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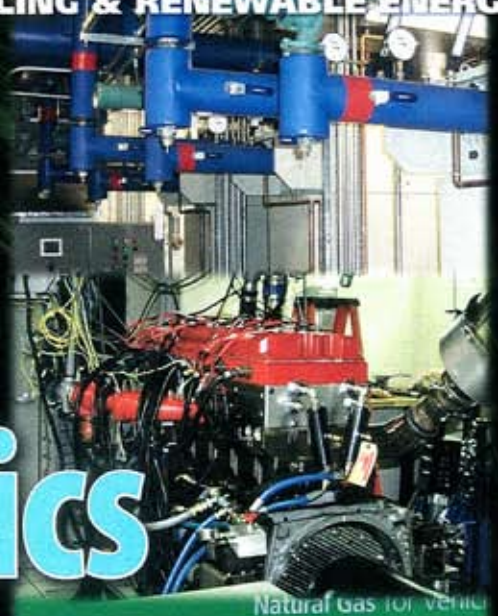
ADVANCING COMPOSTING, ORGANICS RECYCLING & RENEWABLE ENERGY

2011 Conference Preview

Renewable Energy from Organics Recycling



Solving Odor Challenges At Composting Facilities

Filling Up On Dairy Biogas

Smart Engines Open Markets For Renewable Fuels

Connecting Kids With Compost, Healthy Foods

DIGESTER SYSTEM OPTIMIZATION

WWTP ADDS VALUE TO BIOGAS RESOURCES

The City of Janesville, Wisconsin is investing in technology to use biogas to generate electricity, recover usable heat, and produce CNG fuel for city vehicles.

Jay Kemp

THE City of Janesville, Wisconsin has operated anaerobic digesters at the present site of its wastewater treatment plant (WWTP) since the facility was first commissioned in 1970, with the biogas used to fuel engine generators. The city recently replaced the third generation of engines operated at the WWTP. The engines had silica deposits, even though sulfur compounds were removed from the digester gas by an iron sponge. The result was increased engine wear and high maintenance costs to the city. Silica and silicone additives to personal care products and even some food additives become volatile in the digester gas in the form of siloxane, which in turn condenses to abrasive silica when the gas is burned.

The Janesville WWTP upgraded its gas conditioning system to address the silica problems. Siloxanes are removed in a multistage treatment train that first removes moisture and particulates, followed by siloxane adsorption on an activated carbon media with a HOX media (an inorganic adsorptive media) as a polishing step.

To take advantage of the gas conditioning, four 65 kW Capstone microturbines with integral heat recovery were installed and started up in November 2010 to replace the aged engine generators. Janesville receives a premium rate through a feed-in tariff from Alliant Energy of $0.12/kWh on-peak and $0.07/kWh off peak. The electricity is sold directly to the utility. Heat recovered from the turbines is sufficient to heat the digesters; some excess can be diverted to building heat.

Membrane gas storage allows maximizing digester gas combustion during the on-peak hours for greatest revenue potential from the microturbines.

BIOGAS TO FLEET VEHICLE CNG

Anticipating growth in gas production, the conditioning skid was designed to treat 50 percent more gas than the four microturbines require. The highly conditioned digester gas can be converted to a CNG vehicle fuel with an additional step to remove carbon dioxide (CO_2). The gas conditioning system, manufactured by Unison Solutions of Dubuque, Iowa, is available with an add-on module for CO_2 removal. The "bioCNG" fuel produced by the Unison system exceeds 90 percent methane content. Vehicle fuel standards require a minimum of 88 percent methane.

The city has found it cost-effective to invest in the additional CO_2 removal and a CNG vehicle fueling station. The total installed cost of the treatment and fueling system is estimated to be $350,000. The modular nature of the equipment makes the system a relatively straightforward addition to the existing gas treatment system. The fueling system will be located outdoors. Janesville anticipates a program of vehicle replacement that will begin with small cars used for meter reading, and grow to include pick-up trucks and eventually semi-tractor trailers. Switching to CNG will reduce the city's fuel costs as well as lower emissions, thus shrinking its carbon footprint.

To increase the amount of gas produced in the anaerobic digesters, Janesville will begin to accept high strength organic waste at the treatment plant, which will be fed into the anaerobic digesters. Many sources of waste appear to be available within a short distance to Janesville. The city has contacted a local ethanol plant to take its thin stillage. Food wastes, such as high strength waste from a local cannery and whey from cheesemaking, are also likely candidates. At

Janesville installed four 65 kW Capstone microturbines (top) equipped with integral heat recovery. The circulating hot water supply and return connections on the heat recovery module are shown above.

this time clean waste free of debris will be sought, as limited pretreatment is available at the waste receiving station.

The final piece of the city's biogas utilization system will be the addition of the latest generation Capstone microturbine, a 200 kW unit that is more efficient at converting gas input energy into electricity than the current units. With the various outlets for digester gas energy, Janesville officials hope to eliminate any waste gas, and move toward the wastewater treatment plant becoming a net exporter of energy.

The Janesville biogas systems will be a featured tour on Wednesday, November 2 as part of the 11th Annual *BioCycle Renewable Energy from Organics Recycling Conference*, to be held in Madison, Wisconsin (www.biocycleeneregy.net). ■

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