Communities Put Wet-Dry Separation To The Test

By Sue Darcey

■ Some North American communities are elevating source separation to new levels, pulling out compostables to increase recovery rates.

North American waste managers, in their never-ending quest for methods to reduce or recycle larger fractions of the waste stream, are taking a tip from their European counterparts and trying "wet-dry" systems. At least four communities in the United States and Canada are experimenting with this approach: Guelph, Ontario, Greenwich and Fairfield, Conn., and Santa Barbara, Calif.

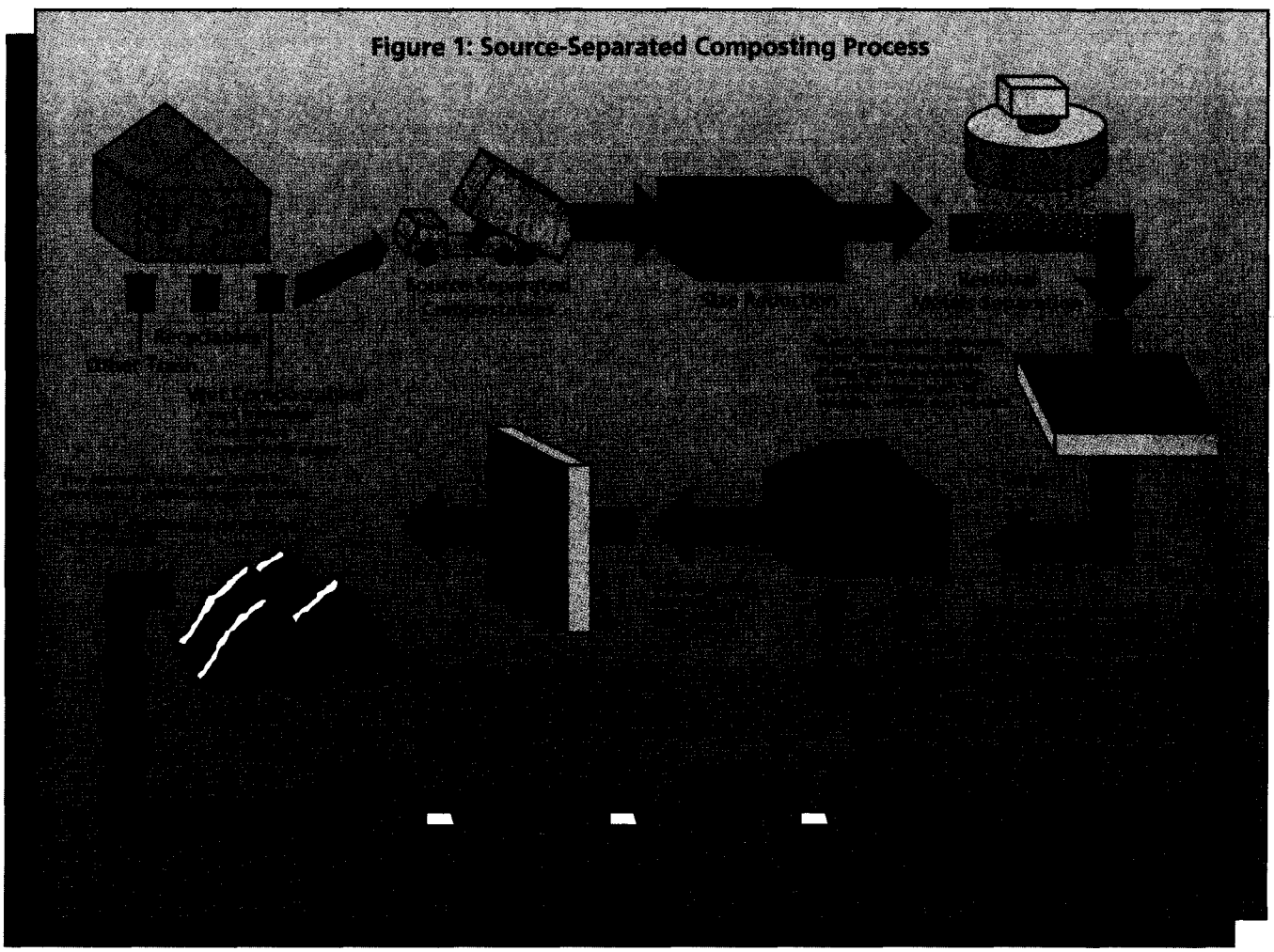
Unlike traditional recycling programs in which recyclables are separated by workers at a materials recovery facility (MRF) or residents, wet-dry systems also recover the waste that was previously sent to landfills — the compostables (see Figure 1).

Compostables include discarded food and soiled paper and can comprise as much as 30 percent of what residents and commercial customers throw away, according to the National Audubon Society. An Audubon study found that when combined with effective recycling, a wet-dry system can achieve 70 percent diversion of the waste stream.

For example, in Canada, the town of Guelph, Ontario, hopes to meet a 65 percent diversion rate. Guelph has run a successful pilot project since 1989 involving a wet-dry compost system developed by R. Cave and Associates Engineering Ltd., Oakville, Ontario.

Residents sort their dry, recyclable waste such as plastic, glass, aluminum and unsoiled paper into one bin, while wet waste goes to another. The collection trucks are designed with two compartments — one for wet waste, one for dry, allowing both fractions to be collected in a single pass. The system is based on successful programs in Europe, according to Steve Foster of R. Cave.

Residents are given reusable wide-



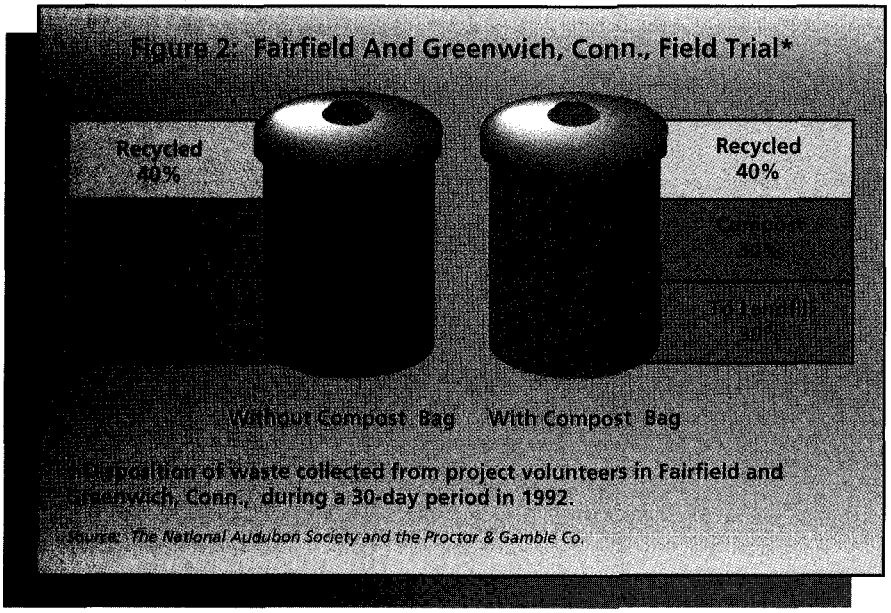


Figure 2: Fairfield And Greenwich, Conn., Field Trial*

*Separation of waste collected from project volunteers in Fairfield and Greenwich, Conn., during a 30-day period in 1992.

*Source: The National Audubon Society and the Proctor & Gamble Co.

mouth plastic jars for collection of non-liquid household hazardous waste, including used syringes, household batteries and used jars of nail polish. These materials are picked up during special collection and drop-off days.

In addition, there will be spring and fall collection of yard waste and expansion of an existing bulky-item exchange day, on which residents are allowed to exchange their unwanted household goods.

The County of Wellington/City of Guelph will soon begin construction of a 139,000 ton per year facility, incorporating a 44,000 ton per year "wet" composting plant and an 85,000 ton per year "dry" MRF.

Wet waste collected under the system is sent to a pre-processing building, where larger chunks are sorted out for later use as a bulking agent. This stream is usually 50 percent water. The combined wet waste then goes to a compost curing hall, where temperature and air flow are carefully controlled. A Buhler system consisting of a bucket wheel excavator turns over the waste as it decomposes. The computer-controlled, Cave-designed process provides the correct conditions for the growth of live organisms that help with the decomposition process.

A biofilter in the system controls odor, said Foster, which is frequently a problem with sludge compost. "In fact, that's one of the problems in the U.S. with MSW [municipal solid waste] compost systems. The same equipment used to compost sludge is applied to composting solid waste, but it doesn't work — you have to provide more air to wet solid waste in order for the process to work." He also noted that to treat MSW, a different type of fungus is used than that used with sludge composting.

The MRF will accept both commercial and residential waste. According to Foster, most of the markets for processed recyclables in the area "are very stable."

R. Cave will be the construction managers of the facility, and the firm will use local general contractors to build the plant. It should be ready for operation by the end of 1994.

Fairfield's Program

In the town of Fairfield, Conn., a slightly different wet-dry project, known as a "wet bag" composting demonstration pilot, was run in March 1992. Project coordinators included the National Audubon Society (through support from Fuji Photo Film USA Inc.), Procter & Gamble, Waste Management, the Town of Fairfield and McDonald's.

Residents were asked to sort their solid waste into compostables and non-compostables. Compostable portions included food scraps, soiled paper, kitty litter, pizza boxes, diapers, sanitary products, napkins and tissues. These were collected in special kraft paper bags with a cellophane-like moisture barrier provided to participating households.

The bags, which are produced by Stone Container and feature a liner made by Flexel Corp., prevent leakage yet are compostable. Residents in the program placed the bags in a separate, animal-proof garbage can labeled with a neon sticker "Compostable Materials."

Greenwich and Fairfield residents already were participating in a curbside recycling program in which they sorted glass, newspaper, metal cans and certain plastic bottles, then placed them out for collection on a weekly basis.

Materials that were not compostable or recyclable were collected and weighed to provide a snapshot of the town's total municipal waste stream. On average, 30 percent of waste was compostable, 40 percent was recyclable and the remainder (about 30 percent) went to the "other" bin (see Figure 2).

Commercial Participation

At the same time, food and soiled paper were collected from behind the counter at three Fairfield McDonald's restaurants. Cooked products and salads that were no longer fresh comprised the major source of the food discarded. The restaurant waste was collected in kitchen trash bins sized for the same paper bags used in the residential program. When each bag was full, it was taken to a dedicated dumpster in the back parking lot of each restaurant. The dumpsters were emptied on a regular schedule and taken to the Fairfield Compost Facility.

After arriving at the composting facility in Fairfield, the source-separated waste was visually examined for non-compostable material. The restaurant waste was then added. Approximately 40 pounds of material were removed during the visual inspection of the incoming waste, or about 0.3 percent of the total.

The waste was then shredded in a tub grinder with a four-inch screen to achieve the proper size for composting. Some of the household waste had to be shredded twice because of the bulk of pizza boxes. Restaurant waste usually did not require a second shredding.

Because the compostables received in March did not contain leaf and yard waste, shredded yard debris was added to achieve a typical blend of residential compostable waste. The yard waste represented about 25 percent (by weight) of the waste that was composted. Water was added to bring the moisture level up to approximately 50 percent.

The shredded waste was composted for 30 days in one of the agitated bays at the Fairfield facility. A buffer of wood chips was placed in the compost bay before and after the organic waste to prevent mixing with the normal compost mixture. The material was mechanically mixed and moved down the bay a total of 18 times.

As in the Guelph project, aeration and temperature were carefully controlled and regulated with temperature sensors in the wall of the bay. Temperatures in the middle of the bay were monitored with a handheld probe. Temperatures above 55° C were maintained for at least three

days to meet the minimum requirement for the "procedure for the reduction of pathogens," (PFRP), a regulatory test protocol that is normally used in composting sewage sludge. Water was added once during the in-vessel composting (after 21 days) to maintain 50 percent moisture content.

Following the 30-day in-vessel composting period, the material was screened through a two-inch shaker screen to remove large materials that may not have broken down or that were inadequately shredded. Out of the 16,000 pounds of residential and restaurant wastes processed, 110 pounds, or 0.6 percent, was removed through the screening process.

The material was then placed in an outdoor windrow and covered with a plastic tarp, as required by the Connecticut Department of Environmental Protection for the experimental study. The temperatures of the compost were monitored three times per week.

The pile was turned with a front end loader at least once per week, or when the pile temperature reached 60° C. Again, water was added to maintain 50 percent moisture. Samples were taken weekly to monitor the compost maturity. As a quality control measure, two separate labs were used to acquire data.

After about six weeks of windrow composting and curing (10 weeks total composting), the material was screened through a 3/8-inch trommel screen. The screen rejected brush or wood chips that were not decomposed and some plastic film. About five cubic yards of the 42 cubic yards of material were removed by the trommel screen.

The finished compost was found to be high in nutrients (with 1.6 percent nitrogen) and free of pathogens. Metals and other inorganic elements were well below federal standards for the unlimited application of sewage sludge to agricultural lands. This sludge standard was used as a yardstick, because neither the federal government nor the state of Connecticut has developed environmental management standards for MSW compost. In addition, the potential of leaching metals was found to be well below regulated levels.

According to the study sponsors, education was the key to the Fairfield project's success. A letter was sent to potential participants explaining the project's goals and details, and it gave an 800 telephone number for more information. Residents also received a flyer that specified the types of materials to be placed in the compost bag. Some residents called their local hauler or

town hall for information on the project, so the municipal waste managers were briefed to handle additional questions. When the kitchen bins and the compost bags were delivered to the homes, an envelope full of additional information was provided to the participants. The packet emphasized what materials could be placed in the compost bag.

Postcard updates were sent out before the start of collection to remind residents of their first compostable waste pick-up and to offer extra bins and garbage cans. Coverage of the project by local newspapers, radio and cable television stations before and during the project boosted understanding and support.

Following the success of the Fairfield project, the National Audubon Society formed a partnership with the Food Marketing Institute and the Grocery Manufacturers of America to promote solid waste composting. The ultimate goal of the program, called "Compost...For Earth's Sake," is to show source-separated composting can be cost effective and environmentally conscientious.

This year, Compost...For Earth's Sake will focus on Santa Barbara County, Calif., which, like other counties in California, must meet a 50 percent solid waste landfill diversion rate by 2000. The Santa Barbara project will help evaluate cost effective collection methods.

About 1,400 households in Santa Barbara County began separating compostable materials from their trash in April for pick-up by the county. The wastes are taken to a composting plant that uses the same technology as the Fairfield project.

For all of these projects, the final composted product can be used as compost or humus, a soil additive that improves the condition of earth for home gardening, landscaping or agricultural purposes.

"We already know that source-separated composting can play a major role in solving America's solid waste problem, but some key questions remain," said Audubon scientist Jan Beyea. Among those questions are:

- What are the real costs of composting when you factor in pick-up, supplies and transport costs?
- What end markets exist for humus?
- What is the most economical way to add composting to already existing recycling programs?

Compost...For Earth's Sake, and these other projects in the United States and Canada, will continue trying to answer those questions. ■

Sue Darcey is the resource recovery editor of World Wastes.