped build the product’s credibility. ISU results showed Renaissance products out-performed the other all-natural fertilizers that were tested.

“That made a big difference in convincing people,” Hodges says. “They started to listen.”

While lawn care, turf management, parks, schools and organic farming have proven to be fertile markets, selling through retail channels has been a more difficult task. Batdorf says it is challenging to get consumers to accept organic fertilizer. “People won’t buy what they don’t know. And if they do accept it, then they question price, and organics cost more than non-organics.”

A new chapter

In early 2007, Renaissance sold its assets, name and trademark to PJC Ecological Landscaping of Rowley, Mass. But Hodges and Batdorf remain actively involved with their products’ success and formed another corporation, Grow Organic, to market and distribute organic fertilizer products. The pair exhibit at trade shows and help clients navigate the arduous task of organic certification to promote and market the Renaissance brand.

While Batdorf wryly calls the Renaissance venture “the most expensive hobby he’s ever been involved with,” he and Hodges are seeing the fruits of their labors in more than just green grass and flowering gardens.

“Our products are getting good recognition,” Hodges says, “and people know we give good service. The word of mouth is good.” ■

Changing roles

Long-time business partners still promote the soy-fertilizer business they built and sold

Business partners Abby Jane Hodges and Gordon Batdorf were featured in the July 1997 issue of Ag Innovation News (above right) after they started managing Renaissance Fertilizers, Inc., producers of organic fertilizers made from soybeans, corn gluten meal and other ag products. They recently sold the company but continue to promote organic fertilizers.

BY DAN LEMKE

Minnetonka, Minn. — Abby Jane “A.J.” Hodges quotes from the movie Rocky when describing how she and business partner Gordon Batdorf have successfully worked together for more than 14 years.

“Rocky is talking about why he’s attracted to his girlfriend Adrian and says it’s because

she fills gaps. He has gaps and she has gaps — together they fill those gaps. I guess Gordy and I do the same thing.”

From 1994 to 2007, Hodges, 72, and Batdorf, 87, operated Renaissance Fertilizers, Inc. — producers of organic fertilizers made from soybeans, corn gluten meal and other agricultural products — in Minnetonka,

Elsewhere in ag innovations

BY DAN LEMKE
CARTOONS © UNCLE HYGGLY

A crush on garlic

Eating raw garlic may be good for your heart, but not your breath. The solution: crush the pungent little bulbs, then bake them slightly.

Garlic and its close relative, the onion, are rich sources of heart-protecting compounds called thiosulfates. These sulfur compounds may lower blood pressure and break up potentially harmful clusters of platelets in the bloodstream.

ARS researchers and collaborators in Argentina tested various cooking techniques to assess how they affected garlic's ability to break up artery clogging platelets. The scientists found that crushing and baking only slightly reduced garlic's effectiveness, while microwaving almost stripped the garlic bulb of any positive effects.

From: USDA-ARS, September 18, 2007

Beneficial beef

Canadian researchers are working on a beef cattle diet that maximizes the amount of conjugated linoleic acid in beef products. CLA

is a fatty acid in all beef and dairy products that may help prevent diseases such as cancer, heart disease, diabetes and kidney disease.

CLA is formed naturally in beef when linoleic acid from digested plant material is converted in the rumen. Pasture-fed animals tend to have the highest CLA concentrations, although diets supplemented with ingredients such as sunflower seeds have also shown elevated levels.

From: www.CLAnetwork.com, September 19, 2007

Hold the lignin

New low-lignin sorghum varieties may be good news for both feed and fuel producers. Developed by ARS researchers in Nebraska, the new strains are more digestible by cattle and could be easier to convert to ethanol.

Lignin provides rigidity and strength to plant tissue and helps fend off attacking insects and pathogen. But it can impede digestion and cellulosic conversion to ethanol. The newer varieties should improve beef and milk production and sorghum-to-ethanol conversion.

From: USDA-ARS, September 10, 2007

Phyto potato

The nearly 130 pounds of potatoes that the average American consumes annually may be boosting our health. New ARS research has identified 60 different phytochemicals in the skins and flesh of 100 varieties of potatoes. Those chemicals, called phenols, may help reduce cardiovascular disease, respiratory problems and certain cancers. Some of the varieties' phytochemicals were similar to those in broccoli, spinach and brussel sprouts.

From: USDA-ARS, September 7, 2007

Soybean 'Stang

Soybean-based polyurethane foam will be used to keep passengers and drivers of the 2008 Ford Mustang comfortable. Ford Motor Company is using soy-based polyols in the seat backs and cushions of the popular sports car. Soy polyols have proven to perform as well or better than their petroleum-based counterparts in total weight, strength and durability.

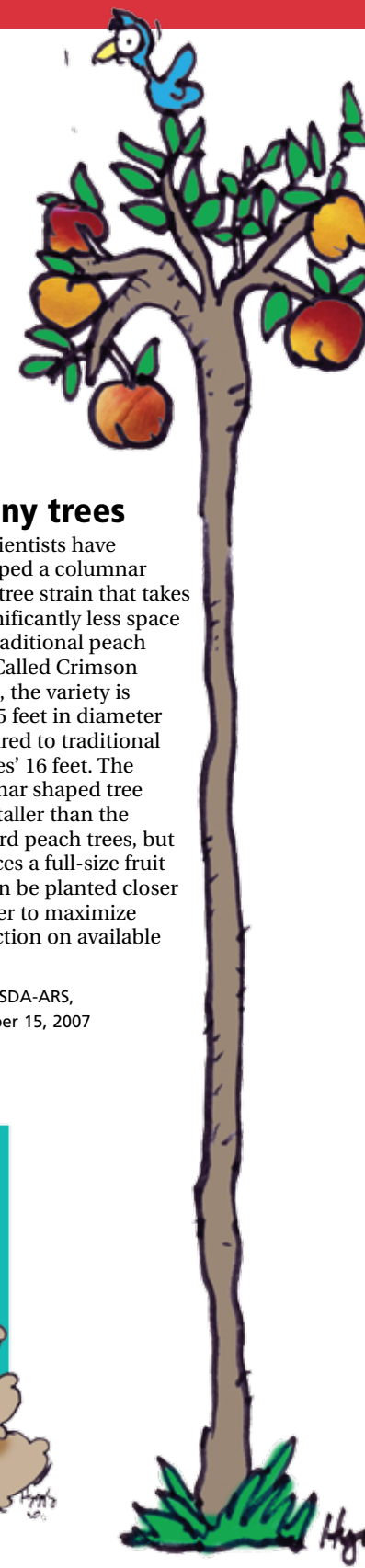
Ford researchers aim to eventually replace up to 40 percent of the standard polyol with soy-based material, which could save Ford up to \$26 million annually and benefit the environment.

From: Biobased Solutions, September, 2007

Battery charged

Soybean growers are powering studies of using soybean oil in biofuel cell batteries. Cell phones, laptop computers and other devices are powered by rechargeable batteries that typically contain toxic heavy metals. Biofuel cells convert energy derived from chemical reactions to electrical energy by the catalytic activity of living cells. The United Soybean Board and Nebraska Soybean Board are working with St. Louis University to determine the feasibility of the soybean batteries.

From: Biobased Solutions, July, 2007



Skinny trees

ARS scientists have developed a columnar peach tree strain that takes up significantly less space than traditional peach trees. Called Crimson Rocket, the variety is about 5 feet in diameter compared to traditional varieties' 16 feet. The columnar shaped tree grows taller than the standard peach trees, but produces a full-size fruit and can be planted closer together to maximize production on available land.

From: USDA-ARS, November 15, 2007



Veteran scientist joins AURI

Doug Root joined the AURI staff in Marshall in October as senior scientist working in biomass and renewable products technologies. A Minneapolis native, Root is a veteran of the pharmaceutical and renewable-energy industries.

Root earned his bachelors degree in chemistry from the University of Minnesota and his doctorate in chemistry from the University of Arizona. He began working at the University of Hawaii, later becoming involved in Hawaii's

sugar industry. Root returned to the mainland and began working in the pharmaceutical industry with several leading companies. He also became involved with renewable energy.

"The area of biofuels is particularly exciting," says Root. "The idea of working toward energy self-sufficiency while creating value-added opportunities is part of what makes biofuels so fascinating."

Root will be directly involved in renewable-

energy projects for AURI, particularly those involving the use and development of biomass sources. Having been involved in the product launch of a number of pharmaceutical products, Root says that experience is a good match for AURI.

"I'm excited about being a part of AURI. There's not another organization like us that is connected to getting a product to the market. We get to bring ideas to reality." ■



All about innovation

BY TERESA SPAETH

The word has been on the masthead of this newspaper for 16 years — innovation.

Innovation has become a popular term these days as businesses seek to differentiate themselves from the competition by being more creative, more willing to think outside the box.

By definition, to innovate is to bring forward something new. It's not just about generating ideas, but bringing ideas to reality. It's more than conceiving a great thought, it's about follow-through.

Since our inception, AURI has been all about innovation. Our mission is to move ag products to new places and create new uses to make them worth more. That's innovation.

Innovation doesn't just happen. It takes effort to think innovatively, to see around corners then follow through. It's not productive to do things the way they've always been done, then expect to be innovative.

Those of us who have been around it know that innovation is part of agriculture's fabric. Producers have adjusted with the times and with technology. In many cases, it has been farmers who have been the catalysts responsible for changing the times, evidenced by ag-based renewable energy.

AURI staff is focusing on ways to be more innovative in our thinking and actions. We are striving to think innovatively internally and in our external actions. This is a concerted effort to provide assistance and resources that will help keep Minnesota at the forefront of innovation.

We certainly can't and don't do this alone. But by collaborating with our partners, talking to our stakeholders, listening to experts, paying attention to technology and other advances, AURI is well prepared to bring good ideas to reality.

That's innovation. That's leadership.

P.S. We also hope that everyone had a safe and prosperous harvest season, regardless of what you were harvesting.



Spaeth.

AURI GUIDE TO SERVICES

A nonprofit corporation created to strengthen rural Minnesota's economy, AURI helps businesses respond to market opportunities with new and value-added uses for agricultural goods. The Institute builds working partnerships with business innovators, agricultural groups and researchers, and provides technical support to clients conducting new product research and development.

AURI programs are available to legally-organized businesses or cooperatives with projects that have the potential to create new uses or new markets for Minnesota agricultural commodities. AURI assistance is designed for the early stages of a product's life cycle, while an element of feasibility is yet to be determined.

Project proposals are evaluated on the following criteria:

- Innovation/uniqueness
- Market viability
- Use of Minnesota commodities
- Number of farmer-producers impacted
- Amount of value added from further processing
- Economic impact
- Cost savings

Programs are designed to assist with:

- Identifying emerging value-added opportunities
- Developing innovative commodity-based products
- Developing production processes for feasible products
- Promoting products developed with AURI technical assistance
- Providing resources to bring new products and processes to the marketplace

Assistance may include:

- Access to AURI's scientific and business staff
- Access to laboratory and pilot plant facilities
- Product development and feasibility testing
- Process evaluation and improvement
- Technology transfer and applied research
- Business needs evaluation
- Links to available resources
- Potential for grant funds to qualifying applicants

AURI provides resources proportionate to the project's impact. Smaller-impact projects may be eligible for technical assistance only, while projects with industry-wide impact may be eligible for financial assistance.

AURI Facilities

- AURI operates several laboratories:
- Coproducts Utilization Laboratory and Pilot Plant, Waseca
 - Fats and Oils Laboratory, Marshall
 - Meat Laboratory, Marshall

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For staff e-mail addresses, visit AURI on the Web: www.auri.org

AURI Ag Innovation Quiz

1. What ag processing leftover is being evaluated for its fertilizer potential?
 - a. Ash
 - b. Corn silks
 - c. Oat hulls
2. How much biomass will the CVEC gasifier consume per day?
 - a. 1,000 pounds
 - b. 35-70 tons
 - c. 11 tons
3. What is the focus of all AURI efforts and projects?
 - a. Intensions
 - b. Convention
 - c. Innovation
4. What are the ingredients necessary for a successful biomass-energy sector according to one AURI staffer?
 - a. Blood, sweat, tears
 - b. Feedstocks, research and end users
 - c. Pepperoni, sausage and extra cheese
5. What is the primary ingredient in most Renaissance Fertilizer products?
 - a. Feather meal
 - b. Glycerin
 - c. Soybeans
6. Why are many jobs in the biofuels industry called "gold collar" jobs?
 - a. It's the dress code
 - b. They require both thinking and doing
 - c. All require doctorate degrees
7. What town in West Central Minnesota is home to both an innovative ethanol plant and the nation's first poultry litter-powered electrical generation facility?
 - a. Bellingham
 - b. Belgrade
 - c. Benson
8. What farcical innovation did Alex Cirillo use to illustrate the point that true innovations must have a demand?
 - a. The automatic dog polisher
 - b. The Swiss Army couch
 - c. The perpetual motion machine



Answers: 1. a; 2. b; 3. c; 4. b; 5. c; 6. b; 7. c; 8. b

ABOUT AG INNOVATION NEWS

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Biofuels industry seeks to attract 'gold collar' workers

Assessment shows that finding and keeping high-level staff is key to ethanol and biodiesel industry progress

BY DAN LEMKE

The biggest challenge for the ethanol and biodiesel industry isn't technology or enough raw materials. It's not even public policy. The biggest hurdle is finding, training and keeping qualified employees.

That was the findings of a multi-state biofuels needs assessment sponsored by AURI, Minnesota Corn Growers, Minnesota Soybean Growers and Southwest Minnesota Foundation. The evaluation helped identify future ethanol and biodiesel plant staffing needs and any impediments to plant progress.

The assessment showed there could be as many as 7,000 to 10,000 jobs created in ethanol and 7,300 to 9,800 jobs in biodiesel over the next few years. Many of these jobs are what one interviewee called "gold collar" positions.

"A gold-collar job combines both thinking and doing," says Duane Carrow, renewable-energy program director at Minnesota West Community and Technical College in Granite Falls, Minn. "Those are the kinds of jobs that are available in the renewable-fuels industry."

The challenge is retaining quality talent. Plant managers, in particular, are in high demand and can be difficult to retain because of opportunities at other facilities. Changing key managers can have a lasting impact on plants as it takes valuable time and resources to acclimate new leaders. Operator positions tend to have lower turnover due to advancement opportunities.

The assessment included interviewing and surveying nearly 80 people involved in Midwest biofuels production. Conducted by the Russell Herder marketing firm, and assisted by student marketing programs at Southwest Minnesota State and Bemidji State Universities, the survey identified immediate staffing needs for the industry, but also found good job opportunities.

While the biofuels industry is driven largely by public policy, such as renewable-fuels standards, the growth outlook is strong, the study showed. About 40 new ethanol plants across the country are under construction or being planned for the next two years. Biodiesel growth isn't likely to be as aggressive as ethanol, but it is expected to provide opportunities for rural communities.

The skills that will grow in demand include plant management, rail safety, basic equipment operation and mechanical engineering. While the need for qualified employees is high, most plants aren't financially able to invest enough in employee training — other than on-the-job.

The need for more training is creating opportunities for renewable-energy curriculum at Midwest higher education institutions. Several do offer biofuels training, but there is an urgent need for more.

"The education system needs to come to the table quite quickly to meet those educational needs today," says Chuck Neece of FUMPA Biofuels in Redwood Falls.

Technical proficiency is a key requirement for employees at any level, but the assessment identified leadership, team-building and skills in multiple disciplines as being of greater importance in any position.

Industry leaders and plant managers also recognize the importance of raising awareness of biofuels career opportunities to inspire young people to work in the industry.

"This assessment was originated to give us an idea of what the needs were and to get a lay

of the land," says AURI Executive Director Teresa Spaeth. "This will go hand-in-hand with the efforts of the talent development team of the Renewable Energy Roundtable.

"It has become fairly obvious that while issues like public policy and research are important to the industry, right now talent development is key."

Information from the biofuel-needs assessment will be used to identify educational needs and highlight career opportunities — the fuel that the industry needs to keep it from running out of energy. ■



PHOTOS BY ROLF HAGBERG