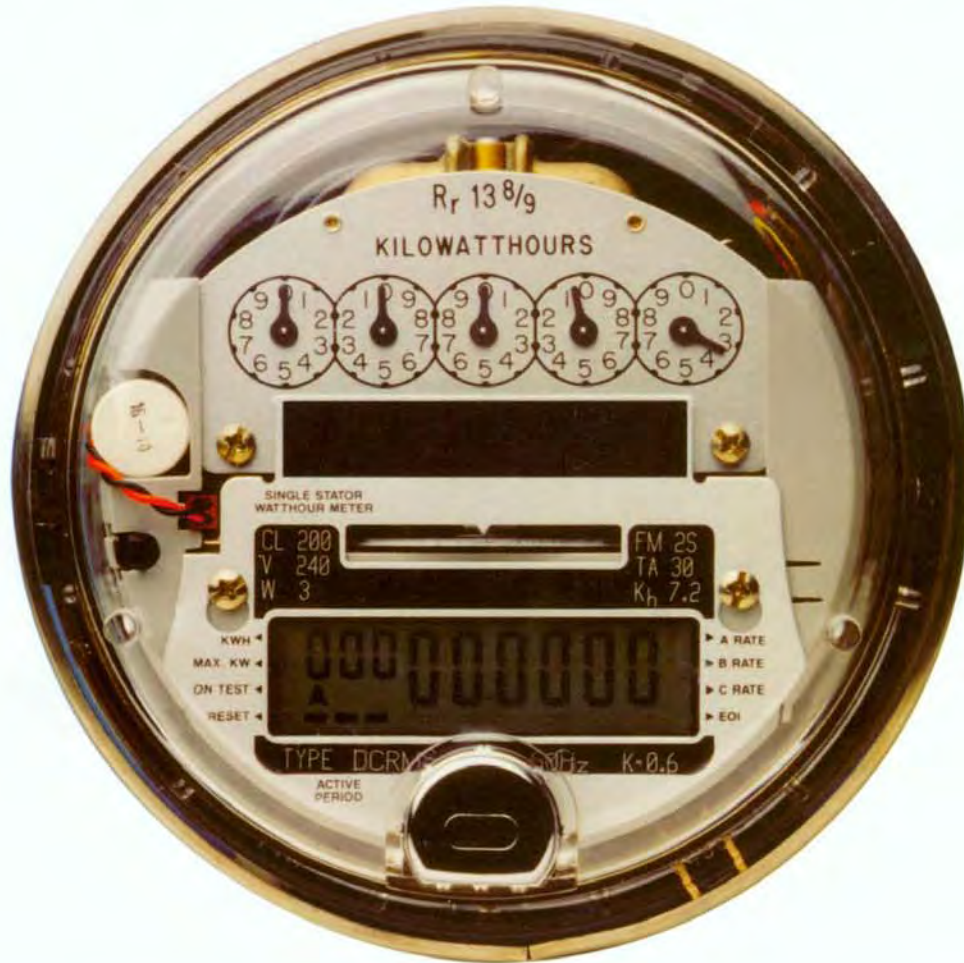


May 2008

# BIODIESEL MAGAZINE



## GALLONS OF MEGAWATTS

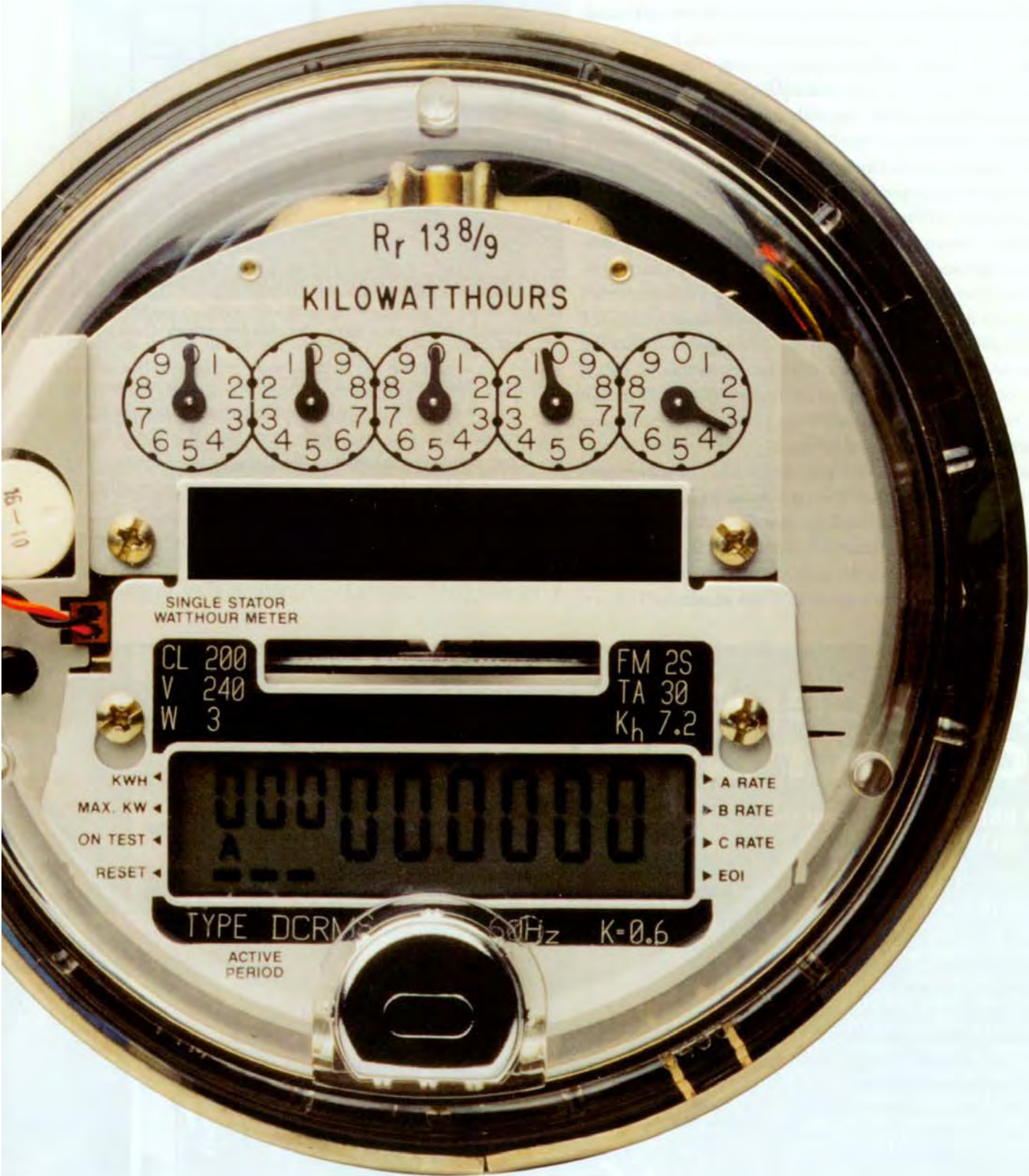
Biodiesel-Powered Turbine Helps Keep the Lights On in Houston

# Gallons of Megawatts

Most think of biodiesel as a motor fuel. But it is much more versatile and can drive steamships and, notably, gas turbines. A group in Texas has been pushing the frontiers of biofuel technology to bring electricity to the suburbs of Houston.

By Jerry W. Kram







Visualize the market for biodiesel and you will see movement—trucks barreling down the road or maybe a locomotive. You may even think of a nice Mercedes sedan. But there is another market, one where biodiesel's clean-burning properties make it an easy choice. Biofuels Power Corp. operates a stationary turbine engine burning biodiesel that is helping to light up Texas while making the air cleaner.

Biofuels Power started out with three 1.6 megawatt (MW) diesel-fueled generators it purchased from a utility in Virginia that had upgraded its facilities. These were the first 100 percent biodiesel fueled generators to be hooked up to the power grid in Texas, according to Fred O'Connor, the company's chief executive officer. The venture proved profitable, but changing economics of the biodiesel industry threw the company a curve ball. The Caterpillar generators, being reciprocating engines, needed fuel that met ASTM standards. When they were installed, ASTM quality biodiesel was selling for \$1.50 to \$2 a gallon. Today the price is more than \$4.50. "Soy and all the oils are out of sight," O'Connor says. "It just blew our economics to hell. Therefore we acquired the turbine to prove that [economically producing electricity from biodiesel] could be done."

Biofuels Power expanded by adding a 10 MW turbine generator. O'Connor says the company purchased a General Electric Frame 5 turbine from Egeland Air Force Base in Florida. The company installed the turbine at its site in The Woodlands, just north of Houston. The turbine allows Biofuels Power to use biodiesel fuel that doesn't meet the ASTM standard. "The tur-



PHOTO: BIOFUELS POWER CORP.

Biofuels Power's 10 MW GE Frame 5 turbine can operate on biodiesel that doesn't meet the ASTM specifications. This gives the company access to lower cost fuels.

bine has a different character," O'Connor says. "What we were able to do is buy off-spec fuel and other waste streams such as used cooking oils and make fuels from that. It makes a lower grade fuel that I couldn't use in a diesel engine but I certainly can put it in a turbine. It makes the turbine a little more efficient based on the price of fuel."

Using lower-quality biodiesel significantly cuts the amount of pollutants generated by the turbine. Biofuels Power brought in an independent testing lab to evaluate all of its generating

# Concept to Construction

**Let BBI guide you down the project development path:**

- Feasibility study
- Organize your business
- Develop the business plan
- Select the right design/builder for your project
- Select the best site
- Negotiate utility and product offtake agreements
- Develop feedstock and risk management plans
- Develop a project financing strategy
- Develop prospectus and offering documents
- Conduct an equity drive
- Secure project debt financing
- Financial close and begin construction!

**BBI International  
Project Development**

*Adding Value to the Biofuels Industry*



*Your Global Biofuels Resource*

300 Union Blvd, Suite 325  
30 Duke St. W., Suite 701

Lakewood, CO 80228  
Kitchener, ON N2H 3W5

(303) 526-5655  
(519) 576-4500





equipment. The lab found that the Caterpillar engines produced significantly less of all the major pollutants using ASTM standard biodiesel. Testing on the turbine isn't complete yet, but preliminary results show a similar reduction. The one exception, O'Connor says, was for nitrogen oxides. The company is making a series of adjustments to the turbine to lower that final emission product. "It was just an incredible drop [in the Caterpillar generators]," he says. "Testing on the turbine is still going on but, just by virtue of the fuel, there's a drop in CO<sub>2</sub> (carbon dioxide), there's no sulfur, the soot is down—all of it is coming down. They can't tell me the exact numbers, but compared with a diesel generator, we are able to knock 90 percent of the pollutants out."

The turbines aren't as efficient as the Caterpillar generators. Those engines consume about 80 gallons of fuel per megawatt hour (MWh) of electrical power while the turbine takes more than 100 gallons of fuel per MWh. However, part of that is made up by the difference in fuel costs. "We go around the nation and around the world seeking out other fuels that people don't know what to do with," O'Connor says. We have closed down plants with inventory remaining, and so forth. We are out there seeking and buying these fuels that would be difficult to put in a diesel engine. But with a turbine, we can make it work."

O'Connor says the company is taking another step towards improving the performance of the turbine by installing a heat recovery steam generation unit. "Basically we are going to take the exhaust off our turbine and generate power with it," he says. "We're going to nearly double the amount of power with the

same amount of fuel. It's old technology called cogeneration that's been around for years and years. We're just doing it with renewable fuels. So we are continuing to go on, and as long as our investors continue to be pleased with our efforts I will still be here."

### Moving to Higher Blends

To prove that a biofuels-based power company could be a successful proposition Biofuels Power had to move beyond the recommendations of the equipment manufacturers. At the National Biodiesel Conference in February, O'Connor shared a session with representatives of engine and turbine manufacturers who discussed how their companies were in the second year of a study using 20 percent biodiesel blends in their products. "We figured we didn't need to wait that long," O'Connor says. "The difference between us and other people is that we are doing it. We went out and did it with private investment. We didn't do it with government money. We have the support of a lot of business individuals who say, 'Let's see how we can make this work.'"

O'Connor says that all of Biofuels Power's equipment was purchased used and out of warranty. One of the reasons for that is manufacturers haven't yet agreed to warranty their engines and turbines to run on 100 percent biodiesel. The older equipment is also less expensive, although more maintenance is necessary. The equipment is good, O'Connor says. "We just have to refurbish it, bring it to our area and install it," he adds.

To carry out its vision of a completely biofueled power pro-



Exposition & Conference  
 October 14-16, 2008  
 Pittsburgh, Pennsylvania



Switchgrass

**Become An Exhibitor Now,  
 Secure Your Speaking Opportunity!**

[www.ebw-expo.com](http://www.ebw-expo.com)

**2008**

**More Networking  
 More Leads  
 More Visibility**





## INNOVATION

ducer, the company will be installing a steam-powered turbine generator, O'Connor says. "So we will basically produce electricity using biofuels with three major types of generating equipment," he says. "So what we are doing No. 1, is proving that it works. No. 2, we're proving that the economics can work."

Biofuels Power is happy to stay put and to be a player in the Texas electrical power market. Texas is unique in that it manages its own power supply grid. In other states, federal regulations dictate how independent power producers hook into the electrical grid, which is something O'Connor is glad to let others deal with. However, the company is reaching out and assisting those who want to follow in Biofuels Power's footsteps. "We have people who want us to bring them this technology in industrial parks, utilities, military bases and so forth," he says. The company has a subsidiary, Alternative Energy Consultants, to sell the technology across the United States and overseas.

AEC mainly does business in Texas and international markets where it's easier to hook into the power grid. "Going in the federally regulated energy grid, you have to go into individual units, say for industrial parks or green housing centers and get permitted to supply that power directly," O'Connor says. "If we were in South Dakota, say, and had industry [feedstock] streams, we could put in a generating facility. But we would have to devise for you your own little grid, your own little power system. It can be done, and it's not that hard. But you won't be part of the federal grid."

Biofuels Power is the demonstration site for AEC's efforts. O'Connor says a constant stream of visitors from across the United States and around the world come to see how their system works.

"What those people are doing is bringing their technologies, gasification, algae and whatever, to us," he says. "Now that there is a place to make it work, they want to see how they can develop their technology with us. We are basically providing a semi-research center for renewable fuels."

Their efforts have attracted attention from more than just potential customers. The Houston area is home to a couple of powerful congressmen, Reps. Nick Lampson, D-Texas, and Kevin Brady, R-Texas. Lampson sits on both the Science and Technology Committee and Energy and Environment Committee while Brady is a member of the powerful Ways and Means Committee. Lampson served on the company's advisory board. "They both have a tremendous interest in renewable energy," O'Connor says. "They have joined in a bipartisan way to support this effort. They have been to the plant several times and brought fellow politicians and other dignitaries with them to show that the facility is working."

The congressmen see the Biofuels Power model as one worthy of duplicating not only because of its use of renewable fuels but also because it has lowered the level of pollution in an area where it's difficult to meet clean air standards. "A third reason they like our work is that we have moved out of the food chain," O'Connor says. "We are using animal fats and waste streams for fuel. We don't use soy or canola, and those things that the cattle growers are worried about. So we have three really strong advantages." ■

Jerry W. Kram is a *Biodiesel Magazine* staff writer. Reach him at [jkram@bbibiofuels.com](mailto:jkram@bbibiofuels.com) or (701) 738-4962.

# Biofuels Canada MAGAZINE

*Biofuels Canada* is the first and only trade publication dedicated to covering the rapidly growing biofuels industries of Canada. The magazine is primarily focused on conventional ethanol and biodiesel production and use, as well as cutting-edge production technologies such as cellulosic ethanol. The full-color bi-monthly magazine is written for a broad range of industry professionals including plant personnel, researchers, project developers, lenders, farmers, policy makers, academics and others. Look to *Biofuels Canada* for the latest industry news, as well as insightful features and commentary, that will give you a competitive advantage in the dynamic international biofuels business.

For subscription and advertising information, please visit:

[www.biofuelsmagazine.ca](http://www.biofuelsmagazine.ca)

Subscriptions +1-519-342-7352  
Advertising +1-519-342-7351

  
INTERNATIONAL  
Your Global Biofuels Resource