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## Turning trash into treasure

By Art Carey

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So this is where it ends, all the stuff bought by residents of Delaware County at Wal-Mart, Home Depot, Target, and Sears, all the trash, waste, rubbish, and garbage, the stinky effluvia of material abundance, the broken, unwanted, discarded relics of consumerism.

It ends here, on the tipping floor of Covanta Energy's trash-to-steam plant on the Delaware River in Chester. The floor is vast - 31/2 acres - and heaped with refuse two stories high. Six boilers combust up to 3,348 tons of municipal solid waste per day, turning water into steam that drives a turbine generator that makes enough electricity for 75,000 households.

Trash is commonly viewed as a problem. But at this facility, formally Covanta Delaware Valley L.P., people such as manager Tim Gregan and chief engineer Alex Piscitelli regard trash as treasure, a renewable source of sustainable energy.

They view themselves as environmental advocates, overseeing a technological process that accomplishes a trifecta of benefits: disposing of solid waste, generating electricity, and mitigating climate change by reducing greenhouse gases.

"Our goal is to produce electricity more cleanly and reliably than other sources," said Paul Gilman, Covanta Energy's chief sustainability officer and a former science adviser and head of research for the U.S. Environmental Protection Agency. "We estimate that every ton of trash we process means one less ton of greenhouse gas."

In the industry, plants such as this one are commonly referred to as waste-to-energy. Covanta calls its facilities energy-from-waste (EfW), with the accent on energy. Its EfW plants produce nine million megawatt-hours of electricity a year, the company boasts - enough to power all the homes in Philadelphia.

With headquarters in Fairfield, N.J., Covanta Energy bills itself as the world's largest owner/operator of EfW facilities, with 42 plants in North America and three overseas. Last summer, the company acquired a two-boiler EfW facility in Plymouth Township that can handle 1,250 tons of trash a day.

EfW plants are increasingly popular in Europe (there are about 400), but a tougher sell in the United States, where only 87 function today. A major reason: They are expensive to build, and dumping refuse in landfills is cheaper, though it often means trucking trash hundreds of miles.

The Chester facility burns waste 24/7. Its "fuel" is delivered by a constant procession of trucks, 300 to 350 a day, Monday through Friday, a half-day on Saturday. It accepts all of Delaware County's trash, about 400,000 tons a year, and about 300,000 tons from Philadelphia.

After the trash is dumped on the tipping floor, front-end loaders push it toward steep conveyor belts. The operators of the loaders watch for "bulkies," items such as engine blocks, tree stumps, and hot-water heaters that can jam or perforate combustion gear.

At the top of each conveyor, the waste falls into a hopper, where it is fed into the combustor, a cylinder about 14 feet in diameter and 50 feet long that is pitched at a six-degree angle and revolves two to three times an hour. Inside, the temperature ranges from 1,500 to 2,000 degrees.

Computerized sensors monitor the composition and moisture of the trash, which determines how much and how fast waste moves through the combustor, and how much fan-driven air is supplied to achieve optimal incineration.

The intense blaze heats water-filled pipes embedded in the combustor itself. The hot flue gas rises into a furnace, then a superheater, where more piped water is transformed into high-pressure steam channeled to a turbine that spins a generator.

"Once you get past the trash-collection part, it's identical to a coal-fired power plant," said Gregan, "but the emissions are lower."

At the end of the combustor, ash tumbles onto a grate, where it is quenched with water. Magnets and screeners recover scrap metal - 40,000 tons of ferrous metal and 1,500 tons of nonferrous metal annually, about 3 percent of the waste stream.

Flue gas, meanwhile, is treated in a scrubber, where a lime-slurry injection neutralizes acid gases. Next is the bag house, where 1,440 filter bags hang in an enclosed tower and capture fine ash particles. Forty percent of the cost of building a new EfW plant, is pollution-control devices, said Gilman, the chief sustainability officer.

Eventually, bottom ash from the combustor and fly ash from the bag house are combined and hauled to a landfill in Berks County, where the ash is used as cover. Combustion has reduced the original volume of waste 90 percent.

What emerges from the stack is invisible carbon dioxide, two-thirds of which is "good CO2," Gilman said, because it's the result of burning biomass. Unlike a landfill, the facility produces no methane to contribute to global warming.

Those who work at Covanta's Chester plant shun the "I word" - *incinerator*. This is not like burning trash in a barrel, they say, or the soot-billowing municipal incinerators of the 1950s and '60s.

Stricter environmental regulations and technological advances have so improved the process of burning waste that the EPA prefers the method to landfills. Modern EfW facilities, EPA officials have stated, have "less environmental impact than almost any other source of electricity."

John Kennedy, assistant director of the southeast region of the state Department of Environmental Protection, said of Covanta Delaware Valley: "Those facilities do put out a certain amount of pollutants. You can't get rid of it all, but whenever there's an issue, they're on top of it. Their compliance has been top-notch."

Managing the Chester plant, because of its size, can be "a bear," said Gregan, 51, a 20-year industry veteran. But the socially beneficial nature of the work is satisfying.

"Besides getting rid of municipal solid waste, we supply clean, renewable energy and, in this day and age of global warming, we're a net reducer of greenhouse gases," Gregan said. "That's important to me because I have four girls who are going to be around a lot longer than I am."

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