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# Technology With an Evolving:

## Past = Solid Waste Management | Present = Waste-to-Energy | Future = Renewable Fuels Strategy

By John F. Williams

Many communities faced daunting garbage problems in the late 1970s and early '80s: landfills were reaching capacity, disposal regulations became more stringent and economic and political factors made long-distance shipping unacceptable. Converting municipal waste to steam or electrical energy while reducing the volume destined for landfills provided a promising enough solution to fuel construction of some 180 waste-to-energy (WTE) operating facilities.

But the trend slowed amid environmental challenges from supporters of other waste management alternatives. Though WTE satisfied requirements of Clean Air Act Amendments, new development came to a screeching halt in the early 1990s as project economics shifted due to tax law changes, district and Supreme Court rulings against local flow control and cheap tipping fees at remote mega landfills.

Today, 91 WTE facilities operate in 28 states, managing roughly 14 percent of America's trash. They are quiet servants generating much-needed power while reducing dependence on land disposal. These facilities recover scrap metal and often provide accommodations for recycling and recovery of household hazardous waste. Fees provide welcome funding to host communities. In many cases, they are viewed as viable options to further reduce long-haul disposal practices.

### Promises Made; Promises Fulfilled

The majority of WTE facilities commissioned during the past 25-plus years continue to operate today as good neighbors and effective waste management tools. WTE conserves fossil fuels by generating electricity.

WTE facilities process 14 percent of the municipal solid waste nationally, generating enough electricity to meet the power needs of 2.8 million homes while serving the trash disposal needs of more than 37 million people. Therefore, WTE will not replace traditional disposal options but serves as a great partner.

Moreover, WTE provides clean energy. U.S. WTE facilities must meet some of the world's most stringent environmental standards. They achieved compliance with new Clean Air Act pollution control standards for municipal waste combustors set forth in 2000, spending more than $1 billion on upgrades. EPA data shows that dioxin emissions have decreased by more than 99 percent in the past decade, now accounting for less than .5 percent of dioxin emissions, and mercury emissions have declined by more than 95 percent. WTE facilities reduce greenhouse gas emissions. EPA estimates that WTE facilities prevent 33 million metric tons of carbon dioxide per year from being released into the atmosphere.

## A Closer Look

### Facts About Waste-to-Energy

As a nation officially "addicted to oil," we need these 91 facilities more than ever. We also need to recognize that the post-recycling waste stream is still rich in material that can be converted to energy. Enough fuel, in fact, to power more than 20 million American households.

Every ton of waste combusted rather than landfilled reduces oil use by about 45 gallons or coal use by 0.28 tons, and most WTE facilities operating in the United States process between 500 and 3,000 tons of waste per day. Current processing capacity generates as much power or steam as oil-fired facilities consuming 1.6 billion gallons of fuel each year.

This article focuses on "promises made and promises fulfilled." It also suggests that this technology can and should be used to complete the recycling process while contributing significantly to curing a powerful addiction.

Learn about HDR's Waste-to-Energy services at http://goto.hdrinc.com/WasteToEnergy.

Additional information on waste-to-energy can be found at the Web sites below.

Waste-to-Energy Research and Technology Council: www.columbia.edu/cu/wtert

Integrated Waste Services Association: www.wte.org

The facilities lessen land impact by reducing the space required to landfill post-WTE materials by about 90 percent.

WTE is compatible with recycling. Communities served by WTE facilities recycle an average of 35 percent of their trash, compared to the national average of 30 percent. WTE annually removes more than 700,000 tons of ferrous materials and more than 3 million tons of glass, metal, plastics, batteries, yard waste and ash at on-site recycling centers. Nearly 3 million tons of WTE ash is reused as landfill cover, roadbed or building material. Ash accounts for

anywhere from 10 percent to 30 percent of the volume of waste processed at WTE facilities.

Finally, WTE facilities provide economic benefits. The $10 billion waste-to-energy industry employs more than 6,000 American workers with annual wages in excess of $400 million. A 1,000-ton-per-day plant engages roughly 60 personnel.

### Disasters That Weren't

Perhaps the largest misconception about WTE was the concern of public health hazards raised by opponents, primarily regarding asthma, cancer, dioxin toxicity and ash handling and disposal. These historic issues have not been confirmed through scientific study and environmental monitoring. Ash, in particular, once was considered so dangerous it needed its own landfills. Today, it is viewed as a resource. Earlier this year, EPA awarded a bronze medal to David Kargbo, a Temple University engineering professor, for his research on using WTE ash to treat acid mine drainage and solve other environmental problems.

*The waste-to-energy plant in Pinellas County, Fla., processes up to 3,150 tons of solid waste daily and generates 75 megawatts of electricity per hour—providing enough power for the plant and approximately 45,000 customers.*

### The Future of WTE

It is estimated that there are more than 1,000 WTE facilities worldwide. WTE is more prevalent in Europe and Asia than in the United States, and we can learn from their experience. The European Union deems WTE a preferable alternative to landfills and has waste management directives aimed at minimizing landfills.

WTE in the United States has made great strides in mass burn and refuse-derived fuel, but the industry should continue investigating alternative technologies used by other countries, such as gasification. For example, it is expected that 16 gasification plants will be built in Europe between 2004 and 2006, with a combined capacity of approximately 1 million tons of waste. Several patented gasification technologies have been developed and appear to be ready for full-scale deployment.

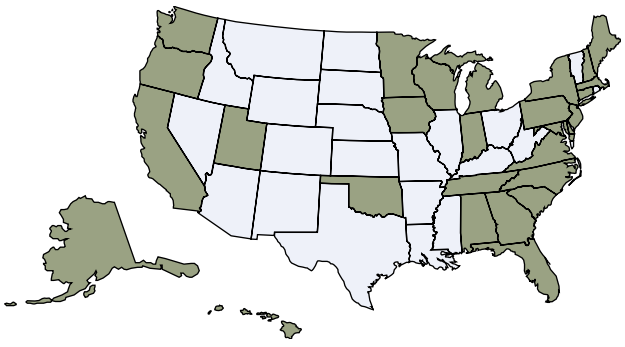
Plasma arc is another emerging technology, developed with support from the Department of Energy and the U.S. Navy. Plasma arc uses extremely high temperatures to break down waste materials into elemental byproducts. The arc in the plasma plume can be as high as 30,000 degrees Fahrenheit. The initial focus has been radioactive waste, medical waste and shipboard waste. However, plans recently were announced to build two 300-ton-per-day processing facilities in Poland.

### Evolution of Established Facilities

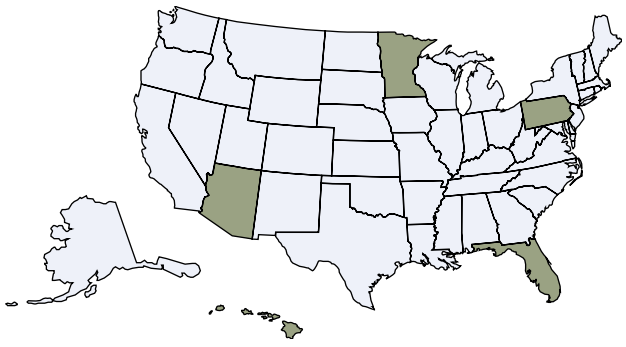
While technology is changing the shape of new facilities, the business of managing existing WTE facilities also is adapting to today's energy industry. Facilities developed under 20-year operating agreements are on the verge of seeing the end of their contract terms. Communities will need to begin considering whether to renegotiate, re-bid, purchase, sell, realign contractual structure, or a combination of the above. For some communities, that process already is under way.

### North East Solid Waste Committee

In Massachusetts, the 23 communities comprising the North East Solid Waste Committee (NESWC) last year completed negotiations regarding service post termination of existing service agreements. They were among the first in the nation to enter into a long-term service agreement for a regional WTE project. In the late 1970s, the Commonwealth of Massachusetts urged communities to develop regional municipal solid waste facilities, indicating that it would soon close unlined landfills in the state, and strongly encouraged WTE as the best alternative. The Commonwealth negotiated the terms of NESWC's construction and service agreement and advocated for its acceptance among the municipalities. These 20-year agreements ended on September 26, 2005.



*At left, the green states have waste-to-energy facilities operating today. At right, green represents the states proposing to build or expand WTE plants.*



Several years ago, the NESWC board and management team began implementing a strategic and financial plan to reduce the environmental and economic burden associated with managing municipal solid waste. That effort culminated this past year, when 22 of the 23 member communities entered into post-2005 contracts that dramatically change the risk allocation between the communities and the private owner/operator of the WTE facility, while cutting the communities' cost by over 50 percent.

### Greater Bridgeport Resource Recovery Facility

The Greater Bridgeport Solid Waste Advisory Board (SWAB) in Connecticut, in association with the Southwestern Regional Recycling Operating Committee (SWEROC), currently is analyzing options associated with its solid waste management programs, along with concerns of participating municipalities. The effort is aimed at establishing a focal point for evaluating alternative solid waste management options when current contractual obligations associated with the Greater Bridgeport Resource Recovery (RESCO) project expire in 2008.

Tasks include conducting feasibility and cost assessments for various solid waste management alternatives, preparing for SWAB/SWEROC negotiations with Wheelabrator (which operates the 2,250-tons-per-day mass-burn facility) and the Connecticut Resource Recovery Agency, reviewing member community legal rights and issues and assessing the physical condition of the seven RESCO transfer stations.

### Pinellas County Resource Recovery Facility

Pinellas County, Fla., invested in WTE in the early 1980s. The county was and remains a fast-growing population and commercial center on the west coast of Florida. The county envisioned that this growth would make it impossible to site new landfill disposal capacity outside its existing facility. WTE was the best option for extending the life of existing disposal capacity, and the county currently anticipates more than 60 years remaining landfill disposal capacity as a result of its decision to turn to WTE as the primary means of waste disposal.

Pinellas County's WTE facility has a waste throughput capacity of 3,150 tons per day with 75 megawatts of electrical generation. The facility is a mass-burn combustor with minimal front-end processing. Tipping floor operators remove large bulky objects that may impact the combustion process. In addition, suspicious materials also are removed.

*WTE facilities process 14 percent of the municipal solid waste nationally, serving the trash disposal needs of more than 37 million people.*

The facility recently underwent two major improvement projects: air pollution control (APC) retrofit and boiler upgrades. The APC retrofit, which included replacing electrostatic precipitators with baghouse filters and adding wet scrubbers, carbon injection and SNCR controls, was done to comply with regulations. The second project involved a large-scale overhaul to enhance performance and extend facility life. This included replacing sections of the boilers, upgrading the boiler-feed water system, upgrading plant controls, tipping floor expansion and other systems improvements.

Pinellas County has had a private operator for more than 20 years, and, with the contract expiring in 2007, is preparing for a competitive process for the next contract period.

### Regulatory and Public Issues

The U.S. Supreme Court's decision in 1994 to uphold challenges to flow control caused some WTE facilities to shut down. Flow control refers to the practice of waste managers to direct waste generated in a specific geographic area to a designated landfill, recycling or WTE facility. Many District Court cases since then have attempted to define the legal limitations on municipal powers to exercise flow control. Legislative attempts to provide support to communities in this area have stalled at every attempt. Many District Court cases since then have attempted to define the legal limitations on municipal powers to direct waste disposal. Legislative attempts to provide support to communities in this area have stalled at every attempt.

The biggest key to WTE's success in coming decades may be public education. In today's media-savvy world, public relations and educational campaigns must be part of the business plan. Activists are making sure their point of view is heard, and WTE executives would be well-advised to do the same.

### Conclusion

More than 25 years after the first U.S. facilities were developed we can say with confidence that WTE was a terrific solution to waste disposal problems in a large number of communities. Not only did these facilities result in dramatic reduction of landfill disposal, they became strong companions to other forms of recycling while providing a source of clean energy. Along the way, they have proven good neighbors to all forms of development.

Significant steps are being taken to keep WTE facilities operating as they age. Many have undergone retrofits and expansions. It will soon be time to reconsider operating agreements and secure new pricing. Communities should be realizing the benefit of retired debt associated with original capital investments, and the stage should be set for favorable new operating contracts. Indeed, the WTE industry is evolving into a renewable solid fuel source that communities can rely upon as part of a sustainable energy plan for the future.

Practicing professionals and new leaders should be reminded to continue looking for ways to convert waste material to energy-rich resources. These resources have significant value that will not be realized at the bottom of the community garbage can.

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