

COMPOSTING MATTERS – PART 2

by Clarissa Morawski

“So large is the cost spread between composting and other disposal options that the debate around the economic merit of composting is over.”



Eco-Economic Savings from Composting

Finally, an end to the diversion debate

Today more than ever before, lifecycle assessments (“LCAs”) are being used to measure the true environmental impact of products and processes from cradle to grave. LCAs have become the primary tool to assess the environmental efficiency of one system versus another.

However, the results of LCAs are generally presented as a series of data which include a variety of pollution indicators, all of which — while are helpful — make it difficult to evaluate the big picture because there is no common measurement. For example, what exactly does it mean when one process results in higher particulate matter, than another which creates high amounts of carbon dioxide? Which is less harmful?

Last fall the Region of Niagara commissioned a study to undertake a full-cost accounting review of region-wide composting of food waste, and leaf-and-yard waste, versus other waste management options like landfill and waste-to-energy (WTE). The study used the newly developed “Morris Calculator” (see cover story, December/January 2008 edition), an excel-based tool that combines recent LCA

data for a complete profile of various pollutants including greenhouse gas emissions (eCO₂); human health particulates (ePM_{2.5}); human health toxics (eToluene); human health carcinogens (eBenzene); Eutrophication (eN); Acidification (eSO₂); and Ecosystems Toxicity (e2,4-D).

The resulting data represents the total pollution or avoided pollution profile for the entire process (recycling, composting, landfill or WTE) from collection to final processing of various wastes. The calculator also quantifies the avoided pollution derived from the use of finished compost, which is unprecedented to date. More specifically, this measures the environmental benefit from replacing pesticides and synthetic fertilizers with compost.

Finally, the calculator assigns a monetary value to each pollutant based on its trading value or assessed monetary impact on human health and the environment. The results are a dollar value representing a cost or cost savings in terms of pollution and its impact on human health and the environment. This provides a “full cost accounting” picture rarely used to assess waste management options. Presented

as the “environmental benefit,” this dollar amount provides us with one indicator that everyone understands. More specifically, the environmental benefit is real dollar savings for society.

In the case of Niagara Region, the study looked at about 52,000 short tons of organics, of which about 16,000 tons are food waste and 35,000 tons make-up leaf, yard and bulky organics. The model was run against aerobic composting, landfill with gas flaring, landfill with electricity generation (75 per cent), and the WTE from the recent environmental assessment study.

Table 1 provides a summary of the net environmental benefits of each process per short ton. Unlike calculating the net benefit of WTE and landfill, the composting net benefit requires subtracting the landfill benefit (as composting is replacing the landfill option in Niagara) and further adding the benefit of compost use.

Once the monetary values are applied (see Table 2), a monetized environmental benefit of each process is obtained (see Table 3).

The environmental benefit is subtracted

Table 1
Pounds of Emissions Reductions/(Increase) Per Ton

		Climate Change (eCO ₂)	Human Health – Particulates (ePM _{2.5})	Human Health – Toxics (eToluene)	Human Health – Carcinogens (eBenzene)	Eutrophication (eN)	Acidification (eSO ₂)	Ecosystems Toxicity (e2,4-D)
COMPOSTING	L&Y&Brush	542.31	0.52	241.54	0.31	5.32	2.17	4.13
	Food scrap	2247.95	0.52	241.54	0.31	5.32	21.7	4.13
LANDFILL – LGR Flaring	L&Y&Brush	970.77	-0.08	-3.44	0	-0.13	-0.3	-0.1
	Food scrap	-734.87	-0.08	-3.44	0	-0.13	-0.3	-0.1
LANDFILL LGR Electricity generation	L&Y&Brush	1083.94	0.82	36.77	0	-0.09	2.77	0.01
	Food scrap	-540.87	0.82	36.77	0	-0.09	2.77	0.01
WTE	L&Y&Brush	148.47	2.86	55.14	0	0.03	8.06	-0.04
	Food scrap	103.1	2.86	55.14	0	0.03	8.06	-0.04

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Table 2

Value of Environmental Impact Category Emissions Reductions Per Ton

Climate Change	Human Health – Particulates	Human Health – Toxics	Human Health – Carcinogens	Eutrophication	Acidification	Ecosystems Toxicity
eCO2 \$36	ePM2.5 \$10,000	eToluene \$118	eBenzene \$3,030	eN \$4	eSO2 \$661	e2,4-D \$3,280

Table 3

Monetized environmental benefit and true costs of composting, landfill and WTE for the Region of Niagara’s organics

	Composting (L&Y&Brush & Food waste)	Landfilling LGR Flaring	Landfill LGR – electricity generation	WTE – low estimate	WTE – high estimate	WTE – best case
Average environmental benefit per tonne	\$49.59	\$7.79	\$19.63	\$25.28	\$25.28	\$25.28
True cost per tonne	\$19.66	\$75.14	\$49.37	\$76.72	\$142.72	\$62.72

from the actual cost of each waste management system applied to Niagara Region. Composting food waste costs \$81.77 per tonne and leaf-and-yard waste \$33.83 per tonne. These are aggregated rates based on the actual forecasted contract price per tonne before and after the minimum threshold is met. The figure also includes current costs for managing organics.


Landfilling with gas flaring is \$82.93 based on current landfill cost projections for 2009. Landfilling with gas recovery and electricity generation is \$69.00; and WTE costs

range from a “best case” of \$88.00; to a low of \$102, and a high of \$168 per tonne. (These rates are based on data generated from “Alternatives To” and “Selection of a Preferred Disposal System,” DRAFT, July 20, 2007 — *WastePlan*) and “Improved Assumptions” applied for sensitivity analysis.

And the winner is...

The resulting “true cost” — represented by the operational cost minus the environmental benefit — shows that composting has a cost of \$19.66 versus all other options, which range from a low

of \$49.37 to a high of \$142.72 (see Table 3)

The findings of the study set a new precedent for waste management accounting. So large is the cost spread between composting and other disposal options that the debate around the economic merit of composting is over. Truly, composting is the best bang for the buck. 

Clarissa Morawski is principal of CM Consulting in Peterborough, Ontario and is a contributing editor of this publication. Contact Clarissa at morawski@ca.inter.net



LAURIN INC.

The Canadian Leader in the Manufacturing and Design of Environmental Equipment

487, rue Principale, Ste-Dorothée, Laval Qc (Canada) H7X 1C4
Tel: 450•689•1962 Fax: 450•689•2527

240 MacDonald Blvd. Alexandria, On (Canada) K0C 1A0
Tel: 613•525•1627 Fax: 613•525•4385