By Deborah Nason

Becoming A Biofuel State

How close is Connecticut to becoming a biofuel state?

"BIOFUELS COULD BE a nexus for Connecticut for the 21st century," says Richard Parnas, using a scientific concept to convey how a new idea can create an economic chain reaction. Parnas is an associate professor at the UConn School of Engineering and one of the leaders of Connecticut's emerging biofuel industry.

Indeed, many say the nascent industry could galvanize Connecticut, enabling it to benefit from its current energy disadvantages, while creating economic linkages between its disparate regional economies.

While corn-based ethanol is making big news in the Midwest, biodiesel is receiving much attention because of its availability in other regions of the country, including New England. In Connecticut, organizations such as the Connecticut Biodiesel/Bioheat Association and the UConn Biofuels Consortium were recently formed for the purpose of developing the state's biofuel industry—especially in light of Connecticut's massive market for home heating oil.

WHAT'S IN A NAME?

The term 'biofuel' refers to renewable liquid fuels made from plant matter instead of fossil fuels, and includes:

- **Ethanol**—Largely based on corn at present, and popularly used in mixture with gasoline (i.e., E85 or 85 percent ethanol); however, R&D initiatives are focusing on the use of cheaper and more plentiful cellulose—waste products from crops, wood or municipal sources.
- **Biodiesel**—Based on vegetable oils (virgin or from waste sources) or animal fats, pure biodiesel is designated B100 by the American Society for Testing and Materials (ASTM). B20 is a 20 percent blend of biodiesel with regular diesel fuel; B5 is five percent biodiesel, etc.
- **Bioheat®**—A trademark of the National Biodiesel Board and the National Oilheat Research Alliance, this term refers to fuel made from a combination of biodiesel and generic heating oil.

"The biofuels industry transcends political boundaries," says Parnas. "It spans the political spectrum, appealing to conservatives who want to develop the industry and [create] jobs, environmentalists who want to preserve open space and farmers who want to reinvigorate the agricultural community." In fact, the dots are beginning to be connected between industry players from diverse places like Norwalk, Bethlehem, New Haven, Hartford, Storrs, North Franklin and Willimantic.

Parnas describes three areas in which Connecticut could position its growth in the biofuel industry and attract investment:

- **Agricultural production of energy crops.** "If we create 'energy plantations' in 10 percent of Connecticut—310,000 acres—we could displace 15 percent (even 25 percent in the future) of our petroleum requirements." He points out that this percentage is roughly equal to what Nutmeggers currently import from the Middle East.
- **Building biofuel 'refineries.'** "The chemistry is green and non-toxic," he says. Many refineries will be needed locally, going forward. "The economics tell us that you don't want to transport biomass more than 50 miles—it's heavy and expensive," thus turning Connecticut's end-of-the pipeline location from a disadvantage to a potential economic advantage. This type of production also lends itself to the development of brownfields, he adds.
- **Blending and distribution**. New infrastructure will be needed for blending, Parnas says, including holding tanks, blending machinery and pumps. Part of a potential distribution network is already available through heating oil dealers and gas stations.

While at least half the states in the U.S. are developing their own biofuel industries, Parnas says Connecticut has some advantages, including its location between New York and Boston, its natural and large market for heating oil, local investment sources and a research university. (See sidebar 1.)

The U.S. biofuel industry is small, but it's growing rapidly. According to a 2006 report by the agricultural research firm Soyatech, the consumption of ethanol is expected to grow from 4.5 billion gallons in 2006 to over 16 billion gallons (10 percent of gasoline consumption) in 2015. Likewise, biodiesel will reach 2.15 billion gallons (four percent of diesel consumption) by 2015. Currently, the production of biodiesel is estimated at about 300 million gallons per year.

"We're brilliantly positioned to do this—to take a leadership role in how our state consumes and utilizes energy," says Mike Devine, president of Devine Brothers Inc. in Norwalk. Through its subsidiary, Devine Bioheat, the company blends biodiesel into a five percent mixture with regular heating oil and distributes it throughout Connecticut. "We have deep water ports and rail transportation to bring in biodiesel from multiple sources," he says, "and we have a progressive population that would support this. Our customers are grateful to have this come to them." In fact, he says the company has experienced a 33 percent growth since introducing Bioheat® to its customers five years ago.

Gus Kellogg fills his car with pure biodiesel (B100) from a 55-gallon drum in his driveway.

Devine Bioheat currently imports its biodiesel from Iowa and Minnesota. Would it also use a Connecticut-produced product? "Why not?" asks Devine, adding, "The opportunities for [our state] will be in local farmland feedstock and recycling yellow greases."

The economic implications for Connecticut are compelling, says Stanley McMillen, managing economist for the State of Connecticut Department of Economic and Community Development (DECD). Although he estimates job creation will only be in the hundreds, other influences will benefit the economy as a whole in significant ways:

- **Environmental avoidance costs.** McMillen cites a Connecticut Center for Economic Analysis estimate which says that using biodiesel for home heating and on-and off-road heavy-duty vehicles could save Connecticut $20 million in health care costs.
- **Research power.** "We have an enormous amount of research capabilities in Connecticut," he says, which can result in an inflow of research investment. "The development of patents can lead to start-up companies with high-tech jobs. Some of the current research includes new types of plants with higher yields and more efficient

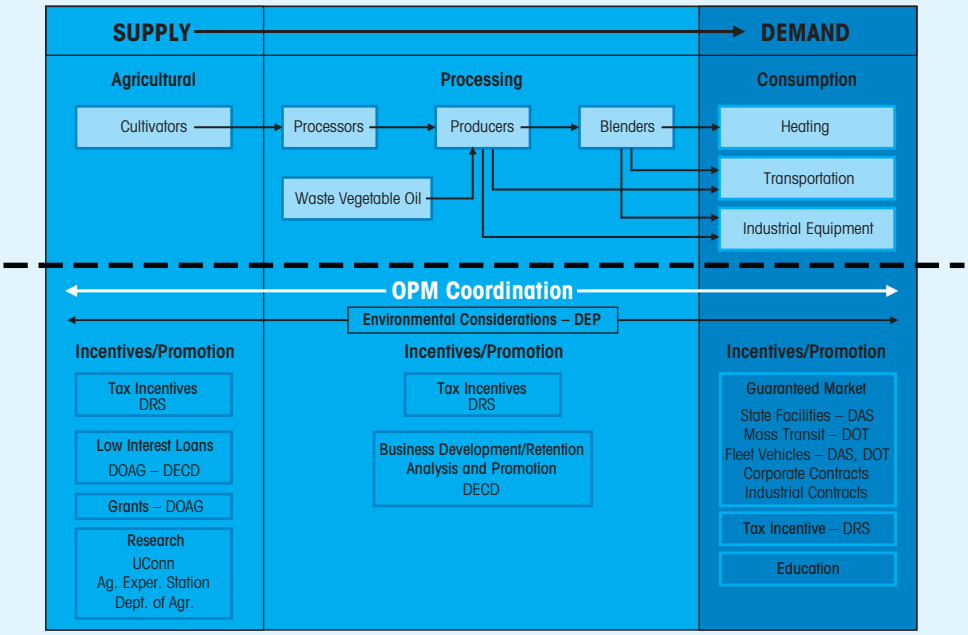
Biofuel Research at UConn

RICHARD PARNAS, AN ASSOCIATE PROFESSOR at the UConn School of Engineering and a member of the UConn Biofuels Consortium, claims that UConn is in a "very good position versus other universities across the U.S. because we have all the pieces." For example:

- **Research and development.** Parnas says the university is highly advanced in the areas of cultivar optimization and prototype plant design, developing cold climate energy crops such as fast-growing poplars. "We have [biofuel-related] companies wanting to relocate to Connecticut because we have better plant science here."
- **Low-cost testing.** The testing of fuel samples, sent to outside labs, costs anywhere from $650 to $1,000 a day, he says. "UConn is the only university in the U.S. [that is] setting up an ASTM testing facility, meaning we can test samples for less. We are also developing an in-house testing method."
- **IP.** Parnas says UConn has created an intellectual property infrastructure which offers consulting and licensing services.
- **Workforce development.** "We are the only university in the country putting a biodiesel production lab into our [chemical, materials and biomolecular engineering] curriculum," he says.

Biodiesel Industry Development Strategy

Figure 1



The Private Sector's Role in Biofuel

THE PRIVATE SECTOR is building its own infrastructure and initiatives as well. Gus Kellogg is president of Guilford-based Greenleaf Biofuels, which wholesales and retails biodiesel. He is also an officer of the Connecticut Biodiesel/Bioheat Association. He describes the process the association proposes for building the industry:

1. **Create the right business climate.** This includes economic incentives and tax relief to make biodiesel price competitive with 100 percent petroleum. "Without incentives," he says, "pure biodiesel is approximately $0.60 per gallon more expensive at today's prices. The common blend is B20, and that adds only about $0.12 per gallon. I think we need incentives for three to five years to get the industry off the ground, perhaps longer if OPEC keeps the price of oil at or about $50 per barrel."
2. **Build the plants.** It's already happening—the state's first biodiesel production facility, BioPur Inc., opened in Bethlehem in July. And this past January, Franklin Farms in North Franklin received a $49,995 state grant for a biodiesel production facility feasibility study.
3. **Enhance the distribution network.** Kellogg says that, for example, the New Haven terminal needs to be retrofitted to accommodate the blending and storage of biodiesel. He adds that "New Haven is the most important place to be right now because most of the home heating oil comes through its terminals."
4. **Public education.**
5. **Development of agricultural inputs.**

ILLUSTRATION COURTESY OF STANLEY MCMILLEN, MANAGING ECONOMIST, STATE OF CONNECTICUT DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT

production processes."

■ **Keeping dollars in Connecticut.** Using 2003 figures, McMillen estimates that if consumers in Connecticut had used 20 percent of state-produced biodiesel blended with home heating oil and diesel, the state could have retained over $250 million, rather than spending that money out of state or overseas.

DECD is not the only state entity looking at a potential biofuel industry; the state legislature is very interested too. "We couldn't get a lot of momentum last year, but the utility crisis just happened last summer, with announcements of 60 to 100 percent increases—so now biofuels is a very hot subject," says state Senator Ed Meyer of Guilford, vice-chair of the senate Environment committee. He has introduced a package of bills, co-sponsored by state representatives Pat Widlitz and Deb Heinrich, built around tax incentives focused on biofuel production, distribution, and research and development.

Also at the state level, the Office of Policy and Management has been given a lead role in developing the biofuel industry, coordinating a myriad of tax incentives, grants, promotion and research activities across a wide spectrum of state agencies. (*See figure 1.*) If national sentiment bears out locally, Connecticut citizens should be supportive. An October 2006 national Biotechnology Industry Organization survey found that 82 percent of adults said national and state governments should provide financial incentives to producers of biofuel.

But it's important to remember that all this biofuel-focused activity is just part of a greater whole, says Bill Leahy, director of the Institute for Sustainable Energy, located at Eastern Connecticut State University. "The problem with energy in Connecticut," he says, "is that there is no silver bullet. We also need initiatives like this in areas such as solar power and alternative energy management. And the biggest thing that can help now is energy efficiency."

UConn's Parnas remains upbeat. "I think [biofuel] is a gold mine. Just like food—everybody needs energy." CTB

Deborah Nason is a freelance business journalist whose work has appeared in national and statewide publications such as the *Christian Science Monitor*, *Investment News* and *Virginia Business Magazine*.