Incinerating Trash: A Hot Issue Getting Hotter

Riverside Resource Recovery Facility, UK

Alarmed by the tendency of landfills to contaminate the environment, both public officials and cities are vocally seeking alternatives. The most commonly discussed alternative is something called a resource recovery facility. Nearly 40 Canadian cities have built such in the last 15 years, and another 50 or so are in various stages of planning.

These recovery facilities are a new form of an old technology. Basically, they're incinerators. But, unlike the incinerators of old, they don't just burn waste. They also recover energy. The energy is sold as steam to an industrial customer, or it is converted to electricity and sold to the local utility. (A few facilities, but not many, also recover metals or other materials before using the waste as fuel.)

A ton of trash possesses the energy content of a barrel and a half of oil. This is not a trivial amount. Canada discards 50 million tonnes of municipal waste a year. If all of it were converted to energy, we could replace the equivalent of 12 percent of our oil imports.

At the local level, selling energy or materials not only replaces non-renewable resources; it also provides a source of income that partly offsets the cost of operating the facility.

The new facilities are, on average, much cleaner than the municipal incinerators of old. Many have two-stage combustion units, in which the second stage burns exhaust gases at high temperature, converting many potential organic pollutants to less harmful emissions, such as carbon dioxide. Some, especially the larger and newer facilities, also come equipped with the latest in pollution-control devices.

The environmental community is uneasy with this new technology. Environmentalists have argued for many years that the best method of handling municipal trash is to recycle it—i.e., to separate glass, metal, paper, and other materials and use them again, either without reprocessing or as raw materials in producing new products. The thought of the potential resources in municipal solid waste simply being burned, even with energy recovery, has made many environmentalists opponents of resource recovery.

More recently, opponents have found a stronger reason to oppose burning waste: dioxin in the plants' emissions. The amounts present are extremely small, measured in trillionths of a gram per cubic metre of air. But dioxin can be deadly, at least to animals, at very low levels.

What is Dioxin?

Dioxin is a generic term for any of 75 chemical compounds, the technical name for which is poly-chlorinated dibenzo-p-dioxins (PCDCs). A related group of 135 chemicals, the PCDFs, or furans, are often found in association with PCDDs.

The most infamous of these substances, 2,3,7,8-TCDD, is often referred to as the "most toxic chemical known." This judgment is based on animal test data. In laboratory tests, 2,3,7,8-TCDD is lethal to guinea pigs at a concentration of 500 parts per trillion. A part per trillion is roughly equivalent to the thickness of a human hair compared to the distance across Canada.

The effects on humans are less certain, for many reasons: it is difficult to measure the amounts to which humans have been exposed and difficult to isolate the effects of dioxin from the effects of other toxic substances on the same population; and the latency period for many potential effects, such as cancer, may be as long as 20 to 30 years.

Nevertheless, because of the extreme effects of this substance on animals, known releases of dioxin have generated considerable public alarm. One of the most publicized releases occurred at Seveso, Italy, in July 1976, where a pharmaceutical plant explosion resulted in the contamination of at least 700 acres of fields and affected more than 5000 people. Dioxin was found in the soil in concentrations of 20 to 55 parts per billion.

The immediate effects on humans were nausea, headaches, dizziness, diarrhea, and an acute skin condition called chloracne, which causes burn-like sores. The effects on animals were more severe: birds, rabbits, mice, chickens, and cats died by the hundreds, within days of the explosion. In response to the explosion, the Italian provincial authorities evacuated 730 people from the zone nearest the plant, and sealed off an area containing another 5000 people from contact with non-residents.

In North America, perhaps the best known dioxin contamination incident occurred at Times Beach, Missouri, where used oil, contaminated with dioxin, was sprayed on roads as a dust suppressant. Soil samples showed dioxin levels exceeding 100 parts per billion. While no human health effects were documented at Times Beach, a flood in December 1982 led to widespread dispersal of the contamination, as a result of which the entire town was condemned, the population evacuated, and over $30 million of the U.S.'s Superfund money used to purchase the condemned property.

Dioxin was among the substances of concern at Love Canal. And it was the major contaminant in the chemical defoliant Agent Orange, the subject of a lawsuit by 15000 Vietnam veterans and dependents and an out-of-court settlement of those complaints valued at $180 million.
As early as 1978, trace amounts of dioxin were found in the routine emissions of a municipal incinerator. Virtually every incinerator tested since that date has shown traces of dioxin.

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