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Urban Facility Delivers Food Waste Composting Capacity

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The 550 tons/day Wilmington Organics Recycling Center brings much needed processing capacity to a region primed to source separate and divert food waste.

Dan Sullivan and Nora Goldstein

WHEN the Delaware Solid Waste Authority (DSWA), responsible for developing and implementing programs for management of the state's solid waste streams, was considering a ban on disposal of yard trimmings at its Cherry Island Landfill in Wilmington a few years ago, it began assessing alternative outlets for the material. Among them was establishment of a composting facility in the Wilmington area, which is about 20 miles south of Philadelphia. "We were asked by DSWA if we were interested in opening a facility and we responded yes, if we can take food waste as well," recalls Nelson Widell, a partner in the Peninsula Compost Group, LLC.

A site was identified within the Wilmington City limits, close to the Cherry Island Landfill and adjacent to the Port of Wilmington, which receives shiploads of fresh produce on a daily basis. In the mid-Atlantic region, Wilmington is halfway between Washington, D.C., and New York City. "It is in the cat bird seat of the highest landfill tip fees in the country," says Widell.

The site is also within a stone's throw of Southbridge, a minority residential neighborhood that has had to live with a local landfill and plenty of traffic and noise. "One of the first things we did was meet with residents and the Southbridge community group, the councilwoman from that district and others," explains Widell. "We asked that they give us a chance to explain what we intended to do. And then, if they really don't want us, we are out of here."

What emerged from this series of events and opportunities is a 27-acre, \$20 million source separated organics composting facility designed to receive an average of 550 tons/day of materials. The site, an industrially-zoned former brownfield, is right off an exit of Interstate 495, providing easy access to haulers coming from as far away as New York City. The Wilmington Organics Recycling Center (WORC) opened its doors December 1, 2009, and when BioCycle editors visited in May, it was receiving about 300 tons/day of food waste, soiled paper and corrugated and some other materials such as clean wood construction debris. "Right now, our loads are about 80 percent preconsumer and 20 percent postconsumer food waste," Widell says. Maximum daily capacity at the WORC facility, expected to be reached by fall 2010, is 700 tons of combined yard, food and construction (wood) waste a day.

COMMUNITY BENEFITS AGREEMENT

A number of circumstances enabled Peninsula Compost Group to move fairly quickly through the permitting process. First was the need for a large composting capacity, as DSWA's yard trimmings disposal ban at the Cherry Island Landfill went into effect in January 2008. (DSWA's other two landfills in the state also will have bans in effect on January 1, 2011.) Second was the company's focus on working with the community. Third was the facility operator's and selected technology's track record. Fourth was a strong team of local partners. Fifth was the ability to establish a competitive tipping fee.

Widell is a partner in a separate company, Waste Options, Inc., which has developed a number of municipal solid waste composting projects, including a successful operation on the Island of Nantucket, Massachusetts. In addition to learning a great deal about materials processing and composting, Widell and his partner, Charles Gifford, learned even more about the need for positive public relationships. "Skin your knees enough times and you learn your lesson," Widell says. "If you don't have support of the community, you are in trouble."

As part of WORC's outreach and education, tours were arranged for Wilmington community leaders — along with a third-party engineer — of the Nantucket plant as well as Cedar Grove Composting in Everett, Washington. The Cedar Grove plant uses the GORE Cover system, the same composting technology that Peninsula Compost intended to employ. Feedstock composition was similar as well, including pre and postconsumer source separated food waste, yard trimmings, wood, soiled paper and compostable products. "They could see the technology we were proposing," Widell says.

Ultimately, Peninsula Compost and the Southbridge community prepared a Community Benefits Agreement, the first in the state of Delaware. Besides addressing concerns such as potential smells and truck traffic around local neighborhoods through proactive measures that include a 24-hour hotline, Peninsula Compost pledged a significant number of jobs — both to build the facility and to keep it running — to local residents and minorities.

"Most important was jobs," Widell says. "We pledged that at least 20 percent of the workers would be from the Southbridge community [currently that's at 60 percent]." At least 20 percent minority

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participation by subcontractors to build the facility was also promised and met. With the support of the local community in hand, Widell says the project was readily embraced by the city council, the mayor and state officials. "We took the politics out of it and had the politicians' support by going immediately to the neighborhood and getting their support."

PARTNERS, PERMITTING AND GHG EMISSIONS

The Peninsula Compost Group also forged alliances with local businesses that became partners in the venture. This included Port Contractors, a nationally operating stevedore, which both owns the property the site is on and supplies WORC with some of its trained materials handlers, and EDIS Construction, a neighboring leaser that oversaw building of the composting facility. "It really put a local identity to this," Widell says.

With community support, local partners and a proven technology, Peninsula was able to move through local and state permitting and zoning fairly smoothly. Because the Wilmington facility lies within the coastal zone, some areas had to be raised — particularly the active part of the compost pad in order to manage storm water — by as much as four feet. WORC's composting process is considered in-vessel or encapsulated, which means — according to the permitting — that rain hitting the covered windrows is considered and managed as storm water and not leachate. The chosen site was zoned heavy industrial so that presented no roadblocks.

The project scored points for reducing carbon emissions as compared to the previous business at the site, a salt and wood grinding operation. "The coastal zone is a special category with a high level of sensitivity for air metrics," Widell explains. Peninsula Compost decided to utilize all electric stationary processing equipment to minimize diesel emissions. Greenhouse gas reduction techniques to limit VOCs related to compost production — e.g., the Gore System — were also a part of that equation, all measured under the rubric of the U.S. EPA WARM Model. "Credit is also given for the fact that methane emissions are reduced when food waste is composted versus being landfilled," Widell says. WORC is monitoring its emissions reductions and intends to apply for carbon credits, just as the Nantucket operation did successfully (see "Compost Generates Cash for Greenhouse Gas Benefits," June 2009). The WORC project was developed over three years with construction completed in December 2009. By Earth Day, April 22, 2010, the site was fully operational. "Peninsula has been a good neighbor," City of Wilmington 4th District councilwoman Hanifa Shabazz offered at the podium during an Earth Day celebration commemorating the event. "Not one complaint had been received by the hotline. Our relationship is solid and it is fruitful for the community."

FOOD WASTE RECIPES

After being weighed, trucks drive into an 18,000 square-foot tip building that's constructed with galvanized steel to avoid corrosion. Bulking agents are piled along the perimeter on one side. On the day of our tour, they included sawdust, ground yard trimmings and shredded wood. Much of the food waste received is entrained with paper and cardboard — roughly 20 to 40 percent on average — so less carbon than originally anticipated is used to achieve an optimum mix. "Our trained loader operators shoot for a moisture content of about 60 percent," says Widell, "which typically is about one bucket of food waste to one bucket of amendment. If the loads are wetter, they add more carbon."

Nevertheless, having wood on hand and available helps achieve the desired consistency for good airflow and related robust microbial activity. Widell stresses that WORC does not take C & D materials but will take clean wood that's separated out and free of any paint, coating or treatment. Magnets on both the shredder at one end of the process and the screener at the other end help make this possible. "We need to be opportunistic for wood," he says. "It's worth it for contractors in New Jersey to separate it, as the tip fee in Wilmington is much less than they would pay in New Jersey for mixed C&D debris." A sophisticated 100-ton weigh scale keeps accurate tabs on everything that comes into the yard.

"We're probably getting a third of our waste from Delaware," Widell says, including chicken and egg wastes from the region's thriving poultry industry. "And we're right next to the biggest banana port on the East Coast. Every week we have ships coming up from Ecuador or someplace, and each ship has maybe 10 tons of spoilage." High nitrogen from the spoiled bananas and carbon from the cardboard boxes in which they arrive presents the perfect compost cocktail, he explains. "For the microbes it's like bread with butter on it — carbon and nitrogen both." When BioCycle called several weeks later with a few follow-up questions, the facility had just taken in 600 tons of spoiled produce from one shipment.

COMPOSTING PROCESS

The GORE Cover System is supplied by W.L. Gore and Associates, based in nearby Newark, Delaware. Each of the almost 200-foot long windrows is covered by a huge pliable rectangle of olive-green Gore fabric that's both breathable and waterproof, and provide odor and emissions control. The expanded polytetrafluoroethylene (ePTFE) is then laminated between two layers of polyester, "which gives it its mechanical strength," says GORE associate Brian Fuchs. The piles are positively aerated.

Each windrow operates as its own controlled microenvironment, explains Waylon Pleasanton, WORC's composting quality assurance manager. Feedstock can change drastically from one day to the next, especially with materials coming from the ports. "It might include bananas one day, fish waste the next and rotten mushrooms the day following," says Pleasanton. "We track each separate heap and rigorously maintain our tracking data." If there ever were an issue with contamination, he says, they would have no difficulty pinpointing where the feedstock came from and precisely where it went.

Two probes in every windrow provide real-time measurements of oxygen and temperature. "We measure the oxygen as percentage by volume, and when the blowers are on we can see the oxygen percentage rise," says Pleasanton. "We can actually see respiration and are able to maintain a range and feed in just enough oxygen." Data tracking by the vendor-supplied computer system provides required documentation that windrows are meeting pathogen reduction requirements.

Windrows are under cover for four weeks, then uncovered, moved to a new pad and recovered, where they remain for two more weeks. In the third phase, piles are uncovered and "cure" for two weeks. At capacity the facility will generate around 100,000 tons of compost annually. Markets for the high-quality product include schools, agriculture, construction, the landscaping and nursery trades and residential homeowners, who are welcome to purchase compost directly at the site by the bin full, trunk load or pickup truck. Most of the compost initially being produced is being sold as high-grade topsoil blends and to nearby nurseries.

The compost is tested for heavy metals, fecal coliforms and agronomic considerations such as percentage of organic materials, particle size, salts, pH and nutrients. "We have not yet applied for the U.S. Composting Council's Seal of Testing Assurance compost certification, but fully intend to now that

we have some finished product,” Widell says.

FOOD WASTE FLOW

WORC’s tipping fees range from the mid to high \$30s per ton for clean wood debris, to somewhere in the high \$40s per ton for food waste. This is highly competitive compared to the \$82/ton soon to be charged by the nearby Cherry Island landfill, up to \$85/ton in Philadelphia and \$120/ton in Trenton, New Jersey, says Widell.

He makes no bones about what has to keep the operation in the black. “The facility must pay for itself from tipping fees, period,” he says. A robust market for good quality compost provides the icing on the cake.

Widell ranks the level of availability of food waste feedstock for WORC — from the low-hanging fruit to more logistically difficult to obtain — as follows: food processing waste and port importers; supermarkets; institutions such as universities, hospitals and prisons; convenience stores; restaurants and fast food joints; and finally residential. He guesstimates that WORC is only tapping into about five percent of the available regional food waste stream within a geographic region that can be effectively serviced by trucks. The Norfolk Southern Railroad line and rail cars pass directly through the WORC site, which could be a future asset given the increase in waste that gets transported by rail.

In addition to the ports, produce terminals and fresh produce preparers, big tipplers in the region include Whole Foods Market and the University of Pennsylvania (UPenn). “Watching the progress has been exciting and long overdue in our area,” says Mark Smallwood, Whole Foods’ Mid-Atlantic Green Mission Specialist. “Whole Foods is excited to be sending our food waste from seven stores in the Philadelphia metro area. We take great pride in diverting over 70 percent of our waste from landfills, the vast majority of that being food waste. We could not do it without WORC.”

The University of Pennsylvania (UPenn) currently sends about 4 tons/week of organics to Wilmington, representing about 80 percent of what the Philadelphia-based institution’s dining halls produce. Despite the added hauling expense, UPenn officials report an overall 10 percent savings compared to utilizing the local landfill. Plus, they say, composting fits lockstep with their sustainability mission. “And we’re working with the landscaping companies to have them get their compost from Wilmington,” says Laurie Cousart, UPenn’s director of dining services, “so we’re really closing the loop.”

TURN AND LEARN

For Widell, who spent the first part of his composting career selling equipment and developing facilities for mixed municipal solid waste, WORC represents the future of composting. “At least it does for me,” he says, recalling the trial-and-error, hit-and-miss 1980s when “every step of the way you actually had to do something to learn.” Widell says he and his partners turned a major corner with the success of the Nantucket facility and have not looked back. Far from resting on their laurels, they have additional projects planned on the west coast of Florida, New Jersey (two projects), Massachusetts (three projects) and Chicago.

“We’re an urban compost facility,” Widell offers excitedly, gesturing to the city skyline. “There’s the City of Wilmington right there. We’re within the City of Wilmington. Our tipping fees are way less — we’re half the price of Trenton, New Jersey — so the incentive is there to separate.” Add to the economic, technological and management breakthroughs a heightened environmental consciousness among citizens and businesses alike and you have the perfect storm, he says. “That combination of things convinced the banks to lend us money,” Widell adds, explaining that funding was initially to come through private industrial bonds until the bottom fell out of the international finance market shortly after permitting of the project. “We were privately funded, even in the midst of an economic downturn.”

Several waste generators appreciate the full-cycle value of bringing their materials to Wilmington and returning the resulting compost to the soil. In addition to the University of Pennsylvania, a major grocery store chain intends to market bagged compost made with its own food scraps to its customers. “It’s like the movie Groundhog Day — you keep doing it until you get it right,” Widell says with a quick smile. “We think we got it right.”

(Sidebar p. 18)

HOW WORC FLOWS

- The 27-acre Wilmington Organic Recycling Center (WORC) is oriented in the direction in which incoming material flows, from weighing in, to tipping, to windrowing, to finished product leaving the yard.
- A wood-processing site across the street preshreds clean construction debris, yard trimmings and land-clearing debris to about 3 inches or less. Current tools include a Komptech Crambo grinder that’s being tested and McCloskey screener.
- After trucks weigh in on a sophisticated 100-ton scale, they tip their loads (Photo 1) inside an 18,000 square-foot tip building — under negative air pressure to help control odors and constructed of galvanized steel to prevent corrosion.
- Inside the tip building, loader operators trained to determine the right mix of carbon (ground wood, paper and cardboard) and nitrogen (food and green yard waste) — typically about one to one, depending on moisture content — aggregate the feedstock before loading it into a Doppstadt slow-speed shredder (Photo 2). Ground wood chips currently serving as a temporary ramp will be replaced with a permanent cement structure once all the machinery has been properly calibrated.
- Shredded feedstock is conveyed to a picking station with as many as four people on each side pulling contaminants (Photo 3). Technicians are trained to not pull compostable plastics, such as bags, which can be recognized. Almost no glass is making its way into the facility.
- A 15,000 square foot biofilter at the south end of the facility treats air from the tip building (Photo 4). To manage back pressure, do media replacement or repairs, air flow to sections of the biofilter can be turned off. WORC uses large size wood chips for the media.
- Leachate and excess liquid from the biofilter and tip building go to a sanitary sewer. Storm water from the site flows into a solids separator and then an aerated retention pond (Photo 5). WORC has two separators and ponds — half the facility drains to one and the other half to the other.
- When WORC opened, seagulls from the nearby landfill quickly discovered the new food source — windrows being constructed with fresh material prior to being covered. The vector problem was solved with Cooper, the border collie, who very effectively keeps the seagulls away.
- The site is set up to accommodate 64 200-foot-long windrows — 56 under cover and eight uncovered for their final stage of composting. Aeration holes in two grated trenches running the length of each compost pad also serve to drain leachate (Photo 6). Two-horsepower blowers mounted on the outside of a cement wall surrounding the windrows kick on individually based on temperature and oxygen feedback.

The key is to introduce the right amount of air to satisfy microbial activity without drying out the material.

- Each windrow is sized to handle about one day's worth of material — approximately 550 tons or 1,000 cubic yards a day. It's an eight-week journey from tipped and mixed feedstock to finished compost.
- A Doppstadt screener is equipped with a punch plate and both half-inch and three-eighth-inch screen sizes (Photo 7). Screens are matched up with a magnet, a destoner and an air separator. Netting catches wayward plastic. At 40 percent moisture, the compost can be screened finely enough for application such as top dressing on golf courses. At 50 percent moisture, it can be screened for bagging. While a retail area has been set up, 99 percent of the compost generated at the WORC facility gets trucked out in bulk by the cubic yard.

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