Economics of New York City Commercial MSW Collection & Disposal and Source-Separated Food Waste Collection & Composting

Opportunities to Reduce Costs of Food Waste Recollection & Recovery

Discussion Document

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As outlined in our document on *Guiding Principles for Recovering Value from Commercial Food Waste*[1], economic feasibility of food waste recovery is vitally important. To achieve the resource recovery rates needed to dramatically curb greenhouse gas emissions, every effort should be made to design waste diversion and recovery systems which will provide cost savings, or at a minimum incur no additional cost, to the restaurant and grocer relative to existing, unsustainable waste management practices.[2]

This memo compares the costs of current source-separated food waste collection and composting options with the collection and disposal of municipal solid waste (MSW) containing putrescible waste. Putrescible waste is defined by the New York City Department of Sanitation as "the portion of the solid waste stream containing organic matter having the tendency to decompose with the formation of malodorous by- products."[3] Using this comparison, this memo outlines options to decrease costs and thereby encourage greater food waste diversion by New York City's grocers and restaurants and other commercial food waste generating entities.

1 CoRR's Guiding Principles can be found at: thecorr.org/CoRRFoodWasteRecoveryGuidingPrinciples.pdf

2 It should be noted that in some cases, waste generators may be willing to pay more for value-added food waste composting services. In the absence of policy mandates, increased food waste diversion would require either 1) waste generators to increase their demand for composting services at a cost that haulers can provide, or 2) the price of this service would have to decrease as described in this memo

3 "New York City Department of Sanitation Solid Waste Management Plan (September 2006) Solid Waste Management Plan Attachment IV," accessed 27 August 2012. (www.nyc.gov/html/dsny/downloads/pdf/swmp/swmp/swmp-4oct/attmnt04.pdf)

Waste Collection, Transfer and Landfill: The System to Beat

Since over 95% of commercial food waste generated in New York City is landfilled or disposed of through a combustion process[4] (as a part of unsorted municipal solid waste), is it important to understand the economics of this system in order to determine how it relates to and compares with food waste collection and recovery.

Cost estimates used in this analysis were developed using the results from our survey of waste industry haulers, brokers, composters and vehicle manufacturers. Ranges are presented to account for the variation in survey responses. Additional information was also provided through a literature search. Sources for assumptions are outlined in Figure 1 (next page, below).

The cost per ton for the collection, transport and disposal of commercial putrescible waste was based on the scenario of in-city collection by a waste hauler and tipping at an in-city commercial putrescible transfer station. Using these assumptions, costs from collection to ultimate disposal at a landfill or waste to energy facility were included. The objective is to provide an estimate that is within the "ballpark" of the industry average and to provide relative cost comparisons with source-separate organics collection, transport and recovery.

To calculate in-city collection costs, a cost range of $75-$100 per hour, or $600-$800 per 8-hour shift, was assumed. If 10-16 tons are collected per shift; in-city collection will cost $38-80/ton.

The New York City commercial putrescible transfer station tip fee is estimated to be $65-$80 per ton.[5] This cost includes the handling of the material at the transfer station, shipping it to landfill, and the landfill tip fee. Adding the in-city tip fee to the cost of collection of $38-$80 previously mentioned yields a total cost of $103- $160 per ton. For reference, the maximum price waste haulers can charge in New York City is $208/ton.[6]

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4 According to presentations at July and November 2011 Global Green food waste conferences and personal communications with one hauler in 2011, the three largest waste haulers in NYC, Action Environmental Group, IESI, and Royal Waste, reported collecting a combined 80 tons per day of commercial food waste in New York City. To account for food waste collected by additional haulers, we're using the assumption that an additional 20 tons per day may be collected by other haulers, resulting in a range of 80-100 tons per day of food waste that is collected in New York City. These numbers calculated by dividing the number of tons generated per year by 365.

5 This tip fee is estimated from conversations with two haulers and one waste services and waste brokerage company, as well as from:
R.W. Beck, Inc., DSM Environmental Services, Inc. & R.S. Lynch & Company, "Hunts Point Anaerobic Digestion Feasibility Study: Prepared for the New York City Economic Development Corporation" (2010), (www.nycedc.com/sites/default/files/filemanager/Projects/Hunts_Point_Peninsula/HuntsPointAnaerobicDigestionFeasibilityStudy.pdf)

6 "Maximum Rates." New York City Business Integrity Commission, accessed August 27, 2012, http://www.nyc.gov/html/bic/html/trade_waste/max_rates.shtml

Figure 1: Assumptions Used for NYC Waste Scenarios

Assumptions		Source
NYC commercial putrescible transfer station tip fee	$65 - $80	3 NYC haulers and/ or transfer station owners; and 2010 NYCEDC feasibility study on anaerobic digestion at Hunts Point[7]
Long-haul truckload	20 tons[8]	Estimate
Cost per mile (using a 20-ton long-haul vehicle)	$4	3 haulers, composters and/ or brokers
8-hour collection route (weight of garbage; 2 routes completed)	10 - 16 tons	Vetted by 3 NYC haulers
8-hour collection route (weight of food waste)	8 - 16 tons	Vetted by 3 NYC haulers
Cost of waste handling at transfer station	$4 - $10 per ton	Estimate
Labor and fuel for in-city solid waste collection	$75 - $100	Vetted by 2 NYC haulers
Shift	8 hours	Vetted by 3 NYC haulers
Cost of refuse collection vehicle	$250,000	Estimate based on conversations with two haulers and one refuse vehicle company
Garbage truck life span (assuming 300,000 miles driven over lifespan)	12 years	INFORM Inc.'s Fact sheet on *Greening Garbage Trucks*[9]
Combined cost of long haul tractor & trailer	$123,000 - $145,000	Estimated based on conversations with one refuse vehicle company and one logistics consultant
Long haul tractor & trailer life span	12 years	Estimate based on conversations with one refuse vehicle manufacturer
Peninsula Compose, Wilmington, DE tip fee	$45 - $50	Biocycle 2010. Nelson Widell Oct. 2011. Personal Communication

7 This tip fee is estimated from conversations with two haulers and one waste services and waste brokerage company, as well as from:
R.W. Beck, Inc., DSM Environmental Services, Inc. & R.S. Lynch & Company, "Hunts Point Anaerobic Digestion Feasibility Study: Prepared for the New York City Economic Development Corporation" (2010)

8 This amount varies considerably due to differences in State-established weight limits.

9 This fact sheet was created as a summary of INFORM Inc.'s report:
"Greening Garbage Trucks: Trends in Alternative Fuel Use: 2002-2005," INFORM, Inc.,
http://www.informinc.org/ggt.php

Assuming staffing and equipment costs to waste generators are cost neutral, the collection and recovery of any material stream should be cost effective if cheaper than the cost of collection and disposal of commercial putrescible waste.

Source-Separated Food, Collection, Shipping, and Tip Fee for Composting

The Peninsula Compost facility in Wilmington, DE was chosen as a comparison to landfill. While not the only facility where source-separated food waste generated in New York City can be composted, this facility is preferred by some haulers collecting from restaurants and grocers since the facility has highway access, accepts compostable packaging, and is able to handle lower food waste stream purity levels. It is also the largest composting facility in the Northeastern United States and is permitted to receive up to 550 tons per day of organic waste. The facility currently receives around 400 tons per day and has the permitted capacity to receive an additional 150 tons per day – which could come from New York City and other areas in the region.[10]

To calculate costs of in-city collection by truck, a cost range of $75-$100 per hour, or $600-$800 per 8-hour shift, was assumed. If 8-16 tons are collected per shift; in-city collection from commercial entities will cost $38-100/ton.

Two options were evaluated for sending food waste to the Peninsula facility, which is located approximately 130 miles from New York City. Both options are currently practiced by haulers in New York City. The first option is for food waste to be sent to a New York City transfer station, consolidated into a long-haul truck, and sent to the Peninsula facility. The shipping costs of sending food waste to Peninsula Compost by long- haul truck were estimated by survey respondents in dollars per mile. An estimate for the transfer station handling cost of $4-$10 per ton is used. To estimate the tip fee charged at Peninsula Compost, we cited an article in Biocycle Magazine with an estimate of the high $40's and our video[11] of the facility, in which the company's Co-Founder Nelson Widell cites a tip fee of $50 per ton.[11]

10 Communication with Nelson Widell, co-founder of the Peninsula Compost facility, March 23, 2011.

11 Nora Goldstein and Dan Sullivan, "Urban Facility Delivers Food Waste Composting Capacity," BioCycle, June 2010, Vol. 51, No. 6, 16.
Article referenced tip fees in the "high $40s." In Global Green's video of the Peninsula Compost facility (Oct. 12, 2011), the company's co-founder, Nelson Widell, states that tip fees are around $50 per ton. The video of the facility can be found at: http://globalgreen.org/blogs/global/?p=2331

Food waste also may be sent directly to the Peninsula facility in a garbage truck. This cost is estimated using the reported price range for garbage collection of $75-$100 per hour. Multiple haulers stated that food waste is often sent on a 260-mile round trip to the Peninsula Compost facility in the same truck that collected the material, and that doing this decreases the lifespan of these trucks. By comparison, shipping food waste to this location using a 'long-haul' truck, would be using an asset that costs half the price and that is built for driving long distances.

To illustrate how this works, we utilized estimates for the lifespan of garbage trucks from INFORM Inc.'s Fact Sheet on Greening Garbage Trucks.[12] This study estimates that over a 12-year lifespan a garbage truck will travel 300,000 miles. If the daily miles traveled by the truck are increased to include both a 15-mile in-city collection route and a 260-mile trip to Wilmington, DE, then the 300,000 mile mark is reached in only 3 years. This accelerated depreciation value, minus the estimated cost of depreciation for a long haul tractor and trailer is used to estimate a cost of $9-$20 per ton.[13]

Discussion & Conclusions

Based on both scenarios outlined above, estimates for hauling fees for curbside food waste collection may range from $113-$233 per ton, placing the upper range above the New York City rate cap of $208 per ton.[14]

The following table summarizes the scenarios discussed above, which compares the costs of landfilling New York City commercial putrescible waste with composting source-separated food waste at Peninsula Compost in Wilmington, DE.

Two key areas that provide greatest opportunity for cost reduction are efficiencies in material handling and collection, and siting composting facilities closer to New York City. The solutions below address both the economics of food waste collection and processing described above, as well the overall system economics of waste collection including food waste, MSW, and recyclables. The overall system economics is broader than the scope of each of the individual waste streams. The combined collection costs to the hauler will include any additional cost for adding collection routes or pick-ups for food waste.

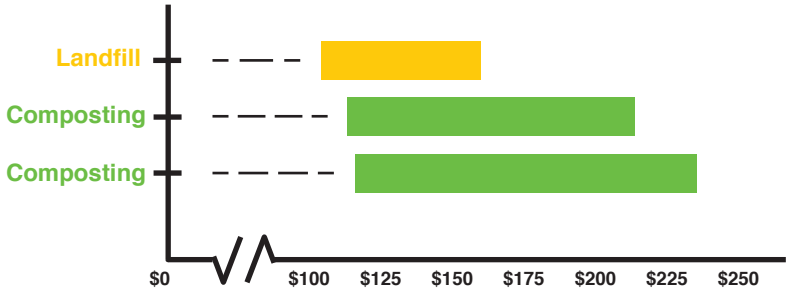
12 This fact sheet was created as a summary of INFORM Inc.'s report: "Greening Garbage Trucks: Trends in Alternative Fuel Use: 2002-2005," INFORM, Inc., www.informinc.org/reportpdfs/st/GGTUPDATEFINAL.pdf

13 Estimate assumes average garbage truck cost to be $250,000 and average price of combined tractor and trailer for long haul to be $120,000 - $145,000 with an estiamted life of 12 years.

14 "Maximum Rates." New York City Business Integrity Commission, accessed August 27, 2012, http://www.nyc.gov/html/bic/html/trade_waste/max_rates.shtml

Figures 2(a) & 2(b): Comparison of the Costs of Landfilling New York City Commercial Putrescible Waste with Composting Source-Separated Food Waste at Peninsula Compost

Item & Units (all on a per ton basis)	Commercial Putrescible Collection & Disposal	Source-Separated Food Waste Collection & Composting at Peninsula Compost in Wilmington, DE	
		Collection and Transfer to a 20-Ton Long-Haul Truck	Collection Truck Directly to Compost Facility
In-City Collection = ($75 - $100/ hr × 8 hours) ÷ tons carried	$38 - $80	$38 - $100	$38 - $100
Incremental depreciation of in-city truck used for long haul to Wilmington, DE[15]	N/A	N/A	$9 - $20
NYC Transfer Station Tip Fee	$65 - $80	N/A	N/A
Transfer Station = $4 - $10 handling cost	N/A	$4 - $10	N/A
Long-haul = [($4/ mile transit cost) × (# of miles travelled[16])] ÷ 20 tons carried (except for the last column, which is calculated by the hour)	$38 - $80	$38 - $100	$38 - $100
Tip fee[17]	N/A	$45 - $50	$45 - $50
Total	$103 - $160	$113 - $212	$115 - $233



While the ranges are overlapping, the colleciton and composting of source-separated food waste tends to be more expensive and the high end of the cost range may either be approaching or over the rate cap.

15 This represents the additional depreciation costs of driving an in-city collection truck the 260-mile round-trip distance to the Wilmington, DE compost facility. The equipment depreciation caused by standard in-city collection is asumed to be included as a part of the cost of collection.

16 The range of number of miles travelled is 130 to 260. This range accounts for both a one-way and a round-trip to Peninsula Compost A one-way trip may be feasible in the case that the truck is suitable for other purposes in demand near the point fo drop-off, and does not return ot New York City.

17 Nora Goldstein and Dan Sullivan, "Urban Facility Delivers Food Waste Composting Capacity," BioCycle, June 2010, Vol. 51, No. 6, 16.
Article referenced tip fees in the "high $40s." In Global Green's video (http://globalgreen.org/blogs/global/?p=2331) of the Peninsula Compost facility (Oct. 12, 2011), the company's co-founder, Nelson Widell, states that tip fees are around $50 per ton.

Discussion & Conclusions

The numbers above indicate that high-end estimates for in-city collection of organics can be $20 more per ton compared to commercial putrescible waste collection - with a range from $38-80 per ton for commercial putrescible versus $38-$100 per ton respectively for the collection of commercial source-separated organics. This difference is due to the amount of organics collected per shift with 8-16 tons per night being cited for organics collection compared to 10-16 tons per night for commercial putrescible waste.

The following is a description of some of the ways increased collection efficiencies per truck route can be achieved to decrease this gap in the amount of waste collected per truck shift and thereby improve overall organics collection economics.

- ***Decrease Stops per Location for Various Waste Streams Through Use of Split-Body Trucks***

  Split-body trucks allow for two waste streams to be collected in the same truck without being comingled and have the potential to increase collection efficiencies and thereby decrease the average cost per ton of in-city organics collection. Potential waste streams to be evaluated for the second waste stream in a split body design vehicle include MSW, recyclables, and grease. Additional logistical analysis would be needed to evaluate the specific efficiencies and cost savings through the use of split body trucks for New York City's commercial sector.

- ***Increase Number of Location Stops per Truck Shift Through Increasing Route Density***

  Increased route density could allow for more location stops per shift and therefore increase total amount of food waste collected per truck per shift.

- ***Increase Volume of Organics Collected per Location Stop***

  Targeting large volume waste generators, such as food processing companies or large grocery stores, provides greater volumes of organics collected per stop.

- ***Decrease Collection Frequency***

  Reducing the frequency of collection can reduce the overall cost of hauling. For example, in some cases, the cost of adding a food waste collection route can be mitigated through decreasing the collection frequency of trash pick-up, such with the residential sector in Portland.[18] Food waste collection pick-ups can also be decreased through compaction, or

18 de la Houssaye, Matt, field report, "*Composting Lessons from Portland*," Global Green Blog, February 21 2010. http://globalgreen.org/blogs/global/?p=4009

on-site processing or composting.

Reducing number of pick-ups requires businesses to take on the risk of adjusting their waste collection schedules and systems. It also potentially requires additional space to store waste – which can be challenging in an urban setting such as New York City. The compatibility of this strategy with NYC businesses' operations still needs further analysis.

- ***Reduce Transport Distance to Processing Location***

  23% - 36% of the total cost of sending organic waste from New York City to Peninsula is due to long-haul transport. Reducing this distance, while maintaining a cost-competitive tip fee, is one way to increase the cost- competitiveness of source-separated organics collection and recovery.

Next Steps

Significant variability exists in the ranges cited. Our intent is for this document to generate dialogue that will allow us to incorporate feedback and achieve greater refinement of the numbers above. By working with the private sector and government agencies to identify the current economics of food waste recovery; greater solutions can be identified toward developing cost-effective organics collection and recovery. In addition, future analysis ideally would include efficiencies across waste streams and collection routes. This memo is a first step in this process by first using industry reported information on the commercial putrescible and food waste collection reports. An area of additional research is to provide more comprehensive analysis of the solid waste system across multiple collection routes and waste streams, and how this affects the costs incurred by waste generators as well as how this relates to synergies and opportunities for greater resource recovery.

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Started in 1994, Global Green has worked to create sustainable urban environments and combat global wamring through a unique cross-cutting approach that merges innovative research, technical assistance, cutting-edge community based projects and targeted education and outreach.