One Word: Organics

Organics will continue to comprise a significant portion of the waste generated in the United States. Diversion of this material from landfills will increase, as state mandates, public acceptance and demand for green energy increases.

By Michelle Leonard

In the 1967 movie, *The Graduate*, Benjamin Braddock, a recent college graduate, is told the future is plastics. Fast forward to 2015, and that same college graduate would be told the future is organics. Organics is playing a progressively more important role in the solid waste industry, and this trend will continue for years to come. This article presents information on the contribution of organics in the municipal solid waste stream, the drivers behind organics collection and processing, the changing role of organics in collection and processing, and the future role of organics in energy-from-waste technologies.

What are Organics?

Typically when we think of organics, we think of yard trimmings and food scraps. Other organic components of the waste stream include paper, manure, textiles, rubber, diapers and carpet. For the most part, food scraps and yard trimmings are the materials that are available, accessible and processible for composting and energy production.

Municipal Solid Waste (MSW) Composition

According to the *U.S. EPA Waste Characterization Study*, food comprises 21 percent of the disposed municipal waste stream, with yard trimmings making up 9 percent **(see Figure 1)**. Recent statewide studies have also identified high percentages of organics in the waste stream. A comparison of organics waste composition in MSW from eight recent state-wide waste composition studies is shown in **Figure 2**. As indicated, the percent of yard trimmings in the disposed waste stream ranges from 3 to 10 percent, with an average of 5 percent in this sample. Food scraps composition ranges from 10 to 22 percent, averaging 15 percent in this sample of states.

Drivers

A number of drivers are creating the incentive to divert more organics from landfills, including:

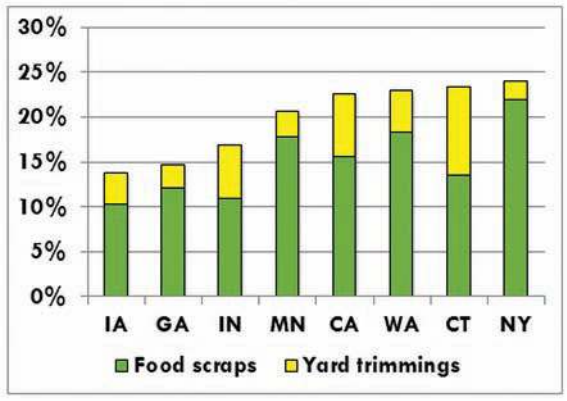
- Disposal bans for yard trimmings and food scraps
- Statewide diversion mandates or goals
- Growing public and political call for renewable energy
- Climate protection regulations
- Recycling and organic diversion initiatives
- More advanced technologies
- Subsidy and grant availability

The following are a few examples of state initiatives that are fueling the demand for organics diversion and processing **(see Figure 3, page 28)**:

- Massachusetts: Beginning October 1, 2014, commercial entities that generate more than one ton of food waste per week must divert waste from landfills/WTE.
- Connecticut: Beginning January 1, 2014, commercial entities that generate more than two tons of food waste per week must divert waste from landfills/waste-to-energy (WTE), if a permitted facility is within 20 miles of the generator.
- Vermont: Beginning July 1, 2014, entities that generate more than 2 tons of food waste per week must divert waste from landfills/WTE.

Figure 1: Food comprises the largest percentage of disposed waste in the U.S.
Figure courtesy of U.S. EPA.

Figure 2: A number of drivers are creating incentives to divert more organics away from landfills.
Figure courtesy of statewide waste composition studies.



- Rhode Island: Beginning January 1, 2016, commercial entities that generate more than two tons of food waste per week must divert waste from landfills/WTE if a permitted facility is within 15 miles of the generator.
- California: By 2016, each jurisdiction must implement an organic waste/recycling program. By April 1, 2016, businesses that generate 8 cubic yards of organic waste per week must arrange for recycling services.

Existing Processing

A recent study by the Institute for Local Self Reliance collected data on the types and numbers of composting facilities operating in the U.S. (*Institute for Local Self-Reliance, State of Composting in the U.S., 2012*). This study revealed that although there are more than 4,000 composting facilities in the U.S., the majority of which (70 percent) compost only yard trimmings. About 350 facilities compost food scraps and many facilities operate onsite. For example, institutions, such as universities, prisons, etc., compost yard trimmings and some food scraps **(see Figure 4, page 28)**.

According to the *U.S. EPA Municipal Solid Waste Generation, Recycling and Disposal in the United States: Facts and Figures for 2012*, 34 million tons of yard trimmings were generated, with approximately 20 million tons, or nearly 60 percent, recovered. However, an estimated 36 million tons of food scraps were generated in 2012, and of that, 1.74 million tons, or less than 5 percent, were recovered **(see Figure 5, page 28)**.

The Future of Organics Processing

To achieve higher levels of recovery, more processing capacity is needed, particularly for food scraps. There is potential to add food scraps to some yard trimming composting facilities, although a number of challenges must be overcome including regulatory barriers, permitting and siting hurdles, and public perception and acceptance.

Interest in the development of anaerobic digesters (AD) for processing food scraps and yard trimmings is growing in the U.S. Europe is still the global leader in this area, particularly Germany. It is estimated that if half of this organic waste were anaerobically digested, enough electricity would be generated to power 2.5 million homes each year. The American Biogas Council projects that up to 12,000 potential sites will be ready for development and predicts that renewable biogas could displace as much as 10 to 15 percent of fossil fuel based natural gas consumption by 2023.

In California, there are a number of AD projects operating, as well as those in various stages of construction, commissioning, permitting and analysis. Operating facilities include both wet thermophilic and mesophilic facilities and dry thermophilic facilities, as well as high solids and handle feedstocks that vary from biosolids, fats, oils, grease and food scraps to yard trimmings and food scraps.

In Marina, CA, the Monterey Regional Waste Management District has operated their pilot research AD facility since March 2013. The facility uses the SmartFerm AD technology, which is a dry, thermophilic process, and is capable of processing 5,000 tons of yard trimmings (30 percent) and food scraps (70

percent) per year. This system produced more than 308,000 kW of electricity in the first six months, or approximately 44,000 kWh per month.

In Perris, CA, CR&R Environmental Services, a municipal waste and recycling services provider, is presently constructing Phase 1 of their AD facility, using the Eisenmann technology, a dry, plug flow, continuous feed process. The planned facility is permitted to process more than 80,000 tons of organic waste per year in phase one and expand to process more than 300,000 tons per year in three additional phases, making it one of the largest anaerobic digestion projects in the U.S. Expanding on their state-of-the-art recycling processes, CR&R will integrate the new plant into their existing operations. Feed for the new system will include green yard waste and food waste. Overall, the AD plant is projected to generate approximately 1,000,000 Diesel Gallon Equivalent (DGE) of CNG per year.

Conclusions

Organics will continue to comprise a significant portion of the waste generated in the U.S. Diversion of this material from landfills will increase, as state mandates, public acceptance and demand for green energy increases. Existing capacity to process organics is not adequate to handle the types and quantities of materials generated. Improvements at existing composting operations and advancements in new technologies will meet the capacity needs, coupled with regulatory changes, financial investments and political support. | WA

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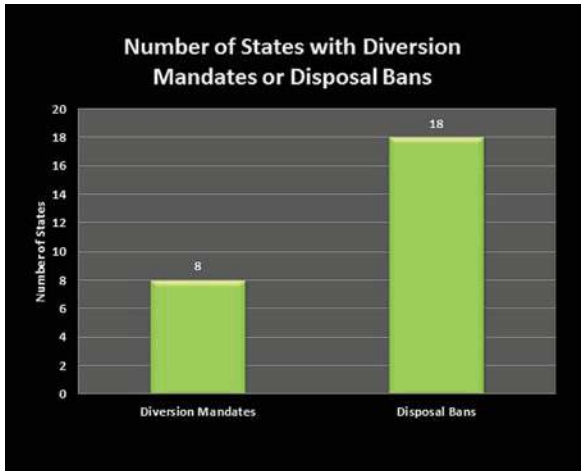

Figure 3:
The demand for organics diversion is driven primarily by state initiatives.

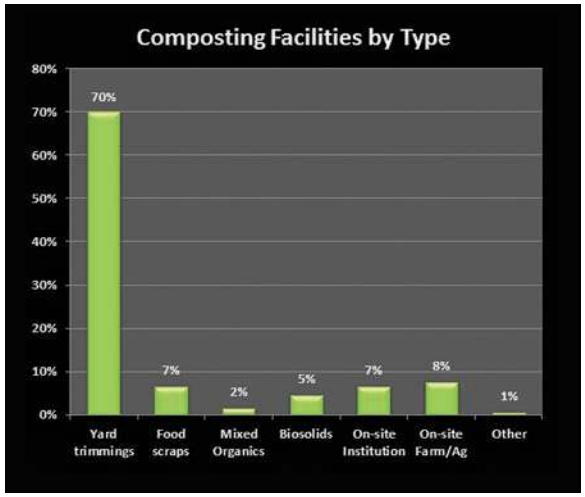

Figure 4:
There are more than 4,000 composting facilities in the U.S., 70 percent compost only yard trimmings.

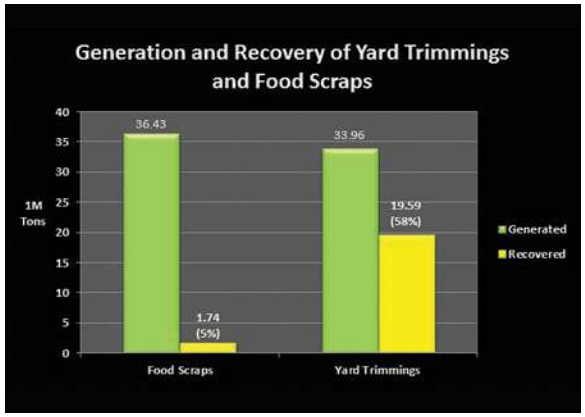

Figure 5:
Several states have progressive programs, which incorporate organics into existing programs and facilities to generate compressed natural gas and electricity.
Figures courtesy of ILSR State of Composting in the U.S., 2014.