



[Back to Landfill or incineration: the climate change dilemma](#)

Landfill or incineration: the climate change dilemma

April 02, 2010

Catherine Porter

It's a humble soybean field today. But soon, a giant smokestack may mark the spot, just east of the idle auto parts plants of Oshawa, where 140,000 tonnes a year of garbage put out on the street by Durham Region residents will go to be burned.

The \$274 million energy-from-waste plant planned for this site, which will include a \$1 million public viewing gallery where visitors can see the technology at work, just passed muster in a provincial environmental assessment. With the public comments period over as of Friday, the proposal now heads back to the environment ministry for final approval.

Proponents say the state-of-the-art plant, which will use waste to generate power, is a symbol of the region's commitment to fighting climate change.

But whether that assertion stands up is a complicated issue for scientists and politicians alike. It all depends on how you analyze the life cycle of garbage.

"It's actually better for climate change to incinerate than landfill," explains Cliff Curtis, the region's commissioner of works. "It's counterintuitive, but if you incinerate, you save one tonne of greenhouse gases for every tonne of garbage you process."

Over a year, Durham's plant, using household waste to make electricity, will produce a net 25,700 tonnes fewer planet-warming greenhouse gases than a modern landfill, his report states. That's equivalent to taking 4,700 cars off the road for one year.

On the other hand, Metro Vancouver, which used a different consulting firm to analyze the question, concluded that if you first fish out most of the compostable and recyclable materials, landfill wins.

Which is correct? Both or neither, it seems. No one really knows.

Traditionally, when it came to handling garbage, the deciding factors were space and money. With climate change on everyone's lips — including politicians seeking re-election — promoters of both alternatives are doing some creative number-crunching, says Jean Bogner. The earth science researcher at the University of Illinois is the lead author of a chapter on waste management for the international scientific body known as the Intergovernmental Panel on Climate Change.

There are at least six distinct models for assessing the life cycle of waste, she says. Most consultants treat them like a buffet, sampling a bit of one, taking a scoop of others.

"The only rule of thumb is that there is no rule of thumb," says Bogner. "It's a free-for-all right now. Everyone is making their own assumptions."

Here's one thing we do know: Of all the alternatives, landfills globally are the biggest emitters of greenhouse gases. But then, far more garbage goes into landfill than any other alternative. And though there are efficient technologies to capture and prevent the release of those gases, many landfills, especially in the developing world, have no controls.

The IPCC uses some strange math of its own when counting carbon emissions from garbage. The carbon dioxide emitted when we toss out plastics — so-called "fossil carbon" — is counted. But not the gasses emitted by rotten bananas and oily pizza boxes, items that only recently were "alive" and absorbing carbon dioxide from the atmosphere. That "biogenic carbon" is considered a wash, environmentally.

The panel's latest report acknowledges that landfills end up storing carbon. Up to half of the paper board and clear packaging that ends up in landfills doesn't rot, nor release carbon dioxide into the atmosphere, the report states.

"If you just use the instant IPCC methodology, the emissions are going to be less for incinerators," says Bogner. "But, if you took carbon storage into effect, landfills become competitive."



The GTA's first incinerator in decades will be built somewhere behind this fence, which encloses a 100-hectare site near Clarington in Durham Region.

Keith Beaty/Toronto Star

With less available landfill space, many European countries opted years ago to incinerate their garbage. Their “waste-to-energy” facilities are regarded as renewable energy sources, since they replace dirtier coal-fired power plants. In cities such as Malmö, Sweden, the incinerator supplies piped-in heat for more than half the city’s buildings.

Under such conditions, burning garbage is considered a form of recycling and decidedly better for the planet than landfills.

“If you apply modern technology, you are going to get fewer greenhouse-gas emissions from a system that doesn’t put organic waste in the landfill,” says Jens Aage Hansen, editor of the journal *Waste Management and Research*, and chair of International Solid Waste Association’s task force on climate change. “But you have to compare systems; you cannot compare technologies (alone) ... If energy doesn’t matter, the incinerator has no mission in the waste stream.”

Durham’s context is different. By the time the incinerator is up and running, it’s expected to be funnelling energy into a relatively green electrical grid. Instead of replacing dirty coal-fired plants, it will compete with cleaner natural gas or carbon-neutral hydro or nuclear plants.

There are no district heating pipes in the ground, as there were in Malmö, and while there’s talk of building some, just looking across the farmland site to the nearest house gives a sense of the crippling cost that would entail. And unlike most European cities, Durham runs a successful central composting program that fishes out banana peels and mouldy bread before they hit a landfill.

That’s key, because once pressed inside the airless confines of a modern dump, those peels and rinds produce methane — a very potent greenhouse gas that packs 21 times the punch of carbon dioxide. Methane is the Achilles’ heel of landfills when it comes to climate change.

Although attention is often focussed on the emissions created by trucks trundling our waste down the highway to Michigan, most greenhouse gases emitted by the waste stream actually come from rotting food.

In Durham, the consultant examining the alternatives gave points to the incinerator for not producing the same amount of methane emissions that a dump would. To most experts, that reeks of double-counting.

“Methane is a significantly larger greenhouse gas contributor than carbon dioxide,” said Jim McKay, consultant with Jacques Whitford Stantec Ltd., the company that did Durham’s life-cycle analysis.

The incinerator also gained substantial carbon points for metal recovery, in McKay’s analysis. The common procedure for incinerators is that, once the waste is burned, the bottom ash is sifted and run past a magnet, so metals left over can be sent to out for recycling.

That saves all the energy and pollution that would go into mining virgin metal, McKay said.

But, if you count the upstream savings — energy not spent on replacing metal — you should also count the upstream costs, anti-incineration activists say.

“If you burn something, you have to go back to square one. You have to reharvest the tree, you have to extract more oil and ship it halfway around the world,” said Paul Connett, an American chemistry professor who has led the charge against incinerators for more than 20 years. “Every single object that goes into that machine will have to be replaced, unless there is a huge downturn in consumption.”

If municipalities really want to pick the system with the least impact on carbon emissions, landfill and incineration are both bad options, Connett said. Composting and recycling are the clear winners.

Another recent report on Vancouver’s waste system shows that every tonne of garbage that is reused or composted saves the city 1,835 kilograms of carbon dioxide emissions. (Landfills fare better than incinerators in this report, as the author Jeff Morris gives them credit for carbon storage.)

“We should be comparing ourselves with the cutting edge of the waste stream,” Connett said. “They’ve imposed a false dichotomy in the argument — trapping the argument between incineration and landfill. That’s unacceptable.”

Confronted with all these nuances, McKay says his study looks at the broad, global picture.

“If we were looking only at local emissions and the local airshed, (a waste-to-energy incinerator) might come out on par with landfill,” he says. “It might come out worse.”