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ADVANCING COMPOSTING, ORGANICS RECYCLING & RENEWABLE ENERGY

Financing Organics Recycling Companies

CELLULOSIC ETHANOL UPDATE • A "GOOD" CARBON REGULATION
MARKETING MIXED WASTE COMPOST • ONTARIO'S DIVERSION VISION

INTEGRATING ANAEROBIC DIGESTION

WHOLE SYSTEM ORGANICS RECOVERY

UTILIZING a whole systems approach, a family of companies in San Jose, California has created an innovative and integrated blueprint to separate, process and recover organics from mixed municipal solid waste (MSW). Locally owned and in operation since 1985 and 1991 respectively, Zanker Road Resource Management, Ltd. (Zanker) and its sister company GreenWaste Recovery, Inc. (GreenWaste) own and operate two unique and complementary facilities based in Santa Clara County.

The GreenWaste Material Recovery Facility (MRF) and Z-Best Composting Facility (Z-Best, owned by Zanker) are conceived, designed and operated to maximize diversion from landfills and effectively process yard trimmings, food waste and the organic fraction of MSW. This integrated system has been very effective, with the most recent audit finding a nearly 76 percent recovery rate for the MSW processed at these two facilities. For Zanker and GreenWaste, the next step seemed natural — a facility that is designed to process organics while creating clean and renewable energy.

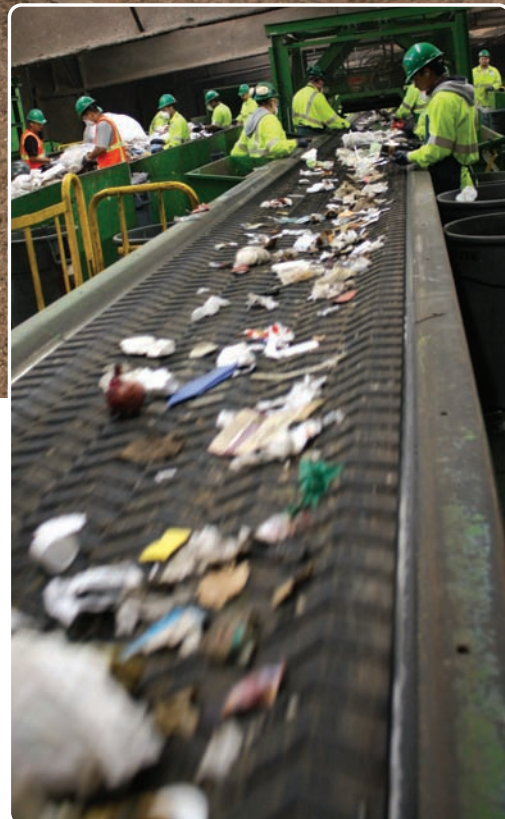
“DIRTY” MRF

The GreenWaste MRF in San Jose stepped up to the challenge of zero waste by installing two side-by-side lines to sort both MSW and single stream curbside recyclables under the same roof. Single stream recycling programs have proven to be an efficient and effective way to increase the amount and quality of recyclable materials captured from the waste stream; however, recyclable materials still end up in the

The final step of combined processing at the GreenWaste MRF captures organic-rich materials from the MSW and single stream recyclables lines (right). Organic fines and processed MSW are transported to the Z-Best facility where they are composted first in aerated bags, then open windrows (above).

A family of companies in San Jose, California is expanding into the realm of dry fermentation to take composting and organics diversion one step further.

Emily Hanson



Photos by James Brunner

garbage and organic and compostable materials still end up in the recycling stream. GreenWaste built this state-of-the-art “dirty MRF” to capture the entire organic portion of the solid waste stream. It became operational in spring 2008.

The automated material recovery equipment was manufactured and installed by Bulk Handling Systems (BHS). The integration of dual processing lines in the same facility enables GreenWaste to capture and combine the clean and dry commodities from both lines and keep them separate from the wet organic product collected from both lines. This side-by-side design maximizes efficiency, increases the quantity and quality of materials recovered and allows a more comprehensive and cost-effective approach to processing all incoming materials. Additionally, by controlling the entire process, from collection through processing and ultimately the end market, GreenWaste and Zanker increase their ability to make incremental changes to the system



MSW is delivered to the tipping floor at the GreenWaste MRF (above). Mixed paper and other lightweight organic materials are separated from recyclable containers at the polishing screen on the MSW line (right).

The MSW line at the materials recovery facility is designed to process 25 tons/hour.

that result in improved waste diversion.

The MSW line at the GreenWaste MRF is designed to process up to 25 tons/hour. When materials are delivered to the tipping floor, bulky nonrecyclables are manually removed (mattresses, carpet and carpet padding, etc.) and stored for disposal. Bulky recyclable materi-

bagged MSW to enhance separation prior to entering the trommel screen. The trommel separates materials into two distinct fractions: “unders” (approximately two-inch minus organics) are sent to a bunker for storage prior to being sent to Z-Best, while “overs” continue on through to the drum separator. The drum separator uses air technology to separate light fiber and three-dimensional containers from the heavy materials, which typically include a

large organic fraction. The heavy materials from the drum separator continue on through another screen separator.

The heavier organic materials are directed into a bunker for storage prior to being combined with the organic “unders” from the trommel for shredding. This fraction, called “organic fines,” represents organics consolidated from both processing lines and consists primarily of food scraps, organic leafy matter and some small and/or lightweight contaminants that will be screened out after composting.

The lightweight materials from the drum separator continue on to the polishing screen that separates mixed paper from the containers. Mixed paper floats on top as the containers drop back through the bottom on to another conveyor to be commingled with the containers from the single stream line. The mixed paper from the MSW line is then sent through a final manual sort to remove any materials that are not organic. The organic materials remaining from the MSW line consist primarily of wet paper products and lightweight nonorganics. This fraction is called “processed MSW.”



als, including E-waste, are manually removed and stored in bins (rigid plastics, wood, metal) to be commingled off the line later in the process. Material is delivered from the tipping floor to the presort area by conveyor where sorters remove garbage, wood and yard waste, metals, injection-molded plastics, glass and items that have the potential to clog or get tangled in the mechanical portion of the facility.

In the mechanical portion of the facility, materials continue from the presort area through the bag breaker which tears open

SOLAR POWERED MRF

DEMONSTRATING its philosophy to be “a brighter shade of green,” GreenWaste installed a 300-kilowatt solar panel system, offsetting use of nonrenewable energy to power the processing and recovery of recyclable materials and organic waste. The system is one of the largest commercial solar system installations in the City of San Jose, and is expected to produce approximately 408 million-kilowatt hours of energy annually, about a third of the energy needed to power the facility. The system is comprised of 1,552 panels spanning two buildings and covering approximately 80 percent (80,000 square feet) of the roofs.

Z-BEST COMPOSTING FACILITY

The two streams — organic fines and processed MSW — are transported separately to Z-Best in Gilroy, California. The volume and types of materials that can be processed at Z-Best have been expanding, and the quality of compostable materials continues to improve. Z-Best can receive up to an average of 1,500 tons/day (tpd), including yard trimmings, and up to 700 tpd of MSW organics.

Clean and source separated yard trimmings are composted in open windrows separately from the processed MSW and organic fines received from the GreenWaste MRF. The processed MSW is shredded before being mixed with the organic fines and transported to the composting area, where it is injected into 350-foot long bags. A system manufactured by CTI, PVC pipes are introduced into the bags to aerate the material, which remains in the bags for about four months.

The contents are then removed, turned, cured and transported to a screening system. The smaller compostable fraction is stockpiled and cured for an additional four weeks before being screened again. Of the total incoming tonnage of MSW that is taken to Z-Best, 82 percent is recovered. Finished MSW compost is marketed to local landscapers.

SAN JOSE'S GREEN VISION AND MULTIFAMILY PROGRAM

In 2007, the San Jose City Council adopted its Green Vision Goals, continuing San Jose's tradition as a leader in environmental innovation and sustainability. As part of the City's Zero Waste Strategic Plan, which was adopted in 2008 to divert 100 percent of waste from the landfill by 2022, San Jose collaborated with GreenWaste to utilize its newly completed "dirty" line at the MRF and send those materials to its sister company Z-Best for composting.

San Jose has had great success with its single family "Recycle Plus" program, reaching a residential diversion rate of 53 percent in 2007-2008. Like other cities nationwide, diversion from apartment complexes proved to be challenging due to high turnover rates for renters, variability in management companies and limited space for recycling containers. After many years of promoting multifamily recycling through various outreach activities, San Jose was only able to achieve a diversion rate of 18 percent for multifamily dwellings. In addition, while single family residences are incentivized to recycle with a Pay-As-You-Throw rate structure based on their garbage container size, multifamily residents don't pay directly for garbage service and do not have a financial incentive to recycle.

To accomplish higher multifamily diversion rates — necessary to meet the Green Vision goals — the city sought input from the local chapter of the California Apartment Association. Their members wanted to avoid mandates that would require them to enforce recycling at their complexes and place more recycling bins than existing space could accommodate. The new program was able to meet apartment manager needs because back-end processing at the GreenWaste MRF and Z-Best occurs "behind the scenes." Nothing needed to change at apartment complexes, and properties could continue to use existing recycling and garbage containers. The resulting multifamily recycling system reflects a unique collaboration between the Apartment Association, City of San Jose, GreenWaste and Zanker.

The GreenWaste MRF began processing apartment waste from San Jose in July 2008. The MSW line services all multifamily dwellings in the City of San Jose, which includes 93,000 households from 3,200 complexes citywide. In addition to recyclables recovery, GreenWaste has been able

to capture organic materials (such as food waste and soiled paper) that are difficult to recover by conventional processing methods. After processing, this material goes to Z-Best for composting. The organics stream from the MRF is kept separate from the clean green yard trimmings.

During the first year of San Jose's new multifamily recycling program and its partnership with GreenWaste, approximately 72,000 tons of apartment waste were processed on the MSW line. Over 54,000 tons (or 75.8 percent) were diverted from landfills through recyclables recovery and composting, boosting San Jose's overall residential diversion rate by 13.5 percent, from 53.2 percent in 2007-2008 to over 60 percent in 2008-2009. Using the U.S. EPA's WARM model for calculating avoided greenhouse gasses, this equates to an annual reduction of almost 50,000 metric tons of CO₂ — equivalent to removing 9,000 cars from the road.

MOVING INTO ANAEROBIC DIGESTION

Zanker and GreenWaste were determined to find an even better way to process organics, further reduce their carbon footprint and move toward a model of sustainability in the solid waste industry. The companies will advance their highest and best use philosophy by working with Zero Waste Energy, LLC (Zero Waste) to develop the first-of-its-kind in the nation dry fermentation anaerobic digestion (AD) facility to create renewable energy and compost from the organic portion of the waste stream.

After an extensive search process, Zero Waste selected the Kompoferm® dry AD system that has been developed by the German company Eggersmann Anlagenbau. The system, which has been exclusively licensed by Bulk Handling Systems for construction in North America, will help San Jose accomplish its ambitious zero waste and renewable energy goals.

Although production of biogas via AD is common in the U.S., the existing processes require a heavily preprocessed wet feedstock containing no more than 8 to 10 percent solids content. To achieve the desired liquid content, the material must be prepared by grinding, screening, blending and liquefying the waste so it can be pumped into the digester. By contrast, the dry fermentation system to be installed at this facility utilizes the relatively dry organic portion of the waste stream with an ideal solids content of 36 to 56 percent for the system to function properly. Because extensive preprocessing isn't required, and there is a significantly higher ratio of allowable solids, the types and blends of appropriate feedstocks are expanded. Thus a significantly greater portion of the waste stream can be diverted from disposal, including the organic fraction remaining from processing MSW, food waste, green waste, fats, grease and other high-caloric wastes.

About 72,000 tons of apartment waste from San Jose were processed on the MSW line, with 54,000 tons of recyclables and compostables recovered.

Finished MSW compost is screened and sold primarily to landscapers. Of total tonnage coming to Z-Best from the MRF, 82 percent is recovered.



Zero Waste is designing and working closely with the City of San Jose to permit this dry AD facility adjacent to the Zanker Material Processing Facility (ZPMF) and the Zanker Road Resource Recovery Operation and Landfill (ZRRROL). It is being designed and will be developed in three phases, with each phase capable of processing 50,000 tons/year of organic materials. When fully built, the total facility capacity of 150,000 tons/year will accommodate the current and growing stream of organic waste generated by San Jose and nearby municipalities.

The facility will process and recover energy from source separated food waste and the organic fraction remaining after recyclables and MSW are processed at the GreenWaste MRF. The AD system will start with the same material that is currently transported to Z-Best (processed MSW and organic fines) and end with the same high quality compost — and recover biogas containing 50 to 60 percent methane. Both digestion and curing will take place in a tempera-

ture controlled (95° to 105° F) enclosed and sealed structure designed to capture all gases and control odors through a biofilter. The biogas will be collected, properly stored and processed as necessary within the en-

closed building. From there, it may be used to power onsite or off-site generators, cleaned and compressed for use in CNG powered vehicles, or possibly injected into a natural gas distribution system.

Materials will be tipped in an enclosed receiving area then loaded into the digesters. After the digester is filled, the AD process is initiated and continues for approximately 21 days. Biogas is generated continuously and extracted throughout the process. After roughly 21 days of fermentation, 90 percent of the material from each digester will be mixed

with fresh material and placed in a sealed aerated composting tunnel for a minimum of 14 days of aerobic composting. The material can remain in the composting tunnel for up to 21 days for odor control. The remaining portion of the digested material (10 percent) will go back in a digester and be used as an inoculant to facilitate the decomposition and fermentation process of the new load of organics.

The first 28 to 42 days of the process are enclosed and all potentially odorous emissions will be treated through a biofilter. By the end of that period, the feedstock will have met pathogen reduction standards, and be sufficiently composted to eliminate vector attraction. During the final stage in the process, the material will be moved outdoors for curing and a screening process to increase its commercial value.

When coupled with the existing infrastructure and facilities being operated by Zanker and GreenWaste, this comprehensive waste management system truly reflects an integrated and innovative approach to handling the organic portion of the solid waste stream, substantially increasing landfill diversion while creating renewable energy. ■

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