



September 11, 2013

Research on biosolids to energy project to start at Antioch wastewater

Paul Burgarino

By this time next year, flushing a toilet here could be a way to create commercially viable renewable energy.

Researchers from **Lawrence Livermore National Laboratory** and Miami-based Chemergy Inc., will start studying a technology that converts biosolids, or remaining byproduct from wastewater treatment, into hydrogen gas to produce electricity, officials said this week.

The \$1.75 million public-private research project, which officials say is the first of its kind in the nation, will begin next month at Delta Diablo Sanitation District's facility in Antioch. The trial is funded by Chemergy and a grant from the California Energy Commission.

In about a year, it is anticipated Delta Diablo will be processing one ton of biosolid material each day and producing up to 30 kilowatts of electricity, Lawrence Livermore chemist Bob Glass said.

"If it works well, it could be the go-to solution for many wastewater agencies across the nation and the world," said Gary Darling, Delta Diablo's general manager.

Adds Glass: "It would turn a liability into an asset. It's a novel process."

The amount of biosolids being produced in California and Bay Area continues to increase, while regulations at the local, state and federal level on what can be done with the byproduct are becoming more stringent.

Historically, biosolids have been used for fertilizer or agricultural land, or to cover landfills.

Californians generated 710,000 dry metric tons of biosolids in 2011, including more than 158,000 from the Bay Area alone. The Bay Area is projected to produce 189,000 metric tons of biosolids by 2030.

Converting biosolids to energy has long been a goal of the Bay Area Biosolids to Energy coalition, which consists of 19 Bay Area public agencies responsible for wastewater treatment. The group has been soliciting ideas for converting the biosolids into energy, seeing the Bay Area has a potential incubator for ideas.

"Our goal is to take the waste out of wastewater," Darling said.

Biosolids have great potential as a fuel source, officials said Darling and Glass point out that water and wastewater plants use 3 percent of the nation's energy, but the potential in the biosolids, which is akin to firewood, could produce 10 times that amount of energy -- enough to power New York City, Chicago, Houston and Dallas.

One challenge has been that the biosolids are wet, Darling said. The current methods to extract energy from the byproduct require high temperatures and large equipment to dry it out for combustion, which is expensive, or organic fermentation that takes a long time and uses bugs, Glass said.

Also, wastewater agencies have been slow in adopting new technologies given the high costs because of their responsibility to provide service to ratepayers.

Melahn Parker, Chemergy's president, said he became aware of the Bay Area's situation while studying energy generation while earning his doctorate at Stanford University.

Chemergy's test uses a chemical reaction process, thus the biosolids do not have to be dried out. Though he remained vague about the company's HyBrTec system for propriety reasons, Parker explains the process as using a chemical reaction to break down the "feedstock" and extract hydrogen, carbon dioxide and thermoenergy.

The hydrogen will be used in fuel cells for electricity or turned into fuel to be used in hydrogen cars.

"It's an area that hasn't been looked at. There was some theoretical work in the 1970s, but it never got off the drawing board," Parker said.

Lawrence Livermore is lending its expertise in hydrogen technology and fuel cells, chemistry and materials science to model the new technology, Glass said.

"We want to use this as a model to encourage the widespread use of biosolids for energy production," he said. "It's a great opportunity for Lawrence Livermore to work with local industry."

Parker said the analysis has been going on for the past decade, but the demonstration will allow others in the Bay Area coalition and industry to "kick the equipment and see how it works."

If successful, plans call for the system to be rolled out to more large-scale commercial applications, Parker said.

Meanwhile, the Bay Area coalition one day aims to create a regional biosolids-to-energy facility or facilities and continue to search for ways to manage it.