Europe finds cleaner fuel in trash as US lags behind

New incinerators convert garbage into energy yet produce very little pollution

Garbage burns in a furnace at the Wheelabrator North Broward waste-to-energy facility in Pompano Beach, Florida. Wheelabrator, a wholly-owned subsidiary of Waste Management, burns garbage in chambers with water-filled walls, creating steam that runs an electrical turbine connected to the local grid. PHOTO: BLOOMBERG

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The lawyers and engineers who dwell in an elegant enclave here are at peace with the hulking neighbor just over the back fence: a vast energy plant that burns thousands of tons of household garbage and industrial waste, round the clock.

Far cleaner than conventional incinerators, this new type of plant converts local trash into heat and electricity. Dozens of filters catch pollutants, from mercury to dioxin, that would have emerged from its smokestack only a decade ago.

In that time, such plants have become both the mainstay of garbage disposal and a crucial fuel source across Denmark, from wealthy exurbs like Horsholm to Copenhagen's downtown area. Their use has not only reduced the country's energy costs and reliance on oil and gas, but also benefited the environment, diminishing the use of landfills and cutting carbon dioxide emissions. The plants run so cleanly that many times more dioxin is now released from home fireplaces and backyard barbecues than from incineration.

With all these innovations, Denmark now regards garbage as a clean alternative fuel rather than a smelly, unsightly problem. And the incinerators, known as waste-to-energy plants, have acquired considerable cachet as communities like Horsholm vie to have them built.

Denmark now has 29 such plants, serving 98 municipalities in a country of 5.5 million people, and 10 more are planned or under construction. Across Europe, there are about 400 plants, with Denmark, Germany and the Netherlands leaders in expanding them and building new ones.

By contrast, no new waste-to-energy plants are being planned or built in the US, the Environmental Protection Agency says — even though the federal government and 24 states now classify waste that is burned this way for energy as a renewable fuel, in many cases eligible for subsidies. There are only 87 trash-burning power plants in the US, a country of more than 300 million people, and almost all were built at least 15 years ago.

Instead, distant landfills remain the end for most of the nation's trash. New York City alone sends 10,500 tons of residential waste each day to landfills in places like Ohio and South Carolina.

"Europe has gotten out ahead with this newest technology," said Ian Bowles, a former Clinton administration official who is now the Massachusetts state secretary of energy.

Still, Bowles said that as America's current landfills topped out and pressure to reduce heat-trapping gases grew, Massachusetts and some other states were "actively considering" new waste-to-energy proposals; several existing plants are being expanded. He said he expected resistance all the same in a place where even a wind turbine sets off protests.

WHY AMERICANS ARE RELUCTANT

Matt Hale, director of the Office of Resource Conservation and Recovery of the US Environmental Protection Agency, said the reasons that waste-to-energy plants had not caught on nationally were the relative abundance of cheap landfills in a large country, opposition from state officials who feared the plants could undercut recycling programs and a "negative public perception." In the US, individual states and municipalities generally decide what method to use to get rid of their waste.

Still, a study by the EPA and North Carolina State University scientists last year came down strongly in favor of waste-to-energy plants over landfills as the most environmentally friendly destination for urban waste that cannot be recycled. Embracing the technology would not only reduce greenhouse gas emissions and local pollution, but also yield copious electricity, it said.

Trash sits piled in the concrete receiving pit of the Wheelabrator North Broward waste-to-energy facility. PHOTO: BLOOMBERG

Yet powerful environmental groups have fought the concept passionately. "Incinerators are really the devil," said Laura Haight, a senior environmental associate with the New York Public Interest Research Group.

Investing in garbage as a green resource is simply perverse when governments should be mandating recycling, she said. "Once you build a waste-to-energy plant, you then have to feed it. Our priority is pushing for zero waste."

The group has vigorously opposed building a plant in New York City.

ACCEPTANCE IN DENMARK

Attitudes could hardly be more different in Denmark, where plants are placed in the communities they serve, no matter how affluent, so that the heat of burning garbage can be efficiently piped into homes.

Planners take pains to separate residential traffic from trucks delivering garbage, and some of the newest plants are encased in elaborate outer shells that resemble sculptures.

"New buyers are usually OK with the plant," said Hans Rast, president of the homeowners' association in Horsholm. "What they like is that they look out and see the forest," he said. (The living rooms in this enclave of town houses face fields and trees, while the plant is roughly some 366m over a back fence that borders the homes' carports). The lower heating costs don't hurt, either. Eighty percent of Horsholm's heat and 20 percent of its electricity come from burning trash.

Many countries that are expanding waste-to-energy capacity, like Denmark and Germany, typically also have the highest recycling rates; only the material that cannot be recycled is burned.

Waste-to-energy plants do involve large upfront expenditures, and tight credit can be a big deterrent. Harrisburg, Pennsylvania, has been flirting with bankruptcy because of a US$300 million loan it took to reopen and refit an old public incinerator with the new technology.

But hauling trash is expensive, too. New York City paid US$307 million last year to export more than 3.6 million tonnes of waste, mostly to landfills in distant states, Post said. Although the city is trying to move more of its trash by train or barge, much of it travels by truck, with heavy fuel emissions.

Last year, a small portion of the city's trash was processed at two 1990-vintage waste-to-energy plants in Newark, New Jersey, and Hempstead, New York, owned by a private company, Covanta. The city pays US$65 per 907kg for the service — the cheapest available way for New York City to get rid of its trash. Sending garbage to landfills is more expensive: The city's costliest current method is to haul waste by rail to a landfill in Virginia.

While new, state-of-the-art landfills do collect the methane that emanates from rotting garbage to make electricity, they churn out roughly twice as much climate-warming gas as waste-to-energy plants do for the units of power they produce, the 2009 EPA study found. Methane, the primary warming gas emitted by landfills, is about 20 times more potent than carbon dioxide, the gas released by burning garbage.

The study also concluded that waste-to-energy plants produced lower levels of pollutants than the best landfills did, but nine times the energy. Although new landfills are lined to prevent leaks of toxic substances and often capture methane, the process is highly inefficient, the study noted.

LAWS SPUR NEW TECHNOLOGY

In Europe, environmental laws have hastened the development of waste-to-energy programs. The EU severely restricts the creation of new landfill sites, and its nations already have binding commitments to reduce their carbon dioxide emissions by 2012 under the international pact known as the Kyoto Protocol, which was never ratified by the US.

Garbage cannot easily be placed out of sight, out of mind in Europe's smaller, densely populated countries, as it so often is in the US. Many of the 87 waste-to-energy plants in the US are in densely populated areas like Long Island and Cape Cod.

While these plants are generally two decades old, many have been progressively retrofitted with new pollution filters, though few produce both heat and power like the newest Danish versions.

In Horsholm only 4 percent of waste now goes to landfills, and 1 percent (chemicals, paints and some electronic equipment) is consigned to "special disposal" in places like secure storage vaults in an abandoned salt mine in Germany. Sixty-one percent of the town's waste is recycled and 34 percent is incinerated at waste-to-energy plants.

From a pollution perspective, today's energy-generating incinerators have little in common with the smoke-belching models of the past. They have arrays of newly developed filters and scrubbers to capture the offending chemicals — hydrochloric acid, sulfur dioxide, nitrogen oxides, dioxins, furans and heavy metals — as well as small particulates.

Emissions from the plants in all categories have been reduced to just 10 percent to 20 percent of levels allowed under the EU's strict environmental standards for air and water discharges.

At the end of the incineration process, the extracted acids, heavy metals and gypsum are sold for use in manufacturing or construction. Small amounts of highly concentrated toxic substances, forming a paste, are shipped to one of two warehouses for highly hazardous materials, in the Norwegian fjords and in a used salt mine in Germany.

"The hazardous elements are concentrated and handled with care rather than dispersed as they would be in a landfill," said Ivar Green-Paulsen, general manager of the Vestforbraending plant in Copenhagen, the country's largest.

In Denmark, local governments run trash collection as well as the incinerators and recycling centers, and laws and financial incentives ensure that recyclable materials are not burned. (In the US most waste-to-energy plants are private ventures.) Communities may drop recyclable waste at recycling centers free of charge, but must pay to have garbage incinerated.

A bulldozer surrounded by scavenging seagulls flattens garbage at the Malagrotta landfill outside of Rome. PHOTO: BLOOMBERG