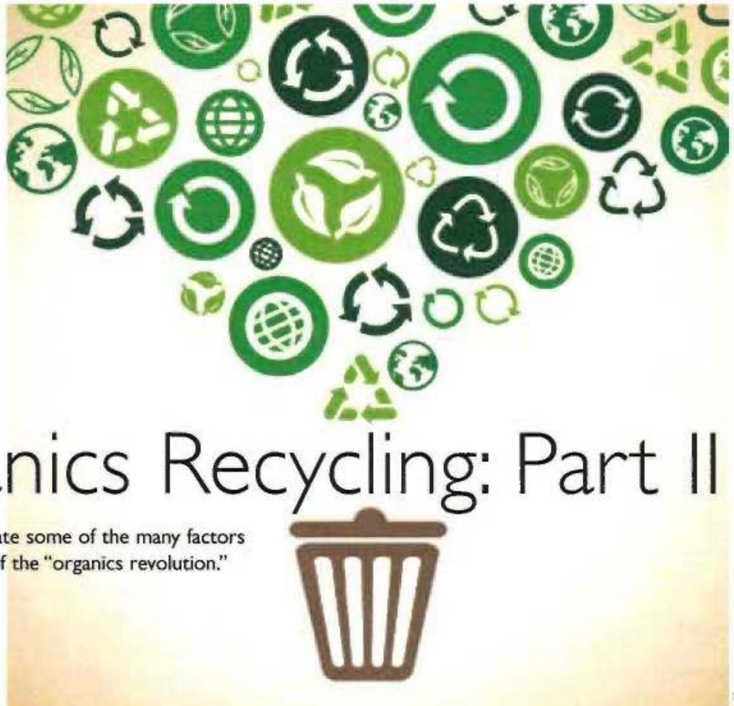

# Organics Recycling: Part II

Case studies illustrate some of the many factors that must be part of the "organics revolution."

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The organic fraction of the municipal wastestream, which includes food scraps, yardwaste, woodwaste, and mixed paper, is about 30 to 40% by weight. As such, many communities in recent years have been evaluating options to handle organics beyond the traditional approach of just supplying information about the benefits of backyard composting.

As we discussed in Part I of this series, many state and provincial governments have begun promulgating policies and regulations that target the recycling of organics, prompting local solid waste agencies to develop municipal curbside collection programs. According to a 2013 *BioCycle* survey in the United States, there are more than 214 source-separated organics collection programs in operation, up from only 20 programs in 2005. Recently, two northeastern states, Connecticut and Vermont, enacted legislation requiring large generators of foodwaste to transport their materials to a processing facility if one is located within 20 miles. We expect this regulatory trend to become the norm, in time, rather than the exception.

Investigations, demonstrations, and pilot organics processing programs for organics have exploded across North America in just a few short years as communities or agencies attempt to respond to ever-increasing, higher recycling goals imposed by state or provincial agencies. The solid waste trade press appear to contain news reports literally every day, announcing the development of new composting projects. Yet, the fact of the matter is that a coordinated organics infrastructure is almost nonexistent in the United States at the current time.

Development of successful operating facilities will take a lot of hard work, a tremendous amount of due diligence on part of local solid waste professionals, and, of course, public and private investment capital and partnerships. The case studies that follow illustrate some of the many factors that must be part of the "organics revolution."

## Municipality of Skagway Organics Feasibility Study

While much has been written about organics initiatives being implemented for large municipalities like San Francisco or Toronto, small communities are oftentimes left out of this discussion. A recent organics feasibility undertaken for the municipality of Skagway, AK, illustrates the types of problems most small communities face when evaluating the issue of what to do with organics in their wastestream.

Unless you have taken a recent Alaskan cruise along the Inner Passage, most folks probably would not know much about Skagway. For starters, the municipality of Skagway is located in southwestern Alaska, almost 1,000 nautical miles north of Seattle. While Skagway sees nearly a million cruise ship visitors during summer months, its relative remoteness, low population (less than 1,000 people in the winter), extremes in winter temperatures, and high winds preclude the feasibility of the typical application of windrow composting that most similar small towns employ.

Over the past year, a citizens recycling committee appointed by the mayor conducted a solid waste and recycling study to evaluate both short- and long-term options to expand recycling and composting options and help reduce the operations of its municipal incinerator. In April, Skagway's assembly adopted perhaps the first zero-waste plan in Alaska, mandating the development of recycling facilities and waste reduction goals, including the development of enhanced municipal ordinances to require the use of compostable materials for its vibrant restaurants, entertainment, and hotel trade.

As part of the planning effort, SCS conducted a detailed residential and commercial waste composition study, which showed that nearly two-thirds of the community's solid wastestream of 1,100 tons per year is recyclable and compostable. Much of the compostable wastestream consists of foodwaste and paper products.

Upon completion of this wastestream analysis, a detailed feasibility study was undertaken of alternatives for composting processing from low-tech windrow composting to higher-tech, in-vessel composting technologies. Traditional windrow composting was eliminated at the outset because of concerns about dust and odors due to the area's high winds, rainy conditions, and lack of available level land in the borough. We then began our investigations into composting technologies that could be implemented near the borough's wastewater treatment plant, and importantly, be operated under roof cover, given the region's weather conditions.

Figure 1 shows a comparison on a short list of available technologies that would fit the Borough's conditions, and be suited to the volume of organics that would be generated. Conceptual designs were developed for each technology alternative, including estimates of capital, operating, and customer fees for these various alternatives.

While further feasibility work needs to be conducted before the borough moves forward, it is anticipated in its plan that it will establish a pilot program to include restaurants and possibly some residences. For example, plastic covered bins, specifically made for holding foodwastes, will be provided by the borough to the pilot program customers. Customers will be expected to sort out any non-foodwaste items before putting the foodwaste in the bin. The bin would be typically left inside the store near the rear delivery door. Food bins will be picked up at restaurants by a borough truck on a daily basis. Residential pilot customers will be collected from the curb once per week. The food containers will be put on pallets in the borough's collection truck and delivered to the wastewater treatment plant building.

The expectation is that the borough will implement an in-vessel composting unit that can process foodwaste, dewatered biosolids, and greenwaste. The unit would consist of a horizontal, frame-mounted cylinder, which slowly rotates. Ground-up wastes would be fed automatically into the front of the unit, along with continuous air from a small blower fan. The mixture is turned in the drum for several hours each day, decomposing rapidly into rough-texture compost in about four days. Inside the drum, the wastes reach a temperature of at least 131°F over the four days, adequate for sterilizing the compost and meeting EPA rules for public distribution and contact. The mixture would be discharged from the drum and onto a small stacking conveyor where it is piled up for final curing. Due to a deficit of mulch

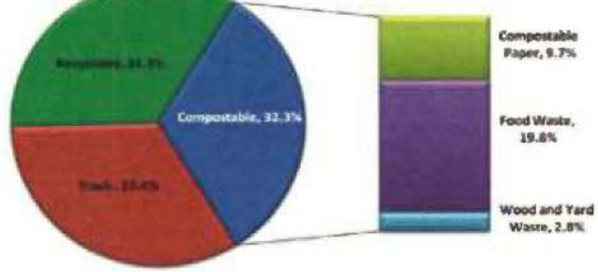


Figure 1

and other organics in Skagway, the borough expects to provide these to residents for free for gardening.

### Charlotte County Co-Composting Facility

An aeration unit

After completing the type of feasibility studies that Skagway is now pursuing, Charlotte County, a rapidly growing community located on the west coast of Florida (20 miles north of Fort Myers) implemented a windrow co-composting facility in 2009. While the county's Solid Waste Division was already mulching yard trash and then using it as temporary daily cover at the landfill, the utility department was at the same time spending a significant sum on long-hauling biosolids for disposal at a private landfill (a 200-mile round trip) and was looking for a less-expensive solution. The $64,000 question at the time was whether or not joining forces to co-compost yardwaste and biosolids made economic and technical sense. The last four years of experience has proved that both of these materials can be handled efficiently and effectively and provide significant savings to the county's utility customers.

As currently designed, the facility takes in 100 tons of yard trash (trees, limbs, and landscape debris) and 50 tons per day of dewatered biosolids, temporarily stockpiling it in a 1- to 2-acre area. Little or no plastic bags are received, due to the requirements of the county's solid waste ordinance. The composting process involves several stages:

- Grinding of the yardwaste
- Mixing of the yardwaste and biosolids
- Formation of multiple static windrows on a concrete pad
- Final curing pile and final grinding

Ground yardwaste is mixed with a biological enzyme, along with 50 tons per day of biosolids at a 3 or 4:1 ratio. The mixture is placed in static pile windrows for approximately 45 days of curing and then transferred to a final curing pile for another 21 days to stabilize. The facility includes an impermeable pad for leachate collection and pumping facilities to the landfill's existing leachate treatment plant. The finished product is used to supplement daily cover. The compost cover material greatly reduces the amount of time necessary for landfill operators to repair exposed washouts and helps establish temporary vegetation.

In 2012, the county signed an agreement with a compost distributor to expand the operations of the co-composting facility. This arrangement has certain potential financial and administrative advantages to the county and the division: payment of a land lease, additional rent based on merchant tonnage of biosolids and yardwaste delivered by neighboring communities to the site, and elimination of current operational costs for the division (yardwaste grinding and elimination of the compost enzyme). The vendor is currently procuring additional governmental contracts to make expanding the facility an economic reality.

> The fact of the matter is that a coordinated organics infrastructure is almost nonexistent in the United States at the current time. Development of successful operating facilities will take a lot of hard work, a tremendous amount of due diligence on part of local solid waste professionals, and, of course, public and private investment capital and partnerships.

### Silver Springs Organics Composting Facility

Another successful application of organics composting is Silver Spring Organics LLC (SSO), which operates a commercial composting facility near the Town of Rainer, WA. The facility is a covered aerated static pile, composting facility that processes yard debris and other organics into stable, high-quality soil amendments and other beneficial products. The covered processing and composting structure is designed to treat potentially odorous air emissions and help mitigate noise, dust, and surface water impacts. During the course of preparing the permit application to the state of Washington, SCS conducted an extensive ambient odor study that included air sampling and site modeling that concluded that estimated potential toxic air pollutants would pass a screening review conforming to the state's environmental regulations.

The facility employs a 216,187-square-foot cover over the majority of the composting operations. Composting operations, including receiving, Stage 1 composting, Stage 2 composting, stabilization, and curing, are conducted beneath the structure. The cover is a pre-engineered metal structure with a concrete foundation, steel framing, roofing, and roof vents. The design of the roof structure is to minimize potential air emissions and odors by preventing excess water infiltration into the feedstock and compost, eliminating ponding, and substantially reducing, if not eliminating, the need for wastewater ponds. The rate of aeration is controlled by zone, with each zone capable of providing variable positive or negative aeration depending on the temperature of the compost in each zone.

The facility also employs certain operational controls to minimize odors and emission. Feedstock entering the facility is inspected, recorded, and classified and then placed in their designated staging areas on the pad. Putrescible feedstock such as food-waste is preprocessed by mixing or bulking with other materials and placed on the Stage I composting pad. Woodwaste feedstock is preprocessed through use of an on-site grinder. Staff uses front-end loaders to help segregate and blend the various types of feedstock to achieve the appropriate carbon-to-nitrogen ratios for composting.

The operator estimates that approximately 15-days of high rate composting in the Stage I area followed by approximately 30 days of stabilization and curing in the Stage II area.

In all, the facility is currently designed to process over 1,000 cubic yards of finished product per day.

### Metro Park East Anaerobic Digester

While there is a great deal of interest in considering the use of anaerobic digester technology, the basic question is whether or not these European technologies will prove economically feasible for many US conditions. Further, there is limited operating and financial information to enable most communities to make a final decision to implement such a project.

With those thoughts in mind, the Metro Waste Authority (MWA), located in the Des Moines, IA, metropolitan area, has engaged SCS to develop a pro forma cost analysis to model capital and ongoing operating costs associated with implementing an anaerobic digester plant to process and treat a source-separated organics wastestream at its Metro Park East (MPE) landfill facility. The desired use of the model is as a preliminary strategic planning tool for purposes of evaluating the financial efficacy of this project.

Costing and revenue variables to be evaluated as part of the pro forma model include the following:

Piles of yardwaste and biosolids are prepared for the mulching process.

- Initial project planning, design, and permitting
- Site engineering and construction, including digester plant components, site development work, license, and installation
- Operations, including training, maintenance, equipment, staffing, wastestream tonnage, wastestream composition, production rates, and design life
- Financial considerations, including production values, tipping fees, cost of living and inflationary adjustments, and debt structuring

SCS's analysis will also evaluate marketability of various end-use products (including electricity from biogas combustion, combined heat and power, cleanup of biogas to compressed-natural-gas quality, and high-quality compost). Model outputs will include cash flow, revenue, and profit/loss projections, as well as requisite tipping fees to achieve MWA's desired financial outcomes. Further, an evaluation will be made of anticipated market opportunities, and operational/functional challenges associated with implementing this technology at the MPE facility.

## Issues and Challenges

A successful organics collection and processing system can yield important benefits for any community. However, implementation of these programs will require proper planning and analysis of key issues that these projects must face. Drawing upon the experience of more than 500 assignments with a variety of communities, agencies, and private operators suggests to us that the nine most important considerations include the following:

- ***Project management team***—Develop a strong management team at the outset to lead the organics collection and processing effort. This effort requires clear goals and objectives for the program.
- ***Size and capacity of the project***—Conducting a comprehensive market survey is critical to understanding the volume of organics that may be attracted to the facility, how they will be collected, and what methods will be employed to collect and transport these materials to the processing site.
- ***Have a detailed business model***—Develop accurate capital and operating costs to be able to project proper budgets, as well as understanding the disposal costs at competing facilities. Without these, such unexpected turns in events as project overruns and increased operational costs can be extremely challenging to the success of the project.
- ***Choice of technology***—The choice of technology goes hand-in-hand with the selection of the project siting, particularly if the facility will be located near urbanized areas. It is important to recognize the potential limitations of a particular technology application and its impact on potential air emissions and odors.
- ***Overcoming community concerns on siting***—Siting of any public works benefit project has become increasingly difficult. The same can be said for an organics processing facility. It is important for the project developers to do their "homework" by developing clear answers for the public about the technology selection, how the materials will be processed, and what operational safeguards will be employed to minimize offsite impacts such as air emissions and odors.
- ***Achieving regulatory conditions***—Every state and province is different and it is important to fully understand the regulatory requirements and design a facility and overall system that meets these requirements.
- ***Develop a communications plan***—Neighbors in the surrounding community will be concerned about your operations. Develop a proactive communications plan to help provide critical information about your operations. Look for opportunities to highlight your project and have opportunities for community outreach.
- ***Developing a quality product***—To be successful over the long term requires the development of a quality compost product that meets or exceeds national, state, and local compost standards. It is important to assure your customers that your product meets these requirements.
- ***Buy-in by political or corporate decision makers***—Lastly, it is extremely important to integrate all of these key issues into your business planning and deployment of your project. In this way, you gain buy-in by decision makers. MSW

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## AD System Selection: Feedstocks Rule

Of all the uncertainties surrounding the development of an anaerobic digester (AD) system for processing diverted organics, one thing is for certain: The characteristics and composition of waste processed today will be different than the waste to be processed in the future.

Typical primary drivers for wastestream characterization include the type of collection system as well as seasonal variations in wastestreams, which vary greatly depending on geography and demographics. Historically, research has been conducted, reports generated, and resources allocated to characterize the makeup of municipal solid wastestreams. While this information creates a strong foundation to project expected volumes and near-term challenges, configuring an AD system capable of accepting the broadest range of wastestreams will ensure the highest uptime and yields.

Diverted MSW organic wastestreams can average from 20% to 30% total solids (TS) content. Depending on other factors (region, season, collection method) the TS of diverted organic wastestreams can approach 50% TS. At the same time, organic wastestreams from institutional/commercial sources may be as low as 10% TS. Selecting the appropriate AD system to handle the broadest range of feedstock will minimize concerns associated with dilution of the incoming wastestreams and net the highest yield from the available wastestreams.

—*Eisenmann Corp.*

To be successful over the long term requires the development of a quality compost product that meets or exceeds national, state, and local compost standards.

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