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ANAEROBIC DIGESTION

ZeroTolerance for Waste

San Jose, Calif., will be home to the country's first commercial organic waste dry anaerobic fermentation process, translated from applications across Europe and modified to create a reference and model for installations in the U.S.

BY LISA GIBSON

Making its U.S. debut, a dry fermentation process will convert organic waste from San Jose and surrounding communities into power for its own operation and others nearby.

The anaerobic digestion process is commonly used and well-known in Germany and across Europe, but San Jose's installation will be much bigger and modified for use in the U.S. A contributor toward the city's 2008 Zero Waste Strategic Plan, the project will increase the amount of garbage diverted from landfills and could serve as a model for urban anaerobic digestion projects all over the country.

Developer Zero Waste Energy Development Co., a joint venture between local sister companies GreenWaste Recovery and Zanker Road Resource Management, is in the middle of permitting the commercial facility, dubbed Zanker Road Biogas, and plans to break ground this year and begin operation in late 2011. The plant will be flanked on two sides by Zanker Road Resource Management's existing outdoor processing operations for mixed waste and construction and demolition debris. While that waste is unlikely to be digested at the biogas facility, it could be used as bulker after the digestion process, according to Emily Hanson, GreenWaste community relations manager and project director.

In fact, feedstock contracts for Zanker Road Biogas have yet to be negotiated, but Hanson isn't worried.



PHOTO: GREENWASTE RECOVERY

The Cutting Edge

"Most companies wait until they have a guaranteed feedstock to develop innovative projects," Hanson says. "What we have opted to do, and it's a little more risky but it also puts us on the cutting edge, is we've decided to plan and develop this anaerobic digestion facility, even though we don't have a guaranteed feedstock at this point." The feedstock will come from contractual agreements and open markets from regional jurisdictions, but if necessary, could come from GreenWaste's existing dirty materials recovery facility

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(MRF), less than 10 miles from the project site.

The MRF already processes multifamily waste from San Jose; 100 percent of all waste including garbage, composting and recycling from nearby Los Altos Hills, Woodside and Portola Valley; a portion of waste from Palo Alto; and open market materials. Each week, 1,600 tons go through the facility for a recovery rate of 75 percent. “We process those organics and municipal solid waste and then in the back end, we end up with a very rich organic fraction,” Hanson says. From there, the processed material goes to Z-Best Compost—owned by Zanker—in nearby Gilroy, Calif., where it is composted for landscaping markets. That organic material would make great feedstock for the biogas facility, but Hanson hopes additional contracts will make its use unwarranted.

“By the time the facility is on line, it’s likely we’ll have enough material where we won’t have to divert from our sister facility,” she says. “We are currently seeking out new sources of organic material, so it may be the case that we don’t have to offset any tons that are going to Z-Best. Z-Best could maintain its consistent flow of material from the GreenWaste MRF, and all of the extra material that is organic through other contracts and through open market services will then go to Zanker [Road Biogas].”

Those potential contracts include one that would allow collection of all the commercial organic waste in the city of San Jose, an unspecified amount as it has been an open market and not tracked closely. “If we are awarded that processing contract, the feedstock would completely take up one entire phase of our anaerobic digestion facility build out,” Hanson says. Zero Waste will know in November if it has been awarded the contract.



TRASH TALK: A truck dumps its load at the MSW tipping floor at GreenWaste’s dirty materials recovery facility.

PHOTO: GREENWASTE RECOVERY

The resulting biogas will be converted to power and initially used for the process itself and perhaps the adjacent Zanker facilities. The amount of power it produces will depend entirely on the composition of the feedstock, efficiency of operation and other factors expected to be polished in the three-phase build-out strategy, starting at double the size of any existing similar operations in Germany. The facility will be capable of taking up to 150,000 tons of waste per year, but will start on a smaller scale. The build-out phases will not be distinguished by feedstock tonnage, but instead by the improvements made to the system as it operates and as Zero Waste learns how to cater it to applications in the U.S.

“Our intention is as soon as it’s operable and we’re able to start calibrating the productivity of the facility, we will then be able to inform any changes we want to make on phase two to optimize its efficiency,” Hanson says. Although the facility will be a commercial operation, it will be a demonstration of U.S. applications and will be somewhat of a learning experience for GreenWaste, Zanker and the city.

“The opportunity we have in San Jose is

to create a reference facility that we’ll collect data from and provide that information for other municipalities and agencies that might be interested in how this would work,” says Jo Zientek, deputy director of Integrated Waste Management for the city of San Jose.

The U.S. Translation

After numerous trips to German dry fermentation plants and copious amounts of research, GreenWaste and Zanker agreed on translating the technology to a U.S. utilization. Besides being bigger than installations in Europe, Zanker Road Biogas will also employ modified odor-control systems and will be tailored to achieve a high-quality composting product. “Energy output is an important component, but we want to have a saleable quality compost on the back end, which is something they don’t do in Germany and they don’t do in Europe,” Hanson says. “They don’t prioritize high-quality compost.”

Zientek is hoping both water and energy use can be reduced in the San Jose application, along with other improvements. “There are lots of operational decisions that we will learn quickly how to maximize gas output, to

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PHOTO: GREENWASTE RECOVERY

COLLECTION PROTECTION: Composted material is stored in the yard at Z-Best and will be used for landscaping.

maximize throughput and to maximize quality of the compost on the back end,” Hanson says.

“The potential the project has and the amount of energy that can be produced is really exciting for the industry and I think it also demonstrates that there is a lot of interest in doing biogas projects all across the country and that’s really exciting to see,” says Amanda Bilek, energy policy specialist at Great Plains Institute and author of the report “Spotlight on Biogas: Policies for Utilization and Deployment in the Midwest,” released in August. The study analyzes state and federal policy that could increase biogas project development in the U.S., focusing specifically on agricultural opportunities in the Midwest. “It is important to have technologies and tools for urban communities as well and municipal solid waste or source-separated organics are a big part of that,” Bilek says.

Zanker and GreenWaste also developed

Zero Waste Energy, a new company that will market the technology throughout the country. “The intention there is to combine not just the anaerobic digestion process, but also the front-end processing so you get the best feedstock that goes into the anaerobic digesters,” Hanson says.

She declined to release a cost estimate for the facility, saying it’s a moving target, but did say Zero Waste will seek funding through the U.S. Department of Treasury’s Payments for Specified Energy Property in Lieu of Tax Credits program.

The Process

Zanker Road Biogas will be divided into two parts: the digestion process and the composting process. Everything takes place within an enclosed building with extensive odor control along with a huge biofilter. “One of the concerns facilities like this have encountered in Europe is the odor, so we’re going above and beyond in terms of sizing the biofilter as well as the number of air exchanges per hour to control the odors,” Hanson says. Even the receiving halls where truckloads of waste will be dumped are enclosed with negative aeration so the smell will not escape when the doors are open, she adds.

Depending on the composition of the feedstock, it could be mixed for consistency and then it’s off to the air-tight, gas-tight digestion tunnels. The particular technology is scaled on eight digester units, so multiple tunnels will be digesting simultaneously. Inside the tunnels, the material is heated before the 21-day anaerobic digestion process, where the resulting biogas is captured. On day 21, the tunnels are purged of any remaining methane (biogas) and oxygen is blown through the pile, Hanson explains. Then the material is removed and bulked. That same day, the material goes to an enclosed composting tunnel for

another 21 days then is removed and stacked in piles outside to cure for screening, grading and marketing to landscape operations.

Zanker Road Biogas will also be located near the city’s existing wastewater treatment plant, the country’s largest tertiary plant, which includes its own biogas process for the 100 million gallons of wastewater it processes per day, according to Michele Young, organics manager for the city of San Jose. The existing AD plant, which generates one-third of the treatment plant’s power requirement, has made the new project a more welcome addition and hopefully will help curb citizen opposition.

“The public feels like renewable energy generation and this kind of technology innovation is one of the most appropriate uses of the land surrounding the wastewater treatment plant,” Young says. “I think we have a very high interest rate in the technology and how it links to the activities that already are taking place in that area.”

Bilek hopes the facility will have a large and lasting impact on the city, as well as the rest of the country as it watches the plant’s development and operation. “I think that the large-scale examples have a larger impact, but they also have a really interesting story to tell and that becomes useful when project developers and people who are interested in advancing biogas projects can take that interesting story to their policy makers and show the amazing potential that biogas projects, especially at the large scale, really have for energy production,” she says.

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