



County creates first-in-the-nation septic bioreactor

By [Dan Miller](#)
Staff Writer

As old-fashioned landfills continue to pile up and become more and more mountainous, St. Clair County, Mich. has devised a sustainable system to deal with its residents' trash without continually purchasing land.

The way Morgan Subbarayan, a consultant for the county, puts it, the old model of a landfill was to put down a layer of plastic, pile trash on top and then seal it with another layer of plastic. The result would be that the trash would be trapped in, like a Ziploc bag, in an effort to protect the groundwater. Today, though, Subbarayan says that officials are realizing that the old ways of solid waste disposal are turning into long-term liabilities.

"It's one of those things where you bury it and it becomes a little mountain in your community and that's it," said County Administrator Shaun Groden.

In response to the problem, the county prepared to create a bioreactor. Traditionally, bioreactors are engineered in such a way that operators can monitor the moisture content and temperature of a disposal site in an effort to expedite the decomposition and gas generation of the trash. According to Subbarayan, bioreactors are a well proven, 30-year-old science.

In a normal landfill, trash decomposes gradually and the volume of gas that emerges is not enough to economically convert into energy.

"In a bioreactor, since you are compressing the same volume of gas over a shorter period of time, you're exponentially increasing the biological reaction," he said. "[We can] suck the gas out which gives us an opportunity to produce renewable energy."

As plans went forward to create a bioreactor, Subbarayan and officials in St. Clair County began a lunchtime discussion on the county's septic waste problem.

According to Commissioner Howard Heidemann, the county had been facing illegal discharge of waste and was trying to deal with the environmental consequences when they developed an idea to solve two problems at once.

One element of the process when using a bioreactor is the re-introduction of leachate — liquid at the bottom of the landfill — back into the garbage to expedite the decomposition process. The group's idea, which Subbarayan calls "spontaneous" and "out-of-the-box," was to use the septic waste instead of leachate, to make the project a "septate" bioreactor.

"Instead of it being a pollutant to our waterways, it becomes a raw material for running the bioreactor," Heidemann said.

While Subbarayan says there are 13 bioreactors active in the country, St. Clair's is the only one to use septic waste.

"This is the first project in the country where two waste types — liquid waste and solid waste — are married to produce renewable energy," he said. St. Clair County, which neither exports nor imports trash, paid for the project itself, without grant or loan assistance, by using fees charged for dumping garbage.

The bioreactor's design also allows for the re-use of different waste sites. Given that there are 10 separate "cells"



Photo courtesy of St. Clair County

St. Clair County work crews install a geosynthetic separation layer above the base liner drainage stone for one of the waste disposal "cells." This layer will prevent solid waste from infiltrating into the drainage stone.

that trash is dumped into in the bioreactor, the entire landfill operates on a 20-year cycle. After filling each cell, one by one, in 20 years' time the county hopes the trash will have decomposed at such a rate that the cell will be reusable.

"We'll be able to go back and use the original, physical site — which is not something you usually do in a landfill," said Groden. "What this design should enable us to create is a perpetual landfill without the need for continual property purchase."

Legal roadblocks

St. Clair County did face legal challenges in getting approval for the project. State laws and EPA regulations prevent liquid waste from being disposed of in solid waste landfills unless they are solidified first (such as being combined with wood chips or ash).

In order to let the project go through, the county lobbied the Michigan legislature for a special license to proceed with the project. According to Heidemann, the project received sweeping bipartisan support and that the Michigan EPA was very helpful in crafting the necessary legislation.

Subbarayan has high praise for the local and state elected officials who helped the county overcome legal obstacles in creating the bio-reactor.

"We're talking about going to the regulators, showing all the merits and changing a statute — that's something a consultant cannot accomplish. It is above and beyond," he said. "That's where the commissioners, the representatives and the senators played a vital role in making a scientific dream into a reality."

Looking forward

Subbarayan is hoping to replicate the bioreactor in different areas of the country where different climate conditions will produce different data. Specifically, he's looking at counties in the southern or western states.

Meanwhile, Heidemann, the county commissioner, hopes to begin a more extensive resource recovery program — that is, extracting recyclable material from landfills and selling it. Mostly, he's thinking about plastics and metals.

"It just doesn't make sense to me to be burying this stuff if there's a market out there for it," he said.

(For more information on St. Clair County's bioreactor, please contact Morgan Subbarayan at 248/486-5100 or via the Internet at www.cticompanies.com.)

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