SWANA TECHNICAL POLICY T-7

ORGANICS MANAGEMENT AS PART OF INTEGRATED SOLID WASTE MANAGEMENT

I. Background

Organics management is an increasingly important component of integrated solid waste management as many communities develop aggressive policies to reduce disposal of municipal solid waste (MSW) in landfills. For the purposes of this policy, all references to organics mean "compostable organics" and refer to material derived from living organisms, predominately leaf and yard debris, food scraps, wood, and paper and paperboard products. Paper and paperboard products are typically managed as recyclables, and addressed in SWANA Technical Policies 6 and 6.1 (*Recycling as Part of Integrated Solid Waste Management and Municipal Solid Waste Recycling, respectively)*, although contaminated paper and paperboard are sometimes composted. Non-compostable organics, such as plastics, are generally made from fossil-derived sources. Conversion technologies (as addressed in SWANA Technical Policy T-11) can be used to manage post-recycled non-compostable residuals and materials.

To achieve high diversion goals, communities must develop strategies to manage organics which, make up a significant amount of total MSW generation. As a general guide to waste management priorities the United States Environmental Protection Agency (EPA) has adopted a waste management hierarchy that focuses first on source reduction and reuse (most preferred), followed by recycling/composting, then energy recovery and the least preferred options, treatment and disposal. [1] EPA also further refines this general hierarchy with a more detailed food recovery hierarchy following a similar path, but with the "reuse" category expanded to include uses such as feeding hungry people and animals.[2] SWANA supports minimizing waste through source reduction and reuse, as reflected in many other SWANA Technical Policies, and while this policy will address reduction/reuse, the main focus of the policy will be on the managing of organics that are collected for organic recycling, or separated at facilities, such as material recovery facilities, since this area of organics management will likely be the most challenging for communities.

[1] http://www.epa.gov/wastes/nonhaz/municipal/hierarchy.htm
[2] http://www.epa.gov/osw/conserve/foodwaste/index.htm

II. Discussion

Communities that have aggressive zero waste/organic diversion policies will have significant levels of organic waste to manage. For the year 2012, EPA estimates that food waste and yard trimmings make up 28% of the waste stream with wood waste adding another 6.3%.[3] EPA also reports that currently only 8.5% of that waste is managed through composting. The EPA data does not fully detail the feedstock composition of compost operations, however, a 2010 report by CalRecycle developed this information for California.[4] It was no surprise that in 2010, the vast majority of feedstock going to compost facilities (from MSW collection) were green materials (e.g., lawn and garden wastes). Thus, food waste which makes up 14.5% of the MSW generated, is not a significant portion of the organics that are currently managed in the United States. In fact, EPA does report the amount of food waste that was recovered in 2012, which was 0.7% of the total weight of MSW generated. This is a national number that does not reflect more robust regional programs which likely yield higher levels of diversion, however, in an overall view, a full range of organic management opportunities (both compostable and non-compostable) should be explored to properly manage an increasing level of organics diverted from the MSW waste stream.

In keeping with the EPA waste management hierarchy, options for organics management include:

1. Reduction and reuse
2. Recycling
    a. Size reduction of green material for use as a mulch or alternative daily cover (ADC) at landfills
    b. Composting
    c. Anaerobic digestion

The following provides a brief discussion of each category:

1. <u>Reduction and reuse</u>

    Many communities are developing programs to minimize food and green waste. These include:

    a. Source reduction – Reduce the amount of food waste being generated
    b. Feed people – Donate excess food to food banks, soup kitchens and shelters
    c. Feed animals – Provide food scraps to farmers

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[3] http://www.epa.gov/osw/conserve/foodwaste/index.htm

[4] http://www.calrecycle.ca.gov/Publications/Documents/Organics/2010007.pdf

Green waste reduction programs include:

a. Backyard composting
b. Grass recycling (leaving grass clipping on lawns - Grasscycling)
c. 'No Mow' or low maintenance landscaping

2. <u>Recycling of Organics</u>

The diverted organic fraction of MSW should be recycled in a manner that optimizes its value as a resource. In this instance, recycling refers to the processing of the organic fraction of MSW to produce a product that has value. The processing can range from simply size reduction for land application as mulch, composting (which can vary greatly in technology) to produce products such as soil amendments and fertilizers, and anaerobic digestion to produce a biogas which can have several energy applications. The preferred method of recycling would be either composting or anaerobic digestion, where it is feasible, as these technologies maximize resource recovery. The following briefly describes each:

a. Size reduction of green material for use as a mulch or alternative daily cover (ADC) at landfills

Green material can be processed through chipping and grinding to a material that can be used as mulch for landscaping or erosion control. This processed material can also be used as an ADC at landfills, if in accordance with all regulatory requirements and approvals.

b. Composting

Composting is the biological decomposition of biodegradable organic solid waste under controlled conditions, predominately aerobic conditions (in the presence of oxygen). EPA describes some of the benefits of composting[5]:

- Reduces or eliminates the need for chemical fertilizers
- Promotes higher yields of agricultural crops
- Facilitates reforestation, wetlands restoration, and habitat revitalization efforts by amending contaminated, compacted, and marginal soils
- Both avoid methane from landfills and extends the life of landfills by diverting organic materials from landfills

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5 http://www.epa.gov/compost/basic.htm

- Reduces the need for water, fertilizers, and pesticides
- Serves as a sustainable marketable commodity and can be an alternative to standard landfill cover (this also can reduce landfill fugitive methane emissions) and artificial soil amendments
- Provides jobs and other economic benefits

The products of composting have many environmental benefits. Compost is widely used as a soil amendment in residential and commercial landscape and garden beds for its ability to improve the physical, chemical and biological properties of the soil, leading to healthier plants. Compost is gaining wide acceptance in the development and construction fields for its role in erosion control and stormwater management. Compost is increasingly used in agriculture for its ability to improve soil health and fertility. The list of applications and the understanding of the uses and benefits of recycled organic materials continues to grow. However, composting and composting facilities, similar to any other solid waste management options, are susceptible to potential negative environmental impacts, especially in urbanized areas. Siting of compost facilities can often be a challenge due to potential odors from the feedstock or improperly operated facilities. Depending upon the feedstock, composting can also be a source of air pollution, emitting volatile organic compounds (VOCs), ammonia, and in some cases greenhouse gases, such as methane and nitrous oxides (typically from improperly operated facilities). However, the very management parameters that make for good composting, such as maintaining a proper carbon:nitrogen ratio, adequate moisture and good airflow, also minimize methane generation and other air pollutants. Additionally, in some cases, composting can lead to significant reductions in greenhouse gas emissions, along with other environmental and community benefits.

There are generally four classes of technology used for composting:

- Turned windrows
- Forced aeration
- In-vessel systems
- Flexible bag systems

The type of system used is dependent on numerous factors, including location, economics, market availability, etc. Feedstocks for composting can vary, but typically consist of:

- Municipal yard trimmings and other green materials
- Food scraps or other organic material
- Biosolids
  - Bulking agents such as chipped brush or sawdust that also provide a carbon source

c. *Anaerobic Digestion*

Anaerobic digestion (AD) is the biological decomposition of organic material (degradable organics) under controlled conditions in the absence of oxygen or in an oxygen-starved environment. Products produced through anaerobic digestion include biogas, liquid fertilizer, and compost. Depending on the anaeorobic process used, the residual (digestate) from the digestion process may need to be further processed by aerobic composting methods. The resultant digestate can be directly land applied as a soil amendment, or applied for the same purpose after composting. The major benefits of anaerobic digestion include renewable energy generation, reduction in greenhouse gas emissions, and waste diversion from landfills.

There are two major categories of AD systems used for processing source separated organics:[6]

- Wet (low-solid) systems (moisture content greater than 80%)
- High-solid systems (moisture content less than 80%)

There are subcategories within these categories based on specific moisture content ranges. Further subcategories involve staging sequential parts of the biological reaction in separate vessels, operating in different temperature ranges, and batch vs. continuous operation. Also, organics, such as food waste, can be co-digested in digesters with biosolids at municipal wastewater treatment plants.

Pretreatment and waste mixing is an important consideration for AD. This may involve contaminant removal, grinding and shredding, and/or conversion to slurry through the

6 http://www.compost.org/English/PDF/Technical_Document_MSW_Organics_Processing_2013.pdf

addition of water and agitation.

An important product of AD is biogas which contains about 60% methane. Biogas, because of its methane content, is an important renewable energy. This energy can be utilized in many productive ways, including:

- Heat source (e.g., process water heating, heating buildings, space heating, etc.)
- Fueling combustion equipment (e.g., I.C. engines) to generate electricity for sale to the grid or for internal use
- Clean-up and processing of the biogas to a natural gas equivalent for direct injection in the utility natural gas pipeline, or use as a vehicle fuel

This renewable energy is not only a valuable resource for the generator, but can become an important component of programs that rely on renewable energy to fulfill regulatory demand (e.g., electric utility renewable portfolio standards).

As discussed above, the AD process also generates a digestate that must be managed. Properly handled, AD digestate can also be a valuable resource, depending on its characteristics. Digestate from high-solid digestion systems can be composted and its products utilized in land applications and as a fertilizer. Digestate from wet digestion systems can also be further treated and utilized directly as a fertilizer or further composted after dewatering.

As with compost facilities, AD facilities can also be subject to odor problems if not operated properly.

III.Policy

SWANA supports managing the MSW organic component (compostable fraction) as an important element of integrated solid waste management. The development of such programs should be mindful of established government waste management hierarchies with special consideration given to the beneficial use of the final product. SWANA also supports careful planning and evaluation of all factors (e.g., through lifecycle analysis–see below) for communities considering organic recycling and/or organic landfill bans. In support of these goals, it is SWANA's policy that:

1. Facilities associated with organic management programs should:

- Be evaluated for the appropriate technology based on current and projected waste volumes and characteristics
- Be consistent with local government integrated solid waste management plans, and all federal, state, provisional and local governmental rules and regulations
- Be designed, constructed by, and under the supervision of experienced and qualified professionals
- Establish the full costs for the siting, design, construction and operation of the program and facilities
- Be planned and implemented consistent with the best economic, environmental, worker safety and public health practices.

2. Industries, businesses, institutions, governments and individuals should establish efforts that will lead to practical reduction/reuse of organics through programs that are carefully developed, with focused marketing and educational campaigns. These can include:

- Promoting educational material on reducing food waste
- Establishing initiatives to feed people and feed animals
- Promoting education and support for home composting
- Promoting Grasscycling
- Supporting the purchase of mulching lawnmowers
- Encouraging the purchase of composted materials in landscaping and land maintenance projects and activities

3. Industries, businesses, institutions, and governments should establish efforts for the maximum practical diversion and utilization of organic materials from MSW. SWANA supports diversion and recycling of the following feedstocks for organic recycling: yard debris from residential sources and similar materials from lawn, nursery, and tree service enterprises; and, food scraps generated from commercial, residential and industrial establishments.

   Initiatives for organic recycling should be implemented which:

- Establish diversion programs to maximize the diversion and recycling of the organic fraction of their solid waste stream, consistent with economic and environmental analyses
- Establish organic waste recycling programs consistent and in conformance with local government integrated solid waste management plans
- Use purchasing power to purchase the products resulting from organic recycling
- Adopt business practices that promote the diversion of organic materials from the solid waste stream for recycling
- Establish organic material recycling facilities, or secure the services of such facilities to process and prepare the diverted organic fraction of their solid waste stream

    - Assure uniform specifications for products made from the organic fraction of MSW
    - Assure inter-state/province and international consistency in the regulation and marketing of mulch, compost, biogas, and other products of organic recycling
    - Foster the development of new markets for organic recycling products through economic and regulatory incentives
    - Support and develop public education programs to stimulate industry, business, government and individual support of organic diversion and recycling of organics
- Provide technical assistance programs for businesses, institutions, local governments and individuals to assist them in assessing, planning and implementing organic recycling programs, and provide information through clearinghouses on organic material diversion programs, methods and initiatives
- Provide grants and loans to stimulate new organic material recycling programs
- Require, where practical, governments to utilize organic recycling facilities for the organic fraction of MSW generated by their programs and operations

IV. Specific Issue

In recent years the concept of life cycle analysis has become an important tool in analyzing the complex interrelationship of waste management options, such as composting and AD, with other management alternatives, such as landfilling. Life cycle has also played a significant role in examining the overall impact of waste management on greenhouse gas emissions.

Life cycle analysis is a means of evaluating the energy use, environmental emissions and cost of alternative MSW management practices. As communities consider waste management options, such as organic diversion and organic recycling, planners need to understand all of the impacts of various waste management practices. Life cycle analysis is an important tool in evaluating these impacts.

Approved by the International Board on

July 11, 2014.

Richard Allen

Richard Allen, International Secretary

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