CT DEEP Green Team Progress Report
Organics/Composting Section
September 16, 2013 | KC Alexander x-3239

Location and Setting: DEEP Headquarters is located in a six story office building in the Hartford capitol district with approximately 766* employees. There are break rooms on each floor, but no cafeteria. Employees bring in their own food either from home, or from truck vendors. Occasionally there are catered food events, such as holiday or retirement celebrations.

Initiated: A pilot for 4th floor staff (approx. 100) using a home compost bin located in back of the building was conducted from November 4, 1996 through August 29, 1997. During that period we diverted 1,561.55 lbs of food scraps over 205 days for an average of 7.6 lbs/day being composted. This confirmed that staff was willing to separate food scraps for composting and that we needed a bigger and better composter if we were going to expand program to the entire building.

Expanded: Expansion of the project to the entire building took place in September 1997. At this point, the pilot morphed into a "demonstration project" and a Model Agency Initiative under the Pollution Prevention Workgroup (now The Green Team). A three cubic yard composting system with mechanical turning mechanism and biofilter was installed behind the building, and collection containers were placed in all 7 break rooms. Capitol costs totaled approximately $8,586.49. Everything about this project was accomplished by volunteer staff – collection, weighing, depositing, turning, harvesting, troubleshooting, data collection, and maintenance. We were the first government agency in the country (as best we could determine) to compost food scraps on-site.

Modified: The task of collecting organics from break rooms was transferred to building management upon renewal of contract in June 2001. Weighing ceased at this point after 3.5 years of weight data collection by staff. The trade-off of not having data was offset by the ability to integrate organics collection into the building management contract, similar to their duties for recycling and trash collection. It made the program more sustainable and placed fewer burdens on volunteer staff. This segue was commemorated by a "Pass the Bucket" event for volunteers.

Improvements: New larger step-on collection containers purchased for break rooms were rolled-out in April 2007 (Earth Week). The original plastic containers were repurposed for use during meetings and events where food is served. New signage accompanied new containers. In 1998 a vinyl canopy was installed over the composter to protect it and volunteers from the elements. In 2002 DEP Support Service became more involved in harvesting by supplying labor, hand tools, wheelbarrows, screen, delivery of wood shavings from our sawmill, and transport of compost which had previously been done by the staff project manager. In spring 2013 pervious pavers replaced a small patch of soil next to the composter which was serving as harborage for rodents (note: rodents were not caused by composting, they were an inherent part of city wildlife and are controlled by building management extermination program).

Equipment Repairs, Service or Modifications: 1) Mechanical aeration with blowers and biofiltration was an issue from the start. Pulling air through the compost desiccated the mix; condensate accumulating in the bottom of the biofitlter caused back pressure and tripped the ground fault shutting the blower off; and basic control of aeration for process management was non-existent. After experimenting with timers and flexible hoses, and installing a new 20A 120V GFI duplex receptacle and 1P 20A GE bolt-in circuit breaker, an aeration retrofit was installed February 18, 1998 to help address the problem by allowing air to be either drawn off the headspace, or from below. Eventually, the blower and biofilter were abandoned altogether with no significant repercussions because it needed constant staff monitoring and adjustments. 2) The lid of the composter was warped allowing rain water into the composter, allowing inside air (which could be odorous) to escape, and causing the lid to be difficult to turn. Troubleshooting with tarps, grease, and a "warp bar" installed under the lid didn't solve the problem. The manufacturer then installed a PVC pipe/pole in the center of the composter

held in place with 2 collar mounts. This helped the most, but then the pole warped due to the weight of the lid and heat of the compost. The staff project manager filled the pipe with concrete and re-bar, which ultimately solved the problem. As well, a permanent vinyl canopy was installed by DEP over the entire compost area. 3) The composter was not designed to collect leachate or "compost tea" which presented us with a dilemma in that we did not want to discharge this liquid to the sanitary sewer or storm drains. We installed a 3.5 gal plastic marine gas tank with a hose to serve as a collection reservoir for leachate. Leachate is then recycled back into the compost mix by hand. 4) The original motor which drives the mixing auger was not rated for outdoor use. The composter manufacturer screwed an 8" aluminum pie plate to the top of it acting like an umbrella, and we also covered it with a 5 gallon pail. Once the canopy was installed, this was no longer needed. 5) Normal wear and tear on the gear motor (which drives the auger) took its toll and was replaced in June 2011.

Tons of Food Scrap Diverted from Disposal through Composting: Sept 1997 through July 2013 = 111,371 lbs (55.6 tons) based on actual weight data from first 3.3 years, then average of 500 lbs per month thereafter. Simplified monthly average is 500 lbs/month = 6,000 lbs/yr = 3 tons/yr.

Tons of Wood Shavings Diverted from Disposal through Composting: Sept 1997 through July 2013 = 36,450 lbs (18.22 tons) based on 3 cy capacity of composter, 30 harvests, and bulk density of wood shavings of 15 lbs/cu. ft. Calculation: 30 harvests x 3 cy = 90 cy x 27cf/cy = 2,430 cf x 15 lbs/cf = 36,450 lbs or 18.22 tons. Simplified annual average is 6 cy/yr = 2,430 lbs/yr = 1.2 tons/yr, Wood shavings are a byproduct of the DEEP sawmill.

Cubic Yards of Compost Harvested: Sept 1997 through April 2013 saw 30 harvests resulting in 47.073 cubic yards of compost.

Estimated Avoided Disposal Coats: Sept 1997 through July 2013 = $3,614 based on $65/ton tip fee at the resource recovery facility. Hauling cost (savings) not included in estimate.

Estimated Avoided Purchases: Sept 1997 through July 2013 = $1,880 based on 47 cubic yards of compost given to state facilities at an estimated value of $40/cubic yard.

Intrinsic Value: display of education, stewardship, image, camaraderie, dedication and leadership = priceless!

Estimated GHG Emissions Avoided: Please see next page.

Volunteers: Approximately 100 different staff volunteers have been involved in the program over the past 17 years. A core group of 20 volunteers keeps the program functioning in its current state. Nickname = The Organic Mechanics; Motto = "Compost – Because a Rind is a Terrible Thing to Waste"

Awards Received by Volunteers: 1998 Green Circle Award; 2011 Distinguished Team Service Award

State Parks and DEP Buildings That Received Compost: Dinosaur State Park, Talcott Mountain Heublein Tower, Sherwood Island, Hammonasset, Topsmead, Osbornedale, Gillette Castle, Eastern District Headquarters, and DEP Headquarters.

Education & Outreach Activities/Efforts: InSide DEP Webpages "Compost Connection"; compost give-away to staff during Earth Day or America Recycles Day events; P2View Article 2003 "A Work of Ort"; various email, voice mail and Intranet announcements; signage in break rooms and on collection containers; "Going Green" tour of DEEP green efforts; school group tours; outside interest tours; tabletop display;

* In 1997

Estimated GHG Emissions Avoided: The following was based on calculations using the "Recycling & Composting Emissions Protocol" For Estimating Greenhouse Gas Emissions and Emissions Reductions Associated with Community Level Recycling and Composting** dated July 2013, Version 1.0, Developed by ICLEI—Local Governments for Sustainability USA (pgs 20-21 excerpted below). Please note highlighted section. http://www.icleiusa.org/action-center/tools/recycling-and-composting-emissions-protocol-version-1

Scenario A. From September 1997 through July 2013, our building composted 55.6 tons of food waste and 18.22 tones of wood shavings. If not recycled, the waste would have been sent to a landfill with no gas collection. Emissions (MTC02e) = 55.6 tons x 1.47 = 81.732 (food) + 18.22 tons x 0.79 = 14.39 (yard trimmings) = 96.122

Scenario B. From September 1997 through July 2013, our building composted 55.6 tons of food waste and 18.22 tons of wood shavings. If not recycled, the waste would have been sent to a landfill with gas collection but no energy recovery. Emissions (MTC02e) = 55.6 tons x 0.37 = 20.572 (food) + 18.22 tons x .20 = 38.79 (yard trimmings) = 59.51

Scenario C. From September 1997 through July 2013, our building composted 55.6 tons of food waste and 18.22 tons of wood shavings. If not recycled, the waste would have been sent to a landfill with gas collection with energy recovery. Emissions (MTC02e) = 55.6 tons x 0.21 = 11.676 (food) + 18.22 tons x .11 = 2.00 (yard trimmings) = 13.67

Scenario D. From September 1997 through July 2013, our building composted 55.6 tons of food waste and 18.22 tons of wood shavings. If not recycled, the waste would have been sent to an energy recovery facility. Emissions (MTC02e) = 55.6 tons x 0.13 = 7.228 (food) + 18.22 tons x .16 = 2.91 (yard trimmings) = 10.13

**** 3.3 Method for Composting**

Step 1. Estimate the quantity (in short tons) of materials collected from the community for composting during the inventory year by material type. See Section 2 for a discussion of methods for estimating quantities of material composted, and Table 2 below for a list of material types.

Step 2. For each material composted, determine the type of facility (landfill with no gas collection, landfill with gas collection but no energy recovery, landfill with gas collection and energy recovery, or combustion facility) that the material would have gone to for disposal, had it not been composted. If your community sends it wastes to multiple facilities, then a breakdown of waste sent to each type of facility is needed (e.g., 20% to landfills without gas collection, 65% to landfills with gas collection, 15% to waste incinerators).

Step 3. For each material composted, multiply the tonnage composted during the inventory year by the emissions factor in the column titled "Fertilizer production displacement credit" from Table 3.3. Alternatively, communities in California may consider the Air Resources Board's published compost emissions reduction factors (less carbon storage), which include water and chemical emission reductions as well as reduced soil erosion[18].

Step 4. For each material composted, multiply the tonnage composted during the inventory year by the appropriate emissions factor for avoided disposal in Table 3.3, based on where the material would have been disposed of had it not been composted.

Step 5. Add the results together for all materials.

Note: the factors in Table 3.3 imply that there is a net emissions benefit for sending food and yard waste to a combustion facility rather than composting it. However, a recent meta-analysis of 82 studies[19] found that composting and anaerobic digestion of organics are preferable to disposal in either mass-burn waste-to-energy or landfill gas to energy, from a GHG emissions perspective. As noted previously there are several emissions benefits of composting that are not sufficiently well-quantified at this time for inclusion in this protocol. Thus, while the methods in this protocol are unable to show the emissions benefits of composting over combustion at this time, the best available science indicates that composting (or anaerobic digestion) is the preferable policy option for reducing GHG emissions.

[18] http://www.arb.ca.gov/cc/protocols/localgov/pubs/compost_method.pdf. These emissions factors are specific to California and should not be used by communities in other states.

[19] Morris, Jeffrey, H. Scott Matthews, and Clarissa Morawski. "Review and meta---analysis of 82 studies on end---of---life management methods for source separated organics." International Journal of Waste Management, Science and Technology. Volume 33, Issue 3, March 2013.

Table 3.3. Life---Cycle Composting Greenhouse Gas Emissions, by Emission Type (MTCO2e/short ton of material collected for composting)

Material	Emissions (+) or reductions (---)				
	Fertilizer production displacement credit	For Avoided Disposal, by Disposal Facility Type (Step 4)[20]			
		Landfill with no gas collection[21]	Landfill with gas collection but no energy recovery[22]	Landfill with gas collection and energy recovery[23]	Combustion facility[24]
Food Waste	---0.03	---1.47	---0.37	---0.21	0.13
Yard Trimmings	---0.03	---0.79	---0.20	---0.11	0.16
Grass	---0.03	---0.72	---0.18	---0.10	[A]
Leaves	---0.03	---0.56	---0.14	---0.08	[A]
Branches	---0.03	---1.17	---0.29	---0.17	[A]

[A] Emissions factors are not available for combustion of grass, leaves and branches as individual waste types. Use the value for yard trimmings for these materials.

Example 3.2 Emissions Reductions from Composting
A community composts 3,000 tons of food waste and 7,000 tons of yard trimmings. If not recycled, the waste would have been sent to a landfill with landfill gas collection and energy recovery.
Emissions (MTCO2e) = (3,000 tons + 7,000 tons)*(---0.03 MTCO2e/ton) + 3,000 tons *(---0.21 MTCO2e/ton) + 7,000 tons * (---0.11 MTCO2e/ton) =---300 MTCO2e + (---630 MTCO2e) + (---770 MTCO2e) =--- 1,700 MTCO2e