



Greening the Plant: Lunch Time in West Lafayette

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Many wastewater treatment plants use biogas for energy. Most haven't won EPA awards for their work. And it's a good bet to say most aren't dumping 20 tons of food waste into their digesters every month. Both can be said of the West Lafayette (Ind.) Wastewater Treatment Plant.

"The main project was to rehabilitate our aging digesters, to use biogas and two microturbines to produce electricity, and to use the waste heat for the anaerobic digesters," says utility director Dave Henderson.

In 2007, the \$8.4 million project won an EPA PISCES award for protection of environmental health and water quality. It was the only PISCES award in Indiana and one of just 29 in the country that year. The project included a FOG receiving station to supplement biogas production for the 9 mgd conventional activated sludge facility.

The FOG station would later turn out to be the key to helping Purdue University save money and reduce landfilling while providing the plant with a new source of energy.

IN WITH LEFTOVERS

"I read an article in Purdue's Exponent student newspaper that said the food courts were sending 20 tons a month to the landfill," recalls Henderson. "Someone was wishing there were some other way to deal with the food waste."

Henderson figured his treatment plant, right across the street from the campus, could make that dream come true. He made a few phone calls and then toured the Purdue facilities to learn about their process. After looking at 35-gallon totes filled with ground-up food

waste collected at the five dining courts on campus, he told the Purdue staff, "It looks like baby food for the digesters."

There were two weeks left in the spring 2009 semester, so Henderson and the university decided to give it a try. "We fed the food waste into the same tank we use for FOG," says Henderson. "We just opened an access hatch and dumped in the totes and it worked pretty well."

After a full year, hauling leftovers across the street instead of miles to the landfill saved money for Purdue, not to mention the environmental benefits of recycling the waste. And it gave the plant an additional source of biogas at minimal cost — just the purchase of

Purdue's food grinder could only handle food and paper napkins that used to go from plates to the garbage. Using that in the digesters worked so well that in fall 2010 Henderson bought a [4-SHRED-H grinder from JWC Environmental] so the plant could also process kitchen waste from producing meals, such as banana peels and food trimmings. That could double or triple the amount of food waste going to the digesters.

The program has created a buzz in the community, and there may be more food waste on the way to the digesters. "It has struck a chord," Henderson says. "Now I'm talking with some students at West Lafayette High School about doing a pilot project with their ecology club. I've had a couple of hotels contact us."

Glycerin, a byproduct from biodiesel production, has also been brought in by a local business that makes the fuel for its trucks. "We're just looking at what sorts of high-strength waste we can identify and try out in the digesters," Henderson says.

His advice for others is to go slowly. "It makes sense to start small and work with places with large concentrations of people where it can be done easily," he says. It also requires a level of oversight.



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A few knives and forks mixed with the food and grease trap waste have not been good for the digesters' pumps.

"We make sure there's always an operator present when they're offloading FOG or food waste," Henderson says. "We also have to keep a close eye on the digesters and the way they respond to the different feedstock we're putting in."

CREATING POWER

The original biogas project, designed by Kennedy/Jenks Consultants, replaced two 50-year-old anaerobic digesters and added a Unison Solutions cogeneration system with two Capstone microturbines to burn the methane. Waste heat from the microturbines heats the digester, replacing a natural gas boiler.

Henderson says the normal digestion process produces around 37 cubic feet of biogas per minute. Adding FOG doubles that, and food waste may add another 10 percent if the plant can maximize that source with its new **4-SHRED-H** food grinder.

In 2010, the treatment plant generated 15 percent of its electricity — 728,000 kWh — for a savings of \$50,000 over the local utility price. Using the waste heat from the microturbines has reduced natural gas use by 40 percent, saving \$50,000 more. That adds up to a savings of about 2 percent of the plant's total operating budget.

FOG has also created a new revenue stream through tipping fees charged to other ways to cut the plant's energy use. The addition of inline dissolved oxygen monitors in the aeration tanks has helped reduce blower use. Operators use the data to decide when they can manually turn off one of the blowers.

"We're looking at replacing a centrifugal blower with a turbo blower and controlling it with the inline DO meters," Henderson says. Electric vehicles may also be in store for the treatment plant and other city departments. To prepare for that, a few charging stations were installed during the construction work on the digesters.

"Things have changed on us very quickly in the last few years," says Henderson. "It all adds up, and in this day and age, any place you can find a little bit to save is good."

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Purdue University sends up to 20 tons of food waste a month across the street to the West Lafayette Wastewater Treatment Plant, saving itself money in disposal costs and increasing biogas production at the plant.



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