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Special Report: Waste-to-Energy Projects Stir Hopes, Controversies

The concept sounds simple: Gasify municipal solid waste (MSW) to make syngas, which can be used to generate low-CO₂ electricity or fuels.

Done right, it can be vastly more “green” – and potentially cheaper – than dumping garbage in a landfill, especially with upcoming “greenhouse” regulations imposing hefty costs on landfill methane emissions.

But the politics and the economics can be more complicated. Just as problematic: a public “knowledge gap,” as proponents and potential partners with gasification-based waste-to-energy (WTE) projects are learning.

WTE project announcements are numerous, growing and headline-grabbing. Prospects for more projects coming to fruition seem more promising, especially as cities grow weary of problems and costs of land-filling (*see related stories, this issue*).

Some of the biggest-ever projects are due to be announced in the U.S. in early 2009, possibly opening the floodgates to WTE projects in numerous cities.

On the other hand, sometimes the headlines about WTE are proving to be painful for some proponents.

Probably none are more painful than those stoking a controversy over a proposed plasma gasification WTE project for Sacramento, Calif., which would relieve the city of land-filling MSW in Nevada.

The Sacramento City Council was due to vote on the proposed project on Dec. 9. But controversy over the project has led to a delay, with a vote not expected until early 2009, as the City's public information officer Amy Williams told *Gasification News* this week.

As the *Sacramento Bee* newspaper has reported, key questions are hobbling chances for the project.

Here's a chronology of that controversy, along with a listing of some other recent WTE projects in the U.S., some of which have stirred their own controversies:

-- **On Nov. 22**, the *Sacramento Bee* reported that more Sacramento City and County officials are having second thoughts about a plasma gasification WTE project proposed by local project developer, U.S. Science & Technology (USST).

This report recounted trips by Sacramento officials to visit a WTE plant in Japan that employs the Westinghouse Plasma technology for MSW WTE. USST reportedly paid more than \$60,000 to cover Japan travel expenses for various Sacramento officials.

-- **On Nov. 17**, the *Sacramento Bee* reported that the USST proposal is running into trouble among Council members because of still-unanswered

questions about plant financial details, whether there's any chance of possibly toxic metal-particle emissions, and a supposed lack of a proven, commercial-scale track record for MSW plasma gasification at large scale.

The *Bee* pointed out that a similar project in St. Lucie County, Fla., has stalled because of project revenue problems encountered by the proponent, Geoplasma.

Asked for comment on that project, St. Lucie County Administrator Douglas Anderson told *Gasification News*: "At this time the County is taking no further action until the developer of the project has a firm commitment in writing that they have end-users willing to purchase the energy generated by the project, allowing the project to move fiscally forward."

-- On **Nov. 8**, the *Sacramento Bee* ran an editorial praising a Sacramento City Council vote that will delay the plasma-gasification WTE scheme proposed by USST. Here's what the *Bee* editorial said:

"In unmistakable terms this week, the Sacramento City Council ordered its staff to hold off on an ambitious but ambiguous plan to partner with a private firm to turn city garbage into electricity," the editorial said.

"Council members were right to postpone this deal. Too many important questions remain unanswered. Chief among the questions is a basic one: Will this process work as its proponents claim it will?"

"Under the deal being negotiated, a private firm would build a plant to vaporize city garbage and use the synthetic gases created in that process to generate electricity. The city would have to deliver at least 2,100 tons of municipal waste a week as feedstock for the plant . . .

"Skeptics have raised serious doubts about whether the plan is technologically feasible. Nothing exactly like it has ever been done before, certainly not on the scale Sacramento contemplates. Critics say 'plasma arc gasification,' as the new technology is called, is a promising but unproven technology, particularly in the municipal waste arena.

"Obviously, city government is ill-equipped to evaluate such a proposal. So it seemed sensible for the city to bring in experts in April to explain the proposal to the council.

"But as the *Sacramento Bee's* Terri Hardy reported this week, at least two of the supposedly independent experts who briefed council members had financial ties to U.S. Science and Technology, the company pushing the project. That significant fact was never disclosed to the council.

"On Thursday, Councilman Kevin McCarty was clearly angry about the city staff's reliance on experts with ties to the company. 'It makes us look rather silly,' he said.

"Even Councilwoman Lauren Hammond, a longtime champion of the project, expressed concern. 'Our analysis has to be independent. If that isn't true, it's troubling,' Hammond told the *Bee*. . .

"The city doesn't know for sure that the facility U.S. Science and Technology proposes to build would be financially viable, whether it can meet air-quality and emission standards or if it will use more energy than it generates.

"These are basic questions that should have been answered before the city entered into exclusive negotiations with a private company.

"To answer them, the city now needs to turn to individuals with truly independent expertise in this highly technical field. . . .

"There's no shame in letting some other municipality become the first to enter the brave new world of plasma arc garbage disposal."

Earlier, the *Bee* reported that one of the experts testifying in favor of the project has worked for Geoplasma, a division of the Jacoby Group.

But our investigation confirmed that the *Bee* report mis-states a key fact: the cited expert (Lou Circeo) actually works for Georgia Tech University, which has contracts for plasma research with Geoplasma and other companies. Circeo is not and never has been an employee of Geoplasma and has no "financial ties" to the project, contrary to the *Bee* report.

Geoplasma was described in the original proposal for the Sacramento WTE plant as "a partner in the Sacramento deal and also is a sometimes partner of Alter NRG Corp., currently slated to design the Sacramento facility," the *Bee* said. However Geoplasma confirmed to us it isn't involved in the Sacramento project, although it had discussed the project earlier with USST.

On the other hand, Geoplasma is indeed working with Calgary, Alberta-based plasma gasification developer Alter NRG (owner of the Westinghouse Plasma technology) on another WTE proposed project in St. Lucie County, Florida.

-- *U.S. Science & Technology Responds to Charges*

In an interview with *Gasification News*, U.S. Science & Technology (USST) vice-president and chief engineer David Prinzing clarified and corrected several factual claims in the *Bee* stories.

He also raised a new issue not reported by the *Bee*: that one council member, an employee of Sacramento Municipal Utility District (SMUD), the local city-owned electric utility, may be trying to torpedo the USST WTE project because it may have a competing WTE proposal in mind.

SMUD Senior Attorney Steve Cohn sits on the Sacramento City Council, which will rule on the fate of USST's proposed plasma-gasification WTE project.

Cohn was quoted in a Nov. 17 *Bee* story as saying that USST's resistance to providing all financial details of the project – prior to reaching an agreement with the city to proceed – raises a “red flag.”

“We have a very powerful competitor: SMUD,” Prinzing said. “They submitted an alternative proposal [for MSW WTE] last year. And they have an employee [Cohn] on the Council who recused himself all year,” until SMUD apparently changed its mind and urged him “not to recuse himself” anymore, Prinzing claims.

(Note: Cohn did not return *GN*'s call for comment on this claim).

However, SMUD's program manager for advanced renewables and distributed energy, Michael DeAngelis, told *Gasification News* that SMUD doesn't have a competing proposal for MSW WTE. Instead, SMUD has several innovative WTE projects in development – and some already in operation – but none so far involve MSW, he said.

However, SMUD last year was engaged with California-based World Waste Technologies, which submitted a WTE proposal to Sacramento last year along with the City's waste recycler, BLT Enterprises.

World Waste Technologies offered up a gasification-based WTE technology to SMUD “which passed our initial technical evaluations,” DeAngelis told us.

While Sacramento decided to reject that World Waste Technologies proposal, the idea of thermal gasification technology was – and still is – of potential interest to SMUD, DeAngelis told us.

“We were in the evaluation process [of World Waste Technologies' statement of qualifications] when the City did the request for qualifications. But we've put it on the back burner until they [City of Sacramento] finish with their plasma proposal.”

If the City decides to scrap the plasma gasification proposal, then it's possible that SMUD might consider some alternative gasification idea for further study, he said.

World Waste Technologies is in the process of merging with a used-oil refiner, the company's latest reports to U.S. Securities & Exchange Commission show. The company president, John Pimentel, didn't return our call for comment.

SMUD has no opinion one way or the other about the plasma gasification proposal of USST, DeAngelis told us.

-- *Financial Details: 'Expensive' Due Diligence*

As for the City's questions about getting more financial details of the plasma gasification proposal, the reason that USST won't provide all details of that – prior to obtaining an agreement with the City to proceed – is that a full due-diligence study is “an expensive task,” Prinzing told us.

“Investors won't do due diligence until there's a commitment from the city to proceed – and there are numerous opportunities for the city to back out” if the resulting due diligence reveals problems or major questions, he said.

As for the *Bee* report questioning the independence of two outside consultants used by City staff to give views on the project: “The only financial connection is that we reimbursed travel expenses,” Prinzing told us.

Georgia Tech plasma scientist Lou Circeo confirmed this fact to us.

While the *Bee* claimed Circeo was “on the payroll” of Geoplasma, Circeo flatly contradicts this assertion.

Although Georgia Tech has a consulting contract with that company – as it does with several other companies around the world that are investigating plasma gasification projects – that doesn't mean he has any "financial ties" to the project, Circeo told us.

As a renowned plasma scientist with 37 years of research experience, Circeo resents the implication that what he's doing is merely on behalf of some special interest. "I'm very disappointed" in the inaccurate *Bee* description of his consulting work on the Sacramento project, he told us. "I do not have any relationship to Geoplasma except through [research] contracts with Georgia Tech. I have no stake in any projects."

So, while the Sacramento City Council may be disturbed by the *Bee* story's allegations and aspersions about the objectivity of experts and some City officials that favor the project, the Council and the City have at least gotten the benefit of hearing the views of top experts on plasma gasification, he said. "There are only a handful of people who really know plasma," Circeo told us.

If the Sacramento Council decides to seek more views from researchers at local California universities, then this probably will only result in delaying a decision on the WTE project, perhaps for another year to 18 months, Circeo speculated.

Besides two projects that Circeo has consulted on for Geoplasma via the Georgia Tech university contract, he's also consulted on four other plasma projects in the U.S. unrelated to Geoplasma, another plasma project in France and yet another in Naples, where he's trying to help them overcome an especially "horrible" problem with garbage disposal, he told us.

Plasma gasification has tremendous potential to supply clean energy to the electric grid, Circeo said, well exceeding that of many other proposed schemes.

In a presentation on plasma gasification in Montreal last month, Circeo listed several U.S. plasma-gasification WTE projects under development, including the St. Lucie County, Fla., project (with Geoplasma); a Tallahassee, Fla., project (Green Power Systems); a New Orleans project (Sun Energy Group); an International Falls, Minn. Project (Coronal), a Hawaii project (with Geoplasma) and the Sacramento project (USST).

Even before Sacramento decided to get outside-expert opinions on the project last April, the City had already reviewed 11 different proposals for WTE, finally selecting the USST project in February, USST's Prinzing told us. Nobody was questioning the independence of the expert reviewers then, including engineering professors at Sacramento State and University of California-Davis, Prinzing said.

Then, when the City got a second group of opinions from three more experts in April, questions started being raised about the independence of those experts. Prinzing told us he believes that at least some of those questions are being raised by Cohn, the SMUD senior attorney on the Council.

For the city, the whole idea of the project is to do something "green" rather than continuing to dump its trash in neighboring Nevada, Prinzing explained. That's exactly what USST is bringing to the table: an opportunity for the City to do something vastly more environment-friendly with Sacramento's trash – at no extra cost, he said.

USST would receive the same tipping fees that Sacramento now pays to dump trash in Nevada.

USST also would generate revenue by selling the gasification-based electric output, either to SMUD, PG&E or would-be California electricity market entrant, NRG Energy, he explained.

USST also would generate a third revenue stream from the inert-solids byproduct of MSW gasification. Studies indicate this material could fetch up to \$30/ton as road-bed material, or possibly up to \$1,500/ton for industrial ceramic or rock-wool applications, he said.

Gasification is preferable to trash incineration because California has such strict limits on dioxin and furan emissions, Prinzing told us. What's more, USST's gasification-to-power project would meet California's super-tough emissions limits for power plants, hence making the whole project "green" by world-class standards, he said.

However, several environmental groups including the Sierra Club are challenging the whole notion of waste gasification, arguing that recycling and re-use campaigns instead would lead consumers to behave "greener," he said.

But there's a problem with the logic: Much of what the "greens" would like cities to encourage citizens to recycle has very little or no economic use, he said. Collecting, separating and reselling many types of MSW materials for recycling often isn't economic, either.

"We're only interested in gasifying the stuff you can't recycle," Prinzing explained to us. Via gasification and "green" electric power generation, "we're recycling the un-recyclables," he quipped.

Meantime, USST is “working through the process” of negotiating purchased power agreements for the proposed project, he said.

As for charges that MSW plasma gasification isn’t proven at scale, Prinzing pointed out that the Utashinai plasma gasifier in Japan has been processing “hundreds of tons per day” of a combination of MSW and auto-shredder residue for the last six years.

That plant employs Westinghouse Plasma technology (now owned by Alter NRG, *see below*), which would provide plasma gasification technology for the proposed Sacramento project, he said.

The Utashinai plant, owned by Hitachi Metals, was designed to gasify up to 280 tons/day of waste materials, he said.

Georgia Tech’s Circeo, who has visited that plant, points out that Utashinai has two production lines, one of which is dedicated for MSW. So the claim that large-scale, dedicated MSW plasma gasification hasn’t been proven at scale, for several years, is flat wrong, he told us.

What USST is proposing for Sacramento would be a different design, aiming to produce syngas and steam for a combined-cycle power plant, Prinzing explained.

Extensive syngas cleaning for the Sacramento project would ensure the facility meets “best available control technology” emissions limits, he added. As a result, the Sacramento plant’s emissions profile would be different than the Utashinai emissions, he said.

For Sacramento, the plant would use a reference design from Alter NRG. Meeting California’s ultra-strict limits on nitrogen oxides (NOx) will require the addition of selective catalytic reduction (SCR), he added.

As for claims that plasma gasification wouldn’t produce much net energy, Prinzing pointed out that the plasma torch itself would consume only about 2-3% of plant power, while the total balance-of-plant energy consumption (including the torch) would only be about 20% of the power output. The other 80% would go to the grid, he said.

Supplemental natural-gas feed would be required for start-ups and also might be required as supplemental energy to meet the minimum Btu requirements of a GE gas turbine notionally selected for the project, he added.

Asked whether the controversy over the project has effectively torpedoed the chances of gaining City Council approval, Prinzing told us that’s “hard to say.”

“We do know they’re extremely embarrassed by all the stuff in the press,” he said. Meantime, the Council is also trying to work through factual issues, he said.

If approved, the Sacramento project might set precedent for more plasma-gasification MSW WTE projects, Prinzing affirmed. The St. Lucie, Fla., project might have been first, but was using a different revenue/financial model, he said.

USST has about a dozen other plasma-gasification projects in the works, although details on those are confidential, he said. Not all involve electric power. Gasification-based ethanol production is one such possibility, while hydrogen output is another, he said.