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Collecting recycling

Establishing a program to collect and process recyclables is not enough. Each step of the process must be well planned for a single-stream collection program to achieve optimal results.

by Susan Kinsella and Richard Gertman

When you ask people what recycling means to them, you most often hear: "I save my bottles and cans for recycling!" and "I put my newspapers out to be collected at the curb!"

Collection is the most visible part of the recycling cycle to the public, as well as to most community recycling program staff. This is why people tend to believe that collection is the definition of recycling – when it is actually only one part of it. Most people seem unaware of the rest of the system, or of the fact that recycling does not actually "happen" until the collected materials are made into new products at a manufacturing facility.

With new single-stream recycling programs being initiated by the collection industry to increase the operational efficiencies and increase diversion rates, all of the recyclables are being collected together in one compartment on a truck.

In order to make this collection system work well, all of the participants – local government, the collection company management and the company's drivers – must agree on what is expected of each of them. Cooperation is the key to optimizing the collection of clean recyclables, and includes determining:

- How will the recycling collection program's design impact the garbage collection system?
- What is its impact on other collection system elements, such as collection of yard debris or other compostables?
- How will these collection program elements affect the processing system for the recovered materials?

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Local governments must specify, as completely as possible, the standards the collection companies and route drivers must meet. If the government manages its own collection, then its standards should be spelled out for all managers and drivers. Recycling managers should think their programs all the way through to ensure that each step of the process supports the optimal functioning of every other step, as well as the recycling system as a whole.

Collection vehicles

An almost infinite number of design features are available for recycling collection vehicles. Should recyclables and garbage be collected in a single truck with two compartments, or should the collector use a dedicated truck for each? How often will each category be collected from residences? How will green waste and other collections be integrated into the routes and schedules, if they are offered to the community at all?

Split-body trucks are often used to reduce the number of collection vehicles traveling on residential streets; however, this may make the collection system less efficient. Some problems that may result when recyclables and garbage are collected in a single truck include:

- Recyclables may become contaminated by garbage during the loading process, plus recyclables may end up in the garbage compartment.
- The compartments may fill up at different rates, requiring that the driver leave the route before it is finished to unload the full compartment. Making an extra trip to unload may add considerable time onto the work day, plus the driver may be reluctant to return early and, instead, may mix the materials.
- Garbage and recyclables are sometimes unloaded at geographically separated locations, requiring the collection vehicle to make an additional trip after unloading the first compartment.

Best practices in collection systems favor collecting each separate category of materials (recyclables, refuse and yard debris) in separate trucks. When loading a truck dedicated to only one type of collection category, the driver does not have to make decisions regarding the operation of valves and levers that might contaminate one material type with another in a dual-compartment truck. Plus, separate trucks also avoid spillage of one material type into the other compartment, which happens even in the best-engineered vehicles. Single-compartment vehicles also eliminate the possibility of one compartment filling up before the other compartment, as the truck only has one compartment, and, at the end of the route, the driver only has to unload the truck at one location.

If more than one load of recyclables will be collected each day, the driver should return to the processing facility and unload the truck after completing not more than 60 percent of the total route area. This will reduce the compaction of the load, allowing the materials to be processed into higher-quality commodities. It also reduces fuel consumption and wear on the truck, thus reducing maintenance costs.

If split-body trucks are used, then managers should calculate the relative proportions of the materials being collected and loaded into each compartment, before the trucks are ordered. This way, each compartment will reach capacity at about the same time.

Automation

One of the most important features of single-stream collection is the opportunity to automate the process. Many argue that most of the benefits claimed for single-stream systems actually result more from automation than from commingling recyclable materials. A number of advantages are credited to automated collection:

- Both semi-automated and fully-automated collection systems reduce worker injuries from lifting accidents, which also reduces medical costs, worker compensation claims and lost work days.
- Fully-automated systems allow service to a larger number of households, since the driver does not lose time exiting the truck and connecting the cart to the dumping mechanism.
- Lidded carts keep paper dry on rainy days and reduce litter from materials blowing out of the container on windy days.
- The use of large carts in automated systems allow residents to save more materials before setting the cart curbside for collection. Collecting more materials from fewer stops increases efficiency.
- A wider pool of drivers is available, because operating a fully-automated truck does not require heavy lifting.
- With both semi-automated and fully-automated collection, recycling rollcarts can be larger and are usually on wheels, encouraging residents to separate more materials for recovery and making it easier for residents to get them to the curb.

Over the typical eight- to 10-year life of a collection contract, the operational benefits and related cost savings from automation can easily exceed the costs to purchase new carts and collection vehicles. Additionally, while labor expenses are on-going costs of operating the system and will increase through the term of the contract, equipment purchases are depreciated at a fixed rate through the term of the contract.

Not all single-stream programs find automation appealing for a number of reasons, including:

- In densely-populated neighborhoods, 96-gallon rollcarts may be too large for many households to store (although, a smaller, 32-gallon cart may be sufficient).
- Localities that experience heavy snow may find curbs to line up carts for automated collection unavailable during several months of the year, and carts left out overnight might be buried in snow.
- Wheeled carts may not be stable in hilly terrains, and narrow streets will not provide room to collect them.

Some potential drawbacks to 96-gallon wheeled carts should be addressed in designing collection programs, such as:

- When residents pay for all waste management services on the basis of how much garbage they put out (often known as pay-as-you-throw or PAYT) and the recycling carts are much larger than the garbage carts, excess garbage may be dumped into the recycling carts.
- The wheeled carts are much larger than the recycling bins in a traditional source-separated program, thus some homes may have difficulty finding storage space for them or fitting them through backyard gates. The 96-gallon carts are not the only option, though, as smaller, 32-

Best practices in single-stream recycling

The Single Stream Recycling Best Practices Manual and Implementation Guide, developed by Conservatree and Environmental Planning Consultants, can be downloaded at www.conservatree.org. The manual highlights many ways to rethink recycling operations, focus on more targeted goals and adapt innovations in ways that benefit the whole system, not just discrete parts of it.

To develop these recommendations, Conservatree and EPC interviewed, visited and received feedback from hundreds of North American participants in all sectors of the recycling system, from collection and processing to manufacturing and recycled product purchasing. The manual focuses on single-stream programs because that is where the greatest discrepancies currently appear. However, because single-stream programs are not suitable for every community, the recommendations also are intended to benefit the many other types of recycling programs that exist as well, including dual-stream and multi-stream programs.

gallon carts can also be automated and take up space similar to a three-bin stack.

Single-stream collection only requires one recycling container, but the container must be large enough to hold all of the materials a resident might generate between collection intervals. Selecting the appropriate container size for a particular neighborhood requires balancing efficiency against space considerations. The larger the container, the more material it will hold and the fewer pick-ups that will be required. The collection system is more efficient when the driver can stop fewer times to collect the same amount of material.

Contamination issues

Automation can affect contamination levels in the recyclables. In a manual or semi-automated collection system, the driver sees the materials before loading them into the truck. To prevent contamination, these types of programs should require that drivers reject contaminated materials and leave a "non-collection notice" explaining why the materials were not collected.

In a fully-automated collection system, however, the driver does not inspect the load. This type of program should require that collection vehicles have a mirror or camera mounted above the hopper, or a closed-circuit camera installed above the hopper with a monitor in the cab. The driver could then observe the material as it is loaded into the vehicle, and either leave a "notice of incorrect set-out" attached to the cart when a contaminated load is spotted, or log the infraction on a reporting sheet for a route supervisor.

Alternately, the route supervisor can stop at locations where recyclables are regularly contaminated and, before the collector arrives, they can tag the problem carts, so the driver will see the tag and not collect the cart. In Chula Vista, California, for example, the cart contents are inspected by the "Recycling Rangers" instead of route supervisors. Residents are congratulated for doing a good job, while others are encouraged to do better.

No matter what the collection system, the collector should identify repeat offenders, so that route supervisors can check the bins or carts at any locations tagged more than once in the prior three months. Identification might include a route log of the problem location or a copy of the notice attached to a cart. Drivers should turn in copies of non-collection notices or notices of improper set-out.

If on-going problems with contaminated loads occur, then a route supervisor should be stationed at the processing facility to observe the trucks being unloaded, and discuss the reasons for the problems with the driver.

Driver responsibilities

The collection vehicle driver plays an essential role in keeping the collected materials contaminant-free. Collection program design usually focuses on the contractor or, if the municipal government does its own collection, the design of routes and choice of carts. Often overlooked, but critical to the success of the collection program, is driver training and incentives for high-quality performance.

For collection programs to get the best results from drivers, performance must be an important condition of continued employment. Therefore, from the very beginning, managers must identify those activities that are most important and then build them into worker training.

When a new contract begins, or when new employees are hired, the program operators should provide all employees with detailed expectations related to keeping the recovered material free of contaminants, thus maximizing recovery of recyclables. Program operators should stress the need to deliver clean materials to the processing facility, so that high-quality materials can be shipped to market. Providing drivers with information about how the recovered materials will be used may help, as they will better understand the problems contamination can create.

Training should include how the collection route should be managed and the need to avoid overloading the vehicle. In most communities, haulers collect more than one load per day to complete their route. To minimize the damage done to the recyclables by compaction, drivers should bring in the first load after 60 percent of the route is completed – a point that should be indicated on the driver's route map, not left up to the driver's discretion. This technique can also be used to time the drop-offs at the processing facility, so collection vehicles do not backup while waiting to unload.

Communication

Each part of the recycling cycle must include a feedback loop:

- Recycling program managers should communicate with residents about what materials to save and how to prepare them, how they are performing overall and what the recycling program is achieving.
- Drivers should communicate with residents on their route about the quality (good or bad) of individual set-outs.
- Route supervisors should communicate with drivers regarding the quality of the collected recyclables.
- Processors should communicate with drivers, route supervisors and the collection program managers about the quality of collected materials delivered to the material recovery facility (MRF).
- Processors also should discuss the quality of their recovered materials with the manufacturers buying them. Both the processors and the manufacturers should report on shipped materials' quality to the community recycling program manager.

Impact of collection on processing

Communities must ensure that feedback from the processor is given to the hauler regarding material quality. This may require that the processor inspect loads at the MRF as they are unloaded.

If on-going problems arise, then the collection program manager should station a supervisor at the processing facility to examine loads and talk to the haulers about the quality of the materials coming out of their trucks. It may even be appropriate for the processor to sample some loads, sorting and weighing the component parts to determine the actual contamination.

The processor should provide feedback on the rate of three different types of contamination:

- Non-targeted materials that could be recycled, but are not part of the current collection program. These materials may cause problems for the processor, whose facility may not be designed to manage them.
- Materials that cannot be recycled and should not have been collected, such as garbage.
- Materials that are recognized as recyclables, but are contaminated during collection. For example, liquids left in food and beverage containers could degrade the quality of the recovered paper.

Commercial collections

In some communities, commercial recyclables are collected in the same truck as residential recyclable materials, even though the types of materials may be very different. Offices, for example, will have more white paper and less newspaper than a residence. If the white paper is not separated from the residential mixed paper, then this high-value material may be lost to the white paper market, decreasing the ability of paper manufacturers to provide recycled content in printing and office papers, and tissue products.

If old corrugated cardboard from retail stores is collected and mixed with paper from a residential, single-stream program, separating the boxes from the other paper may be more difficult for the processor. A collection truck with restaurants and bars on its route may pick up heavy loads of glass bottles that can be most efficiently processed if they are not mixed in with residential loads.

Commercial recycling programs usually

concentrate on specific types of materials from specific types of businesses. In order to produce quality materials at the MRF that are appropriate for use in products that can be repeatedly recycled, the commercial and residential recyclables should be collected separately.

Putting it together

Most of the economic savings from single-stream programs are concentrated in the collection part of the recycling system. However, because commingled collection requires more sophisticated processing, a significant portion of those collection savings must be invested in the MRF to ensure that high-quality materials continue to be available for recycled product manufacturing.

Clearly specifying responsibilities in detail and setting up feedback loops will help collection programs deliver recyclables that allow the processing facility to produce the high-quality materials that support a healthy recycling system. **RR**

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