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RESOURCE RECYCLING

HOW VERTICAL INTEGRATION, A DIVERSION PLAN AND AN INNOVATIVE SYSTEM DESIGN TURNED AROUND MULTI-FAMILY RECYCLING IN ONE OF THE MOST POPULOUS CITIES IN THE U.S.

BY EMILY HANSON

For some, "multi-family recycling" is an oxymoron. Conventional wisdom says apartment buildings and multi-family dwellings are, instead, the source of single-digit diversion rates with highly contaminated recyclable streams. Nothing could be farther from the truth for San José, California.

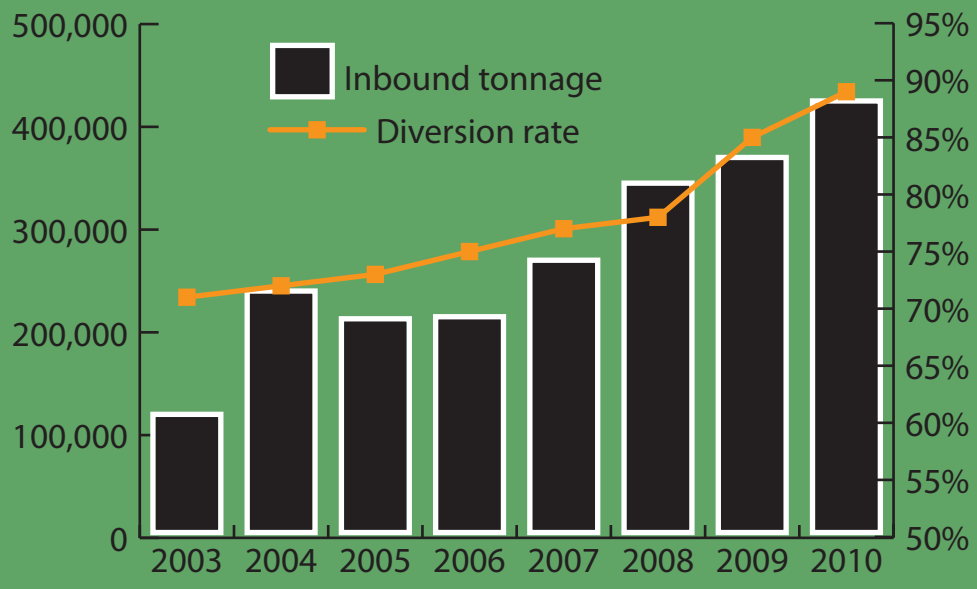
San José wanted to break that mold and overcome the seemingly endless barriers to increasing multi-family waste diversion, and so formed a unique public-private partnership to improve waste diversion at multi-family properties in the capital of Silicon Valley. To do so, the city of San José has collaborated with the solid waste processing firm GreenWaste Recovery, Inc. (GreenWaste) and taken a diversion rate for multi-family dwellings from 18 percent in 2008 to 78 percent in 2010.

Formed in 1991 as the primary contractor for the collection and processing of yard trimmings from the city of San José's residential sector, GreenWaste has since expanded to providing collection and processing to residential and commercial customers for municipal solid waste (MSW), yard trimmings, curbside pickup of recyclables and food waste at its material recovery facility (MRF) located in the city of San José. The company also has the ability to process a great deal of organic materials, through its sister company, Zanker Road Resource Management Ltd., and its Z-Best Composting Facility – the largest compost facility in Northern California, located approximately 30 miles south of the GreenWaste MRF in Gilroy.

Looking to fill what the firm saw as a need for better processing of MSW and increased recovery of organics from the residential sector, GreenWaste designed and built a MRF with two side-by-side processing lines to sort both MSW and single-stream curbside recycling under the same roof. This arrangement takes advantage of both the unique and similar aspects of the two waste streams, merging clean product from both lines to maximize efficiency and increase the quantity and quality of materials recovered. This side-

by-side design results in economies of scale and allows the facility to take a more comprehensive and cost-effective approach to process all incoming material – not just source-separated materials.

Figure 1 | GreenWaste MRF diversion data



Source: GreenWaste, 2011.

Multi-family, many challenges

While single-family residents in the Bay Area receive a financial benefit when recycling due to a rate structure that hinges on garbage volume, multi-family residents, who don't normally pay directly for garbage service, do not tend to have a financial incentive to recycle. Thus, increasing source-separated recycling from the multi-family dwelling sector posed significant and consistent challenges that proved very difficult to overcome.

For example, apartment complexes often lack available space for recycling bins within each dwelling unit, or for units to have both individual containers and access to shared containers. Additionally, the areas for container storage and set-out are often placed in inconvenient locations. To compound these issues, outreach to multi-family residents has proven challenging, due to high resident turnover and inconsistencies of property management.

With a goal of increasing recycling and diversion from the multi-family sector, the city sought input from the local chapter of the California Apartment Association. Their members wanted to avoid mandates that would require them to monitor recycling at their complexes and force them to place many more recycling bins than they might have space for. With over 93,000 households in 3,200 complexes citywide, San José faced hard work ahead.

Ultimately, after many years of targeting the multi-family sector through various outreach activities, the city was able to achieve a diversion rate of 18 percent. According to San José's self-imposed "Green Vision" – a fifteen-year sustainability plan adopted by the city in 2007, the goal of which is to reach zero waste by 2022 – diverting just a fifth of its multi-family waste stream was not good enough. So, the city partnered with GreenWaste to have the company process all the MSW from the 93,000 multi-family dwellings (MFDs) in San José in July of 2008 at the firm's newly completed facility.

Going with the flow

When GreenWaste designed the MRF, it did not have a dedicated flow of material and did not know whether the material would be from the commercial, residential or multi-family sectors. Because of this challenge, the company was not able to conduct a waste characterization study to determine the types and quantities of recyclable materials that would need to be processed. Once the material began to flow, a number of changes were made to the facility to improve the efficiency of the sorting process, resulting in a higher quality of material and an exceptional rate of recovery.

The design of the automated material recovery processing equipment to accommodate the local feedstock composition and the equipment was designed in-house and manufactured by Bulk Handling Systems. In order to optimize results, GreenWaste frequently tracks and evaluates each of the individual manual and mechanical processes on a regular basis and makes modifications to the system to achieve higher diversion rates and to decrease cross-contamination of the sortation streams.

The operations manager for the MRF has a strong presence in the facility, frequently reviewing operational data, as well as the quality, quantity and composition of the incoming material. As an example, from 2009 to 2010, the MSW processing line diversion rate increased from 75 percent to 78 percent and the single-stream line diversion rate increased from 95 percent to 98 percent (see Figure 1).

A double-take on diversion

GreenWaste's dual side-by-side processing lines allow the recovery of valuable recyclables as well as organic materials (such as food scraps and soiled paper) from both the single-stream and the MSW processing lines. Prior to operating the MSW line, the company received feedback from brokers that they were nervous that the recovered material from that line would be contaminated.

These fears proved to be unfounded, because the system was designed to both integrate and separate materials in such a way that the materials stayed very clean. GreenWaste also conducts regular quality checks and cleans up materials prior to shipping, enabling them to sell the products for a premium. By controlling the entire process, from collection through

processing, and on to the end destination, GreenWaste increases the opportunity to make incremental changes to various parts of the system to improve waste diversion.

The volume and types of materials recovered for further processing at the Z-Best Composting Facility has expanded and the quantity of compostable materials, as well.

The overnight transition

Implementation of San José's multi-family

The process of processing

Processing at the facility begins manually, becomes mechanical and then goes back to a manual process for final quality control. The three processing systems that comprise the new MRF include MSW processing, single-stream processing and combined container processing.

MSW Processing – GreenWaste's new MSW processing line is capable of processing up to 33 tons per hour of materials and includes:

- **Floor-sort:** Bulky materials and e-waste are manually removed.
- **Pre-sort:** Sorters remove non-recyclable and non-compostable items, large recyclables and items that have the potential to clog or get tangled in the machinery.
- **Bag-breaker:** Bags are torn open to gain access to materials.
- **Trommel screen:** Materials are separated into two distinct fractions by size.
- **Drum separator:** A vacuum separates three-dimensional containers from the waste stream.
- **Polishing screen:** This screen is used to separate soiled mixed paper from MSW from the containers.

Single-Stream Processing – The single-stream recycling line is capable of processing up to 25 tons per hour of recyclable materials and includes:

- **Pre-sort:** Sorters remove contaminants, recyclables and items that have the potential to clog or get tangled in the machinery.
- **Cardboard screen:** The cardboard disc screen is used to capture cardboard.
- **Newsprint screen:** This screen separates newspaper from the rest of the stream.
- **Polishing screen:** This screen separates mixed paper from the containers.
- **Post-sort:** Quality control post-sort stations ensure optimum marketability of the recovered commodities.

Combined Container Processing – The container line processes containers from the two processing lines to optimize efficiencies and includes:

- **Optical sorting:** PET beverage containers are optically sorted.
- **Electro-magnetic separators:** Ferrous metals are separated using electro-magnetic separators.
- **Optical sorting:** Plastic containers Nos. 2-7 are optically sorted.
- **Eddy current separator:** Non-ferrous metals (i.e. aluminum cans) are separated utilizing an eddy current separator.

recycling system partnership presented a distinctive opportunity to overcome behavioral obstacles and space limitations of containers at MFDs. The overnight transition re-directing the MSW to the MRF, instead of to the landfill, was seamless and because it occurs "behind the scenes," and nothing needed to change at apartment complexes. Properties, too, could continue to use existing containers.

Now, almost three years since the MRF became operational, jurisdictions are now requiring MSW and food waste to be processed and composted, the MRF has consistently demonstrated its capability to sorting and recovering 98 percent of recyclable materials and 75 percent of MSW processed, for a total facility diversion rate of 78 percent.

This unique and collaborative effort has been highly successful in increasing diversion from the multi-family sector from 18 percent to over 78 percent and GreenWaste and the city were jointly awarded the 2009 Recycling Excellence Gold Award by the Solid Waste Association of North America (SWANA) for their successes. The program's combination of back-end processing with traditional recycling efforts results in a total diversion rate of nearly 80 percent, making San José the best-performing recycling program in the nation. RR

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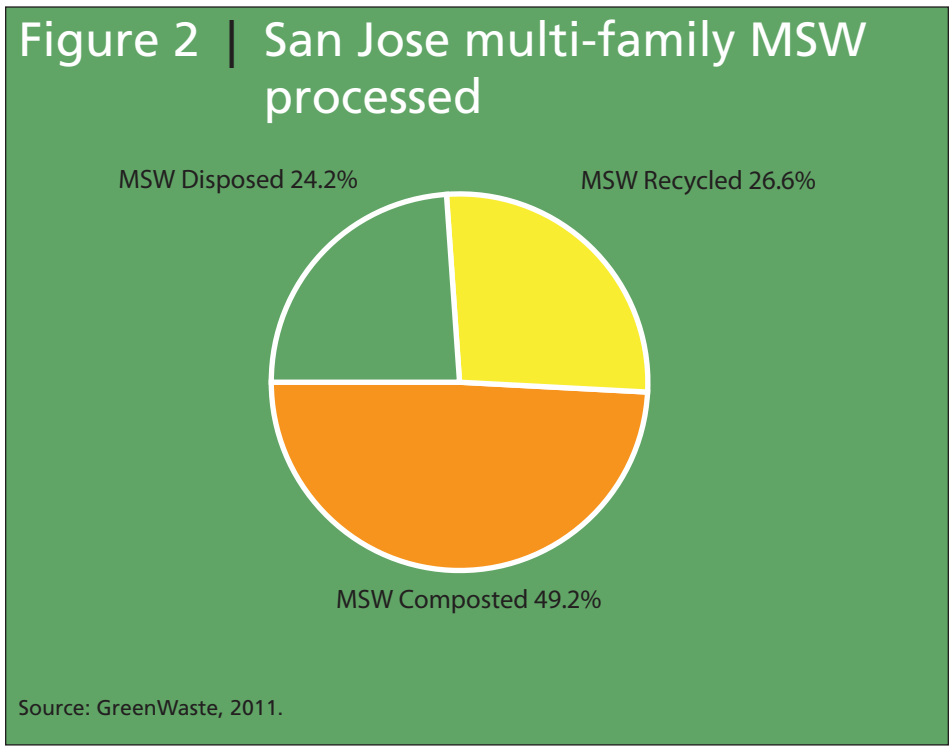
Figure 2 | San Jose multi-family MSW processed



Source: GreenWaste, 2011.