

District Heating & Cooling

Volume 77 Number 3

First Quarter 1992



Indoor Air Quality: Looking Into the Challenge

Featuring

If District Energy is So Good,
Why Isn't it in Place?

Burn That Trash!

Sweden's Aggressive Waste
Management Efforts

Acting to Chart DHC's Future

Special Insert: 1987-1991
Index of Articles

and more. . .

Burn that Trash:

Sweden, Denmark use State-of-the-Art Incinerators to Burn Garbage and Generate Low-Cost Energy

David Israelson, *The Toronto Star*

Copyright © 1991; Reprinted with permission The Toronto Star Syndicate

Editor's Note: The waste generated by human beings throughout the world has been of growing concern for decades. In particular, municipal refuse, wastes generated in and around our most densely populated areas, i.e., our cities, continues to be the subject of technical, social and political debates. As pointed out in the article "Burn that Trash," many Scandinavian communities are turning, or burning, their wastes into energy, useful energy for heating via district heating systems. In fact the home of *The Toronto Star* – Toronto – has a district heating system in operation. In some North American cities, such as Baltimore, MD; Indianapolis, IN; Nashville, TN; and Grand Rapids, MI, wastes generated by the communities are being used to produce heating and/or cooling. The following article presents some practical experience in support of continued investigation of the waste-to-energy option.

To Canadian environmentalists, the very idea might sound like garbage: a huge incinerator that burns a city's trash, causes little pollution and can warm your toes on winter nights.

But in Denmark and neighboring Sweden, they burn garbage and are more or less happy about it. While Metro and other jurisdictions each year pile up enough trash to fill the Skydome, both Stockholm and Copenhagen have been turning their mountains of garbage into molehills.

And they use the energy produced from burning garbage to provide "district heating," networks of pipes that — for a fee — warm houses and offices and extend to numerous neighborhoods, including the core of Stockholm. Both cities keep clean and warm by using a combination of high-tech equipment and low-tech common sense: tight regulations, constant improvements and well-established recycling programs.

The heart of these disposal and heating systems are world-class incinerators, facilities which, if not necessarily loved,

are at least tolerated. By contrast, Ontario has banned the building of new garbage cookers, citing the hazards.

Burning trash is not the perfect answer. When it comes to garbage, nothing is. But in both Scandinavian cities, the drawbacks, while not completely overcome, are at least addressed:

- Complaints by neighbors are few because the plants are located away from residential areas. Emissions are subject to pollution controls that are tougher than Ontario's outdated rules of the weak, unenforceable federal guidelines.
- Recycling is encouraged to keep the quantity of garbage down. Sweden's and Denmark's incinerators are part of a system that includes packaging rules, bottle deposits and blue box-type recycling.
- The district heating systems generate revenue and cut pollution because the garbage-fueled heat takes the place of oil or coal heating.

Stockholm's garbage incinerator provides so much electric power and heat to

the city that its operators claim pollution-caused corrosion in the city has fallen to 1930s levels. In Denmark, the heating system is smaller but expanding, and it already provides enough heating to warm 20,000 houses and electricity for 60,000 apartments in Copenhagen.

Officials estimate that burning trash at Copenhagen's main facility has saved taxpayers about \$35 million in imported oil.

"We're in a position to say there's no reason not to incinerate," says Kirsten Warnoe, a scientist with the Danish government's National Agency of Environmental Protection. Her agency has been monitoring the country's garbage incinerators for years.

Until recently, Denmark had a problem with harmful emissions but Warnoe and other officials have been tightening standards to restrict the amount of cancer-linked dioxins and acid rain-producing gases that come out of smokestacks.

Several incinerators have been closed as a result but there's no plan to stop



Refuse can provide an ongoing resource for waste-to-energy plants.

burning garbage. The Star recently visited the main incinerators in both Copenhagen and Stockholm in order to see the “state-of-the-art” facilities that some argue should be duplicated to solve our garbage crisis.

The main Copenhagen incinerator, called Amagerforbraending, is built on six hectares (15 acres) of reclaimed land at the water’s edge. The building itself, which takes up about a hectare (2.5 acres), cost about \$20 million in 1970. Today it would cost much more; in 1985, just one boiler at Stockholm’s incinerator cost around \$30 million.

Like the Stockholm plant, the Copenhagen facility is owned by the municipal government. It handles the trash for about 520,000 residents, who pay up to \$140 per household each year in garbage disposal fees. It burns nearly 250,000 tonnes of trash a year.

Trash-laden trucks approach the site and are weighed in at the gate. The trucks — the facility can handle 120 trucks an hour — then make their way to one of 11 tipping bays, which open into a silo that

can store 12,000 cubic metres (424,000 cubic feet) of garbage.

“Every Monday, the silo is more or less filled up,” says Tony Holm, the facility’s technical manager.

The garbage is not sorted when it comes in, although there are random checks to weed out recoverable items like refrigerator doors. As in Ontario, most sorting in both Sweden and Denmark is done at home. In both countries, householders recycle newspapers and metal.

They still recycle more than we do, though. Unlike in Ontario, people are expected to return most bottles to stores in exchange for a deposit, and dead batteries are also handed in for safe disposal.

The result of years of garbage control is that each Swede throws out less than one kilogram of trash a day, compared with the 1.7 kilograms tossed out by the average Ontarian.

The garbage that ends up in incinerators is supposed to be the yuckiest stuff, fit only for dumping or burning. The system is not fool proof; among the rotting food

scraps and slick, stinky gunk in the pit were reams of computer paper and at least one bashed up sofa.

Whatever ends up in the pit is crushed to bits and hoisted up by huge pincers attached to cranes, which in Copenhagen’s case can pick up 2.5 tonnes of trash in one grab, 60 tonnes an hour.

The trash is then fed into kilns that roast the trash, reaching temperatures as high as 900 degrees Celsius (1,600 degrees Fahrenheit). The residue, called clinker, is sifted by magnets for any metal. What’s left over can be used as paving material or construction fill. Sweden, on the other hand, puts much of its slag in landfills.

Each 100 tonnes of garbage weighs only 20 tonnes after incineration, and the volume is reduced by 96 per cent. The leftovers are small enough to be stored next to the incinerators until they can be transported, and there they sit, looking like the blackened snow piles you see in shopping mall parking lots.

Continued on page 13

Burn That Trash *Continued from page 11*

What happens to the rest of the stuff? The hot gases are used to make electricity and provide heating. Then the smoke is put through scrubbers before it gets to the stack.

Some of the byproducts will inevitably go up the smokestack and cause air pollution. But to minimize this, the Danes use a scrubbing device called an "electrostatic precipitator," said to be 98 percent effective and which captured some 9,000 tonnes of ash in one year alone.

Stockholm's scrubber is slightly different; it's a limestone injection system that alters the pollution's chemistry before it reaches the air. It's similar to the acid rain controls Ontario Hydro has been forced to experiment with on its coal-burning plants in order to comply with the province's 1985 acid rain crackdown.

The Stockholm incinerator is improving its system to meet new, even tougher acid rain controls, says Christer Andersson, its supervising engineer. The incinerators in both countries, however, already are

able to meet their governments' latest dioxin standards, which are tougher than ours.

Denmark is particularly hooked on the big burners. The 5.1 million Danes burn 1.8 million tonnes of garbage a year in 38 facilities, up to 80 percent of their trash. They would burn more if their incinerators could handle it, but they're already putting to the torch a larger proportion of refuse than any other nation.

They took up incineration as a solution to a Metro-style garbage problem — no landfill space — in a country with even fewer alternatives than we have, since Denmark is just three-quarters the size of Nova Scotia and almost entirely surrounded by seas.

Sweden, larger, less densely populated and geographically similar to central Ontario, is more ambivalent. It puts about 45 percent of its trash in landfills. "Incineration is important, but basically it's a failure," argues Magnus Nilsson of the Swedish Society for Nature Conservation, a group which boasts 200,000 members.

Garbage is an inefficient fuel for producing energy, he contends. Who actually knows what's in the stuff? And even with good pollution control equipment like Sweden's, some toxic chemicals will still reach the air.

Nilsson also says that relying on incinerators gives the public a sense that it's okay to waste, and hampers further recycling efforts. "I know that compared to Canada the amount of garbage we produce is not high, but still I'm convinced we can reduce."

But Stockholm has been incinerating garbage since the beginning of the century. While environmentalists may not be overjoyed by this, they're not particularly upset either.

"There's really no panic to close them (incinerators)," Nilsson says. But "I think it would be impossible to build new plants."



CONTRACTORS

JOSEPH JINGOLI & SON

Specializing in District Heating & Cooling Distribution

Steam
Chilled Water
Hot Water

(609) 896-3111
(609) 896-2334 FAX
3131 Princeton Pike
Building #4, Suite 209
Lawrenceville, New Jersey 08648