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# A FLARE for SUCCESS

Feb 1, 2005 12:00 PM, By Michael Fickes

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GARBAGE IN, GARBAGE OUT doesn't accurately describe what happens at more than 340 U.S. landfills that operate landfill-gas-to-energy (LFGE) systems. Those landfills have transformed their decaying garbage into a renewable energy resource. In doing so, the sites are helping to reduce the estimated 55 million metric tons of carbon equivalent that are released into the air each year by landfills.

Every year, the U.S. Environmental Protection Agency (EPA) Landfill Methane Outreach Program (LMOP), Washington, recognizes noteworthy LFGE projects that have made significant contributions to the industry by using methane as a renewable resource to generate electricity, heat, hot water and benefit the environment. The six projects that received LMOP awards for 2004 include:

- Mississippi earned recognition as State Partner of the Year;
- Fauquier County, Va., was named Community Partner of the Year;
- Nucor Corp. received an award for Energy Partner of the Year;
- Dairyland Power Cooperative also won for Energy Partner of the Year;
- Ameresco Inc. received its second consecutive award for Industry Partner of the Year; and
- Honeywell Inc., Waste Management Inc. (WM) and Enerdyne Power Systems received the grand prize for Project of the Year.

Here's a look at what each of these organizations did to make LFGE systems more useful environmental tools.

## Project of the Year: Honeywell Nylon

The Honeywell Nylon plant in Hopewell, Va., has installed one of the most sophisticated LFGE fueling systems built and pulled off an engineering feat during 2004, according to LMOP.

First, to get landfill gas (LFG) from the Atlantic Waste Disposal Inc. (AWD) Landfill near Waverly, Va., which is owned by Houston-based Waste Management Inc. (WM), the project required the engineering expertise of both companies, plus that of Charlotte, N.C.-based Enerdyne. The project also needed the approvals of three municipalities and seven agencies.

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## Landfill to yield power for Xcel

A Waste Management project in Arapahoe County will collect methane that will generate electricity.

By Steve Raabe Denver Post Staff Writer

Article Last Updated: 06/27/2007 10:38:17 PM MDT

Methane gas from an Arapahoe County landfill will become power for Xcel Energy under a plan developed by garbage giant Waste Management Inc.

Methane seeping up from the Denver Arapahoe Disposal Site will be collected, then burned to produce heat that spins turbines for electrical generation.

The \$4 million facility is expected to produce 3 megawatts of power, enough to serve about 3,000 homes.

The project is one of 60 new generating facilities announced Wednesday by Houston-based Waste Management, the nation's largest trash hauler and landfill operator. Waste Management already has built 100 similar generators in North America in the past 20 years.

"Energy prices, especially fossil-fuel prices, have really helped kick-start these projects," said Paul Pabor, vice president of renewable energy for Waste Management.

Methane gas is created by the decomposition of organic matter such as garbage and manure.

Currently, the methane produced at the Arapahoe County landfill is burned off, or "flared."

Xcel and Waste Management officials said they believe the proposed new generating facility is the first in Colorado to use methane from a landfill. The project will hold a groundbreaking ceremony July 11.

While Pabor declined to disclose the economics of selling methane-produced power, he said the combination of sales to utilities and federal tax credits on renewable energy makes the ventures lucrative.

"It represents incremental revenue to the company," Pabor said. "It's an opportunity for us to make capital investments and get a return on those investments."

The 3-megawatt facility in Colorado is one of the smaller to be built by Waste Management. The projects' sizes are determined by the amount of methane the landfills emit. Typically, less gas is produced from landfills in arid climates, while more methane comes from higher-humidity locations.

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Waste Management's biggest generator produces 10 megawatts from a landfill in Pompano Beach, Fla.

In addition to Colorado, the company plans to build new projects this year in Texas, Virginia, New York, Massachusetts, Illinois and Wisconsin.

The Denver Arapahoe Disposal Site is owned by the city of Denver and operated by Waste Management.

It accepts on average 12,000 tons of waste a day or about 3.7 million tons a year.

Staff writer Steve Raabe can be reached at 303-954-1948 or [sraabe@denverpost.com](mailto:sraabe@denverpost.com).

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The Toronto Star

February 2, 2009 Monday

## A wasted opportunity; Planned clean-energy plant powered in part by captured waste falls victim to downturn

**BYLINE:** Tyler Hamilton Energy Reporter, Toronto Star

**SECTION:** BUSINESS; Pg. B01

**LENGTH:** 1580 words

Steel maker ArcelorMittal Dofasco and electricity developer Sithe Global Power have scrapped plans to construct a "clean" power plant **fuelled** partly by captured waste gases.

The 500-megawatt **facility** would have produced enough electricity for 400,000 homes as well as industrial grade heat for the Hamilton-based steel manufacturer. The ambitious project, said Dofasco spokesman Stirling, simply got "caught up in the current economic times."

But some industry observers argue the Ontario government, despite talk of smart infrastructure and more efficient energy use, shares part of the blame for failing to support such initiatives just when they were needed most.

"For a large project like this the government should be stepping in and asking what they can do to help it happen," said Keith Stewart, an energy researcher with environmental group WWF-Canada. "It would have been a good use of economic stimulus. It would create jobs here in Ontario, and it's going to help save existing jobs."

The proposed **facility** was a combined heat and power or "co-generation" plant, meaning the waste heat from electricity generation is used locally by an industrial "heat host" or as part of a district heating system.

It's considered a highly efficient use of fuel compared to the production of power and heat through separate systems. Denmark, for example, gets 55 per cent of its electricity from hundreds of small and large cogeneration plants that also provide heating to cities and towns.

Some of the cleanest plants, like the one proposed in Hamilton, use waste gases from industrial operations that are otherwise flared and vented into the atmosphere. Sithe's plant would have obtained 20 per cent of its power from waste gases captured from Dofasco's steel-making operations. The rest of the power would have come from **natural gas**.

The bottom line: one-fifth of the plant's power would come from free fuel that emits no additional carbon dioxide gas emissions.

As well, the plan was to recycle the waste heat from electricity generation to produce industrial-grade steam for Dofasco. "The real point of this would be energy efficiency," said Stirling.

As far as power projects go, it made good sense. Ontario needs cleaner electricity that will reduce its dependence on coal. Dofasco needs to become more efficient in an increasingly competitive sector. Amid the economic downturn, the steel maker has had to cut 500 staff since July and its remaining employees have been moved to a four-day workweek.

But officials at Sithe and Dofasco just couldn't make the economics of the project work, an even greater challenge during a credit crisis that has inflated the **cost** of borrowing.

Tom Casten, a pioneer in the recovery of energy from industrial processes, isn't surprised that Sith Dofasco pulled the plug. He said the programs set up by the Ontario Power Authority that are supposed to stimulate development of co-generation have been designed in a way that limits the number of projects to be developed, even under favourable conditions.

"It's unbelievable how much they've stacked the deck," said Casten, who estimates there is more than 3,000 megawatts of potential industrial and commercial **CHP** projects in Ontario - more than enough to displace the province's reliance on coal power.

Of that, about 3,000 megawatts could come from "waste energy," such as lost heat or flue gases from factories, refineries, glass plants and other operations.

Casten argued that the power authority is only half-heartedly pursuing the opportunity. The agency doesn't value the true environmental benefits of local **CHP** projects, specifically the ones that recycle waste and appreciate the economic benefits in the form of job creation and improvements to industrial competitiveness, he said.

There's also the fact that local power production requires less infrastructure to support it. For example, generating power and heat where it's used means there's no need to put up expensive transmission lines to bring the power to a remote location.

Compare this to the Nanticoke coal-fired generating station, which requires massive infrastructure to transport electricity into cities like Hamilton and Toronto. More than half the energy in the coal is released into the atmosphere during combustion as waste heat, and "line losses" during the transmission of electricity - energy is lost through the lines in the form of heat - averages 7 per cent and can reach 20 per cent during times of peak demand.

The power authority said it takes these factors into account when assessing **CHP** projects, but Casten says the agency is lowballing the potential cost savings. "If you're putting new (**CHP**) generation in downtown Toronto, you may be able to avoid a new transmission line that costs more than the generation itself," said Casten.

The benefits of **CHP** have not gone unnoticed south of the border, and many expect the new Obama administration will spur development as part of its massive economic stimulus package.

Last month, the U.S. Department of Energy issued a comprehensive report that praised the potential of **CHP** and recommended what it called "high-deployment policies" that by 2030 would attract an estimated \$10 billion (U.S.) in investments and create nearly 1 million highly skilled technical jobs.

Doing so would save enough fuel each year to provide heat and electricity to half of U.S. households. "Emissions could be reduced by more than 800 million metric tons per year, the equivalent of taking half of the current passenger vehicles in the U.S. off the road," according to the report.

Ontario's approach to **CHP** has been less ambitious, though experts acknowledge the projects can help. **CHP** can help certain industry players become more competitive, but the power authority must also consider whether a weakened company in a struggling industry can be relied on for signing a 20-year contract.

What if, after just a few years, an industrial heat host closes shop? If Dofasco, for example, were to close its Hamilton facility, then Sith would no longer have access to waste gases or have a customer for the heat. As a result, the plant would no longer be viable.

Jason Chee-Aloy, director of generation procurement at the Ontario Power Authority, said it becomes a balancing act - even more so during a recession - between the pursuit of clean and efficient power, making industry competitive, and the mandate to protect ratepayers from unnecessary risk.

"We realize the economy is an issue and we are really paying attention to that. That speaks to some of the complexities with combined heat and power," said Chee-Aloy.

But critics say the agency has been overly cautious. Only seven **CHP** projects totalling 414 megawatts have been approved.

been awarded power-purchase agreements from the power authority since 2006. The agency is currently seeking another 500 megawatts through a second round of contracts, but a number of potential bidders including Sithe and Dofasco - withdrew before last Thursday's application deadline.

Not that these companies didn't invest money and time before getting to that stage, said WWF's St. "They're typically spending \$300,000 to \$1 million just to do the engineering work. If you're going through the bidding process, that's a lot of money to spend if you're not sure you're going to win."

Enwave Energy Corp., known for building and operating the world's largest deep lake-water cooling system in Toronto, was one potential bidder who decided in the end to withdraw. Enwave wants to replace its gas boiler system used for district heating with a superefficient gas turbine system that would produce heat and 20 megawatts of electricity, 24-hours a day, for the city.

Get enough of these facilities operating throughout Toronto and building a third transmission corridor through the city could be avoided, some say. It would also be cleaner. "There would be a big reduction overall in greenhouse gas emissions and air pollution," said Kevin Loughborough, vice-president of major project Enwave.

The project hinged on Enwave's ability to sell the electricity to the province, meaning it had to snag a deal with the power authority. It tried during the last round of contracts and was turned down. It was its second attempt but, after reviewing the rules and assessing the economic outlook, isn't so sure now.

"It's more stringent," said Loughborough. "They've put a cap on how much they're prepared to pay for the Canadian dollar going down to 80 cents it makes importing equipment, like generators from the United States, much more expensive. So it's putting pressure on our business case."

It's frustrating, he said. "We want to do it badly." (Enwave has since found out all applications for new 100-megawatt power projects in downtown Toronto are being turned down until Hydro One does upgrade a transformer station so it can safely take new supply.)

The power authority has clearly stated that it's not prepared to pay more than \$2,000 for every kilowatt-hour of electricity a CHP facility is capable of generating. Loughborough said it seems like an arbitrary cap, much lower than current estimates for the cost of building new nuclear plants, some even exceeding \$6,000 per kilowatt.

Chee-Aloy called the cap an "informed" calculation. "It's really a guiding measure," he said.

The agency, he added, is open to accommodating broader government policy objectives if directed.

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Section V.A.1.

Guidance by source category: Annex C, Part II Source Categories

Waste Incinerators:

Municipal and hazardous waste, and sewage sludge

Coordinated by Mr. Robert Kellam (United States of America)



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# TECHNOLOGY JOURNAL.

## Drying Up Waste Stream With Power of the Sun

*'Plasma Torch' Turns Trash To Fuel, Building Products; But Is It Cost-Competitive?*

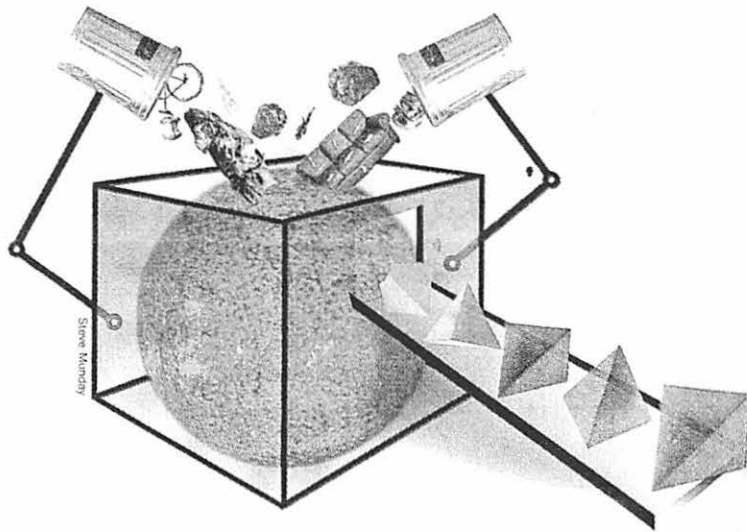
BY JIM CARLTON

A new kind of space race is gaining velocity: harnessing a power akin to the stars' to zap away garbage and free up room in landfills.

One of the leaders in the field is Westinghouse Plasma Corp., a Madison, Pa., company that has developed a machine whose "plasma torch" blasts into oblivion practically anything fed through its chute.

The plasma machines being sold by Westinghouse and others disintegrate waste with a stream of plasma, or ionized gas, that reaches as much as 30,000 degrees Fahrenheit, three times as hot as the surface of the sun. The process reduces the waste to gases—mostly hydrogen and carbon monoxide, piped away for reuse as fuel—and a glass-like material that is used in construction.

Westinghouse Plasma, a descendant of the former Westinghouse Electric Corp., says it has deployed 16 plasma machines in the past six years to help dispose of municipal waste in Japan, where there is almost no room for landfills and incineration has contributed to an air-pollution problem. Other companies have sold plasma technology in Europe, as well as Japan. Now, with landfill



space at a premium in many places in the U.S. and concerns growing about incinerator pollution, the technology is drawing increased interest from American waste managers.

"If this works on an industrial scale the way it is supposed to, this has the potential to change all the waste rules," says Jeff Voorhis, an engineer at the Texas Commission on Environmental Quality, which is reviewing a plan for at least two plasma machines to be operated in the Houston area.

Westinghouse is also teaming with Geoplasma LLC, Atlanta, and the Georgia Institute of Technology to pitch a plasma-waste system for Honolulu, which is exploring alternatives as it runs out of landfill space. Westinghouse Plasma designs and makes the plasma torch reactor; Geoplasma designs the technology that collects the waste gas and combusts it to generate electricity.

First used in the late 1800s by metal makers for such purposes as melting iron, "plasma arc" technology—in which

gas is ionized with an electric arc to form a plasma torch—was later used for such applications as making fuel and testing spacecraft.

Other companies now using the torch to melt everything from hazardous materials to household garbage include Retech Systems LLC, a former unit of Lockheed Martin Corp., and Startech Environmental Corp. Retech, of Ukiah, Calif., said it has supplied six commercial versions of its Plasma Arc Centrifugal Treatment machines to customers in Switzerland, France and Germany, among other places. Startech, a small publicly traded company based in Wilton, Conn., said it has sold one of its Plasma Converter Systems for \$3 million to a commercial customer in Japan, and that it has signed contracts to deliver more in such places as Poland. All of the contracts are contingent on customers getting financing, however.

The 14-year-old Startech is currently unprofitable, posting a loss of \$2.6 million on \$1.7 million in sales in the fiscal year ended Oct. 31. Startech is trying to stay focused on its technology while its largest investor, NorthShore Asset Management, is subject to a Securities and Exchange Commission probe. The SEC is investigating whether millions of dollars was stolen from a hedge fund bought by NorthShore, a Chicago investment firm. A lawyer for NorthShore has said he didn't believe there had been any misuse of funds by his client, and added that the

*Please Turn to Page B5, Column 1*

## Plasma Torches Turn Garbage Into Gasses, Building Products

*Continued From Page B4*

firm is cooperating fully with the SEC. NorthShore bought a 20% stake in Startech, now valued at about \$11 million, about two years ago, and NorthShore representatives occupy two of the five board seats.

Startech Chief Executive Joe Longo says, "We don't get involved in the affairs of our shareholders."

Plasma technology isn't without issues. Some environmentalists, for example, say the plasma machines are indirect polluters, requiring great quantities of electricity that often comes from fossil-fuel power plants. Industry proponents say that using the waste gas as fuel can actually generate more electricity than the plasma-arc technology uses.

The process does produce dangerous gases, says John Hankinson Jr., an environmental consultant in St. Augustine, Fla. These have to be safely contained within the machine, he says. "You want to manage the gases properly, that's critical," says Mr. Hankinson, who also was the Environmental Protection Agency's regional administrator in Atlanta. He notes that the process also has its limits. It isn't the answer to radioactive waste, for example—it can significantly reduce the volume, but it doesn't make them safe.

Finally, the technology often is more expensive than the older methods it replaces. Municipal dumps in the U.S., for instance, spend on average \$30 a ton to dispose of waste, says Shyam Dighe, chief executive of Westinghouse Plasma. With plasma machines selling for as much as \$20 million, zapping away garbage runs \$50 to \$80 a ton, he says. Startech officials say that cost comes down when the value of recycled waste fuel is factored in.

In the U.S., the plasma makers hope to find more market opportunities—especially for hazardous waste, which industry officials say is less expensive to dispose of with plasma than with other methods.

New York City officials, meanwhile, say they are looking at plasma machines made by Startech and others to reduce the 24,000 tons of daily trash the city now has to truck to distant states such as Virginia. The trucking has been going on since New York closed its last landfill in 2001. According to Carmen Cagnetta Jr., a lawyer for the city, that has raised the cost of garbage disposal to as much as \$80 a ton.