

Issue Paper #10

Single-Stream Recycling Collection Methods

Bins vs. Carts

10.1 Overview

Broome County (County) has a single-stream recycling program in which all recyclable materials (residential and commercial) are commingled together in preparation for collection. The County has a contract with Waste Management (WM) Recycle America for processing single-stream recyclable materials, however, haulers and municipalities are not mandated to use this materials recovery facility (MRF). Some private haulers continue to collect recyclable materials using the dual-stream method in which fiber (newspaper, cardboard, office paper, magazines, etc.) and containers (plastic, glass, aluminum and tin) are separated into two streams. The materials are then delivered to a dual-stream MRF rather than WM Recycle America's MRF.

Currently there are five recyclable materials processors in the region:

1. WM Recycle America in Binghamton, NY. This facility accepts recyclable materials commingled (single-stream) and transfers the materials to its materials recovery facility (MRF) in Liverpool, NY where the loads are sorted, processed and marketed.
2. Broome Recycling, Inc. in Binghamton, NY. This facility is owned and operated by Bert Adams Disposal and Taylor Garbage Service. The facility accepts recyclable materials in two streams (fiber and containers) and processes/markets the material at its Binghamton location.
3. A&W Recycling in Chenango Bridge, NY. This facility accepts materials in two streams (fiber and containers) and processes/markets the material at its Chenango Bridge location.
4. Taylor Garbage & Recycling in Owego, NY (Tioga County). This facility accepts recyclable materials in two streams (fiber and containers) and processes/markets the material at its Owego location.
5. Empire Recycling Corporation in Johnson City. This facility is a branch of Empire Recycling's main facility in Utica. They accept scrap paper and shredded paper, exclusively from commercial accounts. The materials are baled and marketed to end users from the Johnson City location.

The residential recyclable materials collected in the County are delivered to either WM Recycle America, Broome Recycling, Inc. or A&W Recycling. Commercial recyclables are taken to any of the five facilities.

From the Recyclable Materials Characterization Study completed in December of 2008 by R. W. Beck, it was determined that approximately 65 percent of the curbside recyclable materials collected in Broome County is delivered to WM Recycle America's transfer station in Binghamton, and an estimated 35 percent is delivered to Broome Recycling and A&W Recycling facilities combined. (Taylor and Empire did not report any recycling tonnages to the County in 2007.)

The focus of this issue paper is the collection method of recyclable materials and the potential to increase diversion. The County is interested in the possible use of lidded, wheeled carts (carts) for residential recyclable materials collection County-wide, and the potential impact this policy change would have on the recyclable materials stream and on the haulers who collect recyclable materials. This paper will address the potential benefits and drawbacks of using carts for recycling collection throughout the County.

10.2 Collection Options

Since approximately 1992 the County has been providing curbside recycling bins to municipalities and private haulers at no charge. Each year the County purchases the bins and receives a 50 percent reimbursement of the cost through the New York State Department of Environmental Conservation's (NYSDEC) Municipal Waste Reduction and Recycling (MWR&R) program.¹ In recent years the County has purchased between 8,000 and 10,000 18-gallon bins annually. The reason for ordering such a high number of bins is due to the number of requests for replacement bins. Because there are many college students living in the County, it seems that bins tend to "disappear" each year.

All of the haulers in the County currently collect residential recyclable materials using the curbside bins. Commercial recycling is collected using a variety of collection methods including dumpsters, wheeled carts and some of the smaller businesses use the 18-gallon curbside bins.

This issue paper will focus on the collection of *residential* recyclable materials. There are three methods typically used for the collection of residential recyclable materials:

- **Manual, using curbside bins** - Collection drivers and/or laborers manually empty the curbside bins, typically into a rear-load or side-load collection vehicle. This method works for both single-stream and dual-stream collection.
- **Semi-automated, using carts** - Collection drivers and/or laborers manually wheel the carts to a collection vehicle that has been fitted with lifters or cart tippers. The tipper automatically empties the contents of the cart into the collection vehicle. This method is typically used for single-stream collection, however some municipalities and haulers offer dual-stream recycling collection

¹ Source: NYSDEC website. <http://www.dec.ny.gov/pubs/4776.html>

(or dual-commodity collection for garbage/recyclables or organics/recyclables) using split carts and split-body collection vehicles. See Section 10.9 - Resources for examples.

- **Fully-automated, using carts** - Collection drivers use a vehicle with an automated arm to empty the carts, without having to exit the cab of the collection vehicle. This method is typically used for single-stream collection.

Another automated or semi-automated option that has been implemented in some communities is to provide residents with two carts and offer fiber collection one week and containers the following week.

The County is interested in using carts for collection to not only increase diversion, but also to reduce the number of curbside bins required to be purchased each year. A brief overview of wheeled carts is provided below.

10.2.1 Carts

Carts are a very important component of an automated or semi-automated collection system. Once carts are purchased and distributed, it is extremely difficult and costly to re-think the decision, so choosing the right cart from the start is crucial to customer satisfaction and system effectiveness.

10.2.1.1 Cart Construction

There are three ways in which plastic carts for automated or semi-automated collection are constructed: Blow molding, injection molding, and rotational molding. Blow molding was the initial technology utilized for constructing carts, rotational molding followed, and the latest technology is injection molding. Carts are made of linear high-density polyethylene (HDPE), crosslinked HDPE (which is stronger than linear HDPE but can not be recycled), or medium-density polyethylene (MDPE), which is more flexible than HDPE but may be weaker. There are advantages and disadvantages to each of these processes, which are outlined in Table 10-1.

**Table 10-1
Cart Construction - Advantages and Disadvantages**

	Blow Molded	Rotationally Molded	Injection Molded
Advantages	<ul style="list-style-type: none"> ▪ Strong and tough ▪ Can use recycled content, including HDPE from curbside collection programs ▪ Can be recycled at end of life ▪ Least costly method 	<ul style="list-style-type: none"> ▪ Produces a zero stress product ▪ Smooth textured surface with no weld lines ▪ More material deposited in bottom corners – helps protect cart from wear ▪ Can use a wide variety of tough plastic materials –e.g. MDPE, which is more flexible than HDPE, and cross-linked HDPE, one of the highest quality resin on the market ▪ Can use recycled materials ▪ Linear HDPE and MDPE can be recycled at end of life ▪ Results in round-shaped containers, which work well with automated arms. ▪ Exterior of containers has textured surface to prevent slippage 	<ul style="list-style-type: none"> ▪ Allows for complicated designs ▪ Consistent wall thickness ▪ Consistent weight ▪ More reinforcement can be built into cart where needed ▪ Features can be molded-in, less hardware needed, less need to drill holes and “stress” the container ▪ HDPE can be recycled at end of life ▪ Can vary wall thickness strategically throughout the same part
Disadvantages	<ul style="list-style-type: none"> ▪ Have to drill holes to add hardware – introducing potential areas of weakness 	<ul style="list-style-type: none"> ▪ Crosslinked HDPE can not be recycled ▪ Wall thickness is inconsistent ▪ More difficult to incorporate molded- in features ▪ Slower production process than other methods – generally results in a more expensive product ▪ Thinner walls generally result in a lighter cart with less wind resistance 	<ul style="list-style-type: none"> ▪ Have a weak area at sprue, where plastic flows into mold ▪ Material is more rigid, less flexible than rotationally molded ▪ Exterior surface is more “slick” – more prone to slippage with automated arms ▪ Have “molded-in stress” from high-pressure process

Carts are designed and tested for use in all climates and are designed to resist cracking, especially in cold temperatures. Per one cart representative, the blow-molding process produces a product that offers the best stress crack resistance of any molding process, especially in an outdoor environment of temperature extremes. However, vendors of both rotationally molded and injection molded carts also claimed those carts perform very well in colder climates. Two cities that experience extremely

cold temperatures in the winter - Bismarck, North Dakota and Akron, Ohio – both utilize rotationally molded carts.²

There are several major companies that produce carts for automated or semi-automated collection. A list of potential vendors is included in Appendix A.

10.2.1.2 Cart Warranties

Most of the major cart manufacturing companies offer 10-year, non-prorated full replacement warranties. Most manufacturers, therefore, will replace or repair a cart if it cracks or breaks from normal use. No cart manufacturer will replace or repair a cart if it fails due to abuse or misuse. It is important to clarify the warranty with the cart vendor during the procurement process. It is also important to read the “fine print” in the warranties. Although nearly all manufacturers claim to have a 10-year non-prorated full replacement warranty, some of the warranties may be worded to provide the company with a “loophole” for claims.

10.2.1.3 Cart Maintenance Programs

Many of the major cart manufacturers offer cart maintenance programs. Typically this service is outsourced to a third party. Rates for this service are generally based on a monthly per-cart fee.

10.2.1.4 Using Carts on Rural Recycling Routes

Servicing rural households can be a challenge for haulers collecting recyclable materials (as well as refuse). Rural collection issues typically include:

- Low-density housing, which can result in long distances between stops and lengthens the time spent on the route;
- Long distances to processing facilities;
- Material generation may be low, resulting in inefficiencies and decreased economies of scale;
- Logistical problems for residents in getting materials to the road, especially if they have long driveways; and
- Uneven terrain for container/cart placement.

Despite the challenges, some communities have been successful in implementing curbside recycling using wheeled carts in rural areas.

In 2008 Rice County, Minnesota³ switched from source-separated recycling collection to single-stream recycling using carts. The county spent \$800,000 to provide a 65-gallon wheeled recycling cart to every household in the county, including those in the rural areas. The largest complaint the county received was from rural residents who did not subscribe or contract for refuse collection but wanted a recycling cart. The

² Source: “Of Warranties, Service, and Resins,” MSW Management, May-June 2007.
<http://www.mswmanagement.com/may-june-2007/warranties-service-resins.aspx>

³ 2008 Population estimate: 62,390; number of owner-occupied housing units: 16,800.

county made it mandatory that a household subscribe for garbage collection in order to receive a recycling cart. (An additional benefit to residents signing up for refuse and recycling collection is the potential to decrease the amount of backyard burning of refuse.) The county reported that the residential recycling tonnage increased from 2,200 tons per year to 5,500 tons per year after the cart-based collection program was implemented.

Frederick County, Maryland switched to single-stream recycling using carts in March of 2009. To address some rural collection issues, the county offered suggestions on its website:

“Residents living in rural areas or on sloping sites are encouraged to use their carts in a manner that will prevent recyclable materials from becoming litter in the landscape. Try not to overfill the cart as doing so keeps the lid from closing all the way; excess recyclables may be placed next to the cart in another open container and larger carts are available upon request. The cart should be set on a hard level surface if possible. A brick or stone may be used to weight the lid.”⁴

For residents with long driveways, getting the carts to the road can be a challenge. The Regional District of Central Okanagan in British Columbia, Canada allows residents to permanently keep their carts where their driveway meets the road and deliver their garbage, recycling and yard waste to the carts on collection day.⁵

In 2007, the Warren County (Ohio) Solid Waste Management District was awarded a grant of \$100,000 from the Ohio Department of Natural Resources (DNR) to purchase curbside recycling carts for use in targeted rural areas. CSI Waste Services of Cincinnati provided a match of \$116,000 which resulted in 3,000 65-gallon carts to be purchased for approximately \$72 each. The recycling rate before the pilot began was estimated to be 6.6 percent and after the pilot program it had increased to over 30 percent, based on tons recycled.

Recycling service in rural Warren County is subscription-based and CSI Waste Services gained more customers when the cart-based service became available. Eventually the other haulers began offering the same level of service in an effort to compete, which may have resulted in increased tonnages of recycling to be collected.⁶

In order to maximize payloads, most rural recycling is collected every-other-week, rather than weekly.

⁴ Source: Frederick County, MD website: <http://www.co.frederick.md.us/index.aspx?NID=3574>

⁵ Source: Regional District of Central Okanagan website: <http://www.regionaldistrict.com/docs/waste/AutomatedPgm/Information%20for%20Rural%20Resident%20s.pdf>

⁶ Source: Telephone conversations with Warren County Solid Waste Management District staff; Ohio DNR staff; and CSI Waste Services staff.

10.3 Diversion Potential

Typically when municipalities switch from curbside bins to carts for recyclable materials collection, it is in conjunction with a change in set-out methods from dual-stream to single-stream recycling. Because the County already adopted single-stream recycling in 2002, it is difficult to predict how the use of carts would impact the quantities of residential materials collected. Because the capacity of the carts (typically 65 or 95-gallon) is larger than the County's current 18-gallon bin, it is likely the volumes of material set out for collection would increase. It is not uncommon for residents to place recyclable materials in with their garbage if their recycling bin is full. The larger capacity carts may alleviate this problem. In addition, many consider the wheeled carts to be more convenient to use so there is the potential for some non-recyclers to begin recycling or for inconsistent recyclers to start recycling on a regular basis.

While the quantities of recyclable materials may increase with the use of wheeled carts, there is also the potential for an increase in contamination of "non-targeted" materials (items that are defined by the County as not acceptable) to be placed in the carts. Some residents may place garbage in their recycling cart if their trash container is full or as a way to avoid purchasing specially-marked bags, such as those required for garbage collection in the City of Binghamton.

In the case studies provided below in Section 10.4, two pilot programs are highlighted in which curbside bins were replaced with carts. Both studies resulted in increased tonnages of recyclable materials. Clark County, Washington's tons increased an average of 29 percent for weekly and 16 percent for every-other-week collection. The City of Roseville, Minnesota noticed a 28 to 32 percent increase in tons collected from households on routes with cart collection. It should be noted that in these two examples, the collection container (cart) and the collection method (single-stream) were both new to residents, whereas in Broome County, the commingling of the recyclables would not be new to the residents, so the results may not be as significant.

10.4 Case Studies

For this issue paper, two pilot studies are referenced - Roseville, Minnesota and Clark County, Washington.

10.4.1 City of Roseville, Minnesota

With assistance from R. W. Beck, the City of Roseville, Minnesota⁷ conducted a pilot study in 2004 to help refine its curbside recycling program to capture more recyclable materials. The pilot study analyzed the impacts that various collection methods have on the quantity and quality of residential recyclable materials collected curbside, as well as impacts on customer participation. At the time of the pilot study, the City of Roseville had dual-stream recycling collection, using 18-

⁷ The City of Roseville is an inner ring suburb of St. Paul with a population of about 34,000.

gallon curbside bins, collected every other week. The city conducted five pilot routes, two of which utilized single-stream collection using 64-gallon wheeled carts. (The two routes differed in demographics; one route was a newer area, considered more affluent.) The other pilot routes were variations on the city's dual-stream collection program and included increased frequency (from every-other-week to weekly); additional education; and larger bin capacity (from 18 to 22-gallon bins).

The pilot program studied several performance measures including material composition, tonnages of material collected, set-out and participation rates, and customer attitudes.

Although Broome County's situation is different because the County has already implemented single-stream recycling, the Roseville study is referenced here to illustrate that the County may encounter 1) increased quantities collected; 2) increased contamination or quantities of "non-targeted" materials; and 3) increased participation.

10.4.2 Clark County, Washington

Clark County, Washington was interested in boosting recycling tonnages and participation in the County's recycling program. Some cities had shown interest in moving to a cart-based system in an effort to reduce litter caused by windy conditions and open curbside recycling bins. The County's contract for transfer and disposal provided an opportunity to upgrade the current processing system to accommodate a change in the collection method.

At the time of the pilot study, recyclable materials were collected weekly using three stackable curbside bins. The recyclable materials were to be sorted into three material groups: 1) containers (plastic, glass, aluminum and tin)⁸; 2) newspapers; and 3) mixed paper. The pilot study consisted of eight routes: five routes with 65-gallon carts collected weekly and three routes with 95-gallon carts collected every-other-week. The residents were asked to place glass in a separate bin and all other recyclable materials in the wheeled cart.

10.4.3 Quantities Collected

In the Roseville study, the net pounds collected (not including non-targeted materials) per household on the single-stream (SS) routes increased an average of 7 to 8 pounds (28 to 32 percent) when compared to quantities collected before the pilot study, as shown in Table 10-2.

⁸ It should be noted that Washington does not have a "bottle bill" or legislation similar to New York's Returnable Container Act, so the quantities and types of recyclable containers collected at the curb in Clark County would most likely be different than the quantities and types collected in Broome County.

Table 10-2
Comparison of Net¹ Pounds per HH Collected Per Route *Before* and *During* the Pilot
City of Roseville, MN

	Routes “Before” Pilot – All Dual-Stream			Routes “During” Pilot			Statistically Significant Difference
	Net Average (without non-targeted materials) ²			Net Average (without non-targeted materials) ²			
	Mean (Avg. Lbs Collected per HH per Route)	Lower Range	Upper Range	Mean (Avg. Lbs Collected per HH per Route)	Lower Range	Upper Range	
Mon. – Primary SS	21.33	19.70	22.96	28.16	25.83	30.49	✓
Mon. – Contrast SS	26.87	25.72	28.03	34.39	32.19	36.59	✓
Wed. – Addt'l Educ	21.73	15.84	27.63	25.30	22.62	27.99	
Thurs. – Larger Bins	20.03	17.82	22.23	26.87	23.29	30.46	✓
Fri. – Control	24.14	19.19	29.10	26.86	20.60	33.11	

¹ Average total pounds after non-targeted materials were subtracted.

² The range was calculated by subtracting the difference in pounds collected with and without non-targeted materials from the gross pounds collected per household.

In Clark County, the quantity of recyclable materials collected from the pilot routes with the 65-gallon carts collected weekly increased an average of 29.2 percent compared to the baseline average (before the pilot study). The quantity of materials collected from the routes with the 95-gallon carts collected every-other-week increased an average of 16.2 percent.

10.4.4 Non-Targeted Materials Collected

In the City of Roseville’s pilot study, the average quantity of non-targeted materials collected during the single-stream pilot routes was higher than during the dual-stream pilot routes (8.5 percent versus 3.4 percent of the total tons collected), as shown in Table 10-3.

Table 10-3
Comparison of Material Compositions by Weight¹
Single-Stream and Dual-Stream Routes
City of Roseville, MN²

Material Category	Average Weight (Pounds)	
	September & October 2004	
	Single-Stream (Monday)	Dual-Stream (Wed – Friday) ³
Paper	9,246	5,652
Metals	309	655
Glass	654	1,838
Plastic	647	916
Non-targeted Materials	1,013	315
Total	11,867	9,375

¹ The weights were estimated by applying the median percentages from the sorting events to the average of the pilot route truck tonnages.

² It should be noted that Minnesota does not have a “bottle bill” or legislation similar to New York’s Returnable Container Act, so the quantities of recyclable containers collected at the curb in Roseville are most likely higher than what would be collected in Broome County.

³ The weights from Tuesday’s routes were excluded from the comparison because they represent weekly collection, whereas the Wednesday, Thursday and Friday routes provided more comparable data as they were collected bi-weekly.

In the pilot program conducted for Clark County, Washington, contamination was observed in over 38 percent of the carts and in 15 percent of the glass bins. The contaminants that were found most frequently were plastic film (including plastic bags), found in almost 19 percent of the setouts. When comparing contamination quantities of Clark County’s baseline program and the pilot routes, contamination rose from 1.6 to 2.9 pounds per household per month. However, the total contamination by weight (4 percent) was not considered significant.

In the City of Portland, Oregon, the quantities of contaminants increased when carts were distributed in 2008.⁹

10.4.5 Participation Rates

The results of the participation data collected by the City of Roseville for the bi-weekly pilot routes are shown in Table 10-4. Participation was defined as a household that set out recyclable materials at least once during the six collection events during the term of the pilot study.

⁹ Source: The Oregonian – OregonLive.com website.
http://www.oregonlive.com/news/index.ssf/2008/10/portlands_new_recycling_bins_g.html

Table 10-4
Comparison of Participation Rates Before and During the Pilot
(Bi-Weekly Routes)
City of Roseville, MN

	Primary Single- Stream	Contrast Single- Stream	Add'l Education	Larger Bin Capacity	Control
Participation Before	85.3%	91.8%	79.6%	78.5%	85.8%
Participation During	94.3%	96.7%	89.5%	93.3%	89.3%
Percentage Change	9.0%	4.9%	9.9%	14.8%	3.5%

All routes had increases in participation, including the single-stream routes with carts (9 percent and 5 percent), however the pilot route with the largest increase in participation was the Larger Bin Capacity route (14.8 percent).

In Clark County, two routes were observed for participation. On an every-other-week route, participation decreased by 2.5 percent compared to a 3 percent increase in participation on a weekly route. The volumes collected on both routes increased (4.6 percent on the every-other-week route and 28.6 percent on the weekly route).

10.4.6 Pilot Study Results

The City of Roseville chose to stay with dual-stream recycling. Although the recommendation was to switch to larger curbside bins, the City stayed with 18-gallon bins due to cost issues. The results of Roseville’s pilot study are included in Appendix B of this paper.

In April 2009, Clark County converted to a cart-based recycling collection system with a separate bin for glass. The link to Clark County’s pilot program final report is provided in Section 10.9 - Resources.

10.5 Capital and Operating Expenses

If the County were to convert to wheeled carts for single-stream recycling collection, the largest expense would be the purchase of the wheeled carts. Carts are a significant financial investment. At an average price of \$55 to \$60 per cart, the investment required for Broome County could be between \$2.9 and \$3.2 million for an estimated 54,000¹⁰ carts. Usually the cost is amortized over the life of the carts which can range anywhere from 10 to 20 years. A portion of the carts may be eligible for fifty percent reimbursement through the NYSDEC’s Municipal Waste Reduction and Recycling

¹⁰ Number of owner-occupied housing units in Broome County per the U.S. Census Bureau, 2005-2007 estimate.

program. Some municipalities place a recycling fee on the residents' property tax statement to offset a portion of the expenses related to the recycling program.

Some cart manufacturers will lease carts. Typically the lease fee is in the \$0.72 - \$1.75 per cart per month range, based on a five-year lease and may include a maintenance program. The lower end of the range includes no assembly or maintenance. The upper end of the range includes assembly and maintenance programs. Some municipalities have found this to be a more cost-effective means of procuring and maintaining their carts. Another option may be for the County to lease carts from WM Recycle America.

The County would also incur operating expenses related to staff time to plan the conversion, procure the carts, draft and distribute public education/instructions, etc. The cost to deliver the carts to residents could be an expense of the hauler or the County. In some cases, municipal or county crews deliver the carts, in other cases the hauler(s) is contracted to deliver the carts.

In addition to the County's expenses, the haulers would also incur expenses related to a switch to a cart-based recycling collection system. New collection vehicles may need to be purchased or current trucks may need to be retrofitted with cart tippers. Some of these costs may be offset by increased productivity. Automated collection typically results in less time on the road collecting recyclables. Fully-automated collection requires only one staff person per vehicle, so hauling companies may be able to reduce the amount of staff required on recycling routes, either by reducing the number of staff on a vehicle or including more households on each route, therefore potentially requiring fewer vehicles. In addition, many municipalities switch from weekly to every-other-week collection when they convert to a cart-based system for recycling, thus reducing staff and collection time even more. One financial benefit to fully-automated or semi-automated collection is the potential to reduce on-the-job injuries and workers' compensation claims. Many communities that implement automated collection report that their workers' compensation claims and insurance costs have resulted in significant cost savings.

10.6 Addressing Stakeholder Concerns

Implementing a cart-based recycling collection program would impact several sectors of Broome County. Stakeholders may include, but not be limited to, government officials, municipalities, recyclable materials haulers, and residents.

As mentioned in Section 10.7 – Implementation Requirements, the County may want to consider establishing a task force to discuss the implications of converting from bins to carts for recycling collection. The task force could address concerns raised by private haulers and municipalities that currently operate their own recycling collection programs, as these two groups would be most affected by such a conversion. The County should expect resistance from haulers to the changes required to retrofit existing collection vehicles or the need to purchase new collection vehicles in order to service the carts.

10.7 Implementation Requirements

If the County were to move forward with researching the option of using carts for single-stream collection, it may consider forming a task force to consider the implications of such a conversion. The steps required to implement cart-based recycling collection might include, but not be limited to:

- Research cart options and discuss cart design with haulers because it is imperative that their equipment works effectively with the carts.
- Determine the size cart that would be offered, and whether residents could opt to have a different sized cart, and how this would be conveyed (many communities, for example, send a post card or post a notice informing residents they can opt for a larger or smaller cart in advance; otherwise, they receive the default size).
- Determine the number of carts required and obtain quotes from several cart manufacturers. Research how carts are shipped – whether lids are already attached, whether wheels snap in place, etc. This will have an impact on assembly and distribution costs.
- Research cart maintenance options.
- Research leasing and grant/funding opportunities available to the County for procuring carts.
- Solicit feedback from haulers and municipalities that would be affected by the change.
- Consider implementing a pilot study to gather more data on the logistics and effects of a cart-based recycling collection program (possibly in the City of Binghamton where special trash bags are required for refuse collection, to see if cart-based recycling collection results in excessive increases in contamination of recyclables, as well as to see if carts result in increased participation/tonnages in recycling program).
- Determine level of effort required of County staff to implement a change to a cart-based recycling system (planning, procurement, distribution, possible maintenance, public education, customer service calls, etc.).

10.8 Benefits and Drawbacks

Implementing a cart-based collection system for recyclable materials has benefits as well as drawbacks, as outlined below.

10.8.1 Benefits

The benefits to the County and its residents may include, but not be limited to, the following:

- A potential for increased quantities of recyclable materials collected due to increased participation as well as larger container capacity.

- A potential decrease in the amount of MSW disposed at the Broome County Landfill, thus increasing the life of the Landfill.
- Improved residential neighborhood aesthetics by reducing the amount of litter caused by windy conditions (in which the recyclable materials get blown out of the curbside bins) or by animals getting into the recyclable materials.
- Increased convenience to residents.

Benefits related to changing the collection method to a fully-automated or a semi-automated system may include:

- An increase in productivity because the collection crews would be able to service more households in one day than they are able to service using the current, manual collection method. One 65 or 95-gallon cart collected every other week is generally large enough for the quantities of recyclable materials generated per household in two weeks.
- The potential to lower workers' compensation claims because workers would be doing less lifting compared to manual collection of recyclable materials.
- Reduction in fuel costs and truck emissions (and as a result, a reduction in greenhouse gas impacts), if collection frequency changed from weekly to every-other-week.
- Protection of recyclable materials from moisture, which results in improved sorting capabilities, particularly with paper.
- Potential to collect recyclable materials every-other-week, which can result in significant cost savings to the hauler(s) and potentially to the residents if the hauler passes those savings on.

10.8.2 Drawbacks

The drawbacks related to a cart-based collection system for recyclable materials may include, but not be limited to, the following

- A potential for increased quantities of contaminants or non-targeted materials to be collected with the acceptable recyclables, however education and enforcement efforts can mitigate this risk.
- Implementing a cart-based collection system may impose a financial burden on some haulers to purchase new, fully-automated collection vehicles or retrofit current vehicles with semi-automated cart tipplers. These costs are not likely to be included in the hauler's current equipment budget.
- Implementing a cart-based system may impose a financial burden on the County if the County subsidizes the program in any way (e.g., by purchasing the carts).
- Depending on the automated collection method, the number of collection staff may be reduced, resulting in lay-offs or employee displacement. If a fully-automated system (in which a mechanical arm picks up and empties the carts) is chosen, only one equipment operator may be required per truck. If a semi-

automated system (in which cart tippers are used) is put into place, two person crews would be required so one person could drive the truck while the other brings the carts to the truck to be emptied. When converting to automated collection, many hauling companies and municipalities are able to reduce staff through attrition or by transferring staff to other departments.

- Some residents may resist the use of carts, citing lack of space to store the cart.

10.9 Resources

Provided below is a list of program information supporting R. W. Beck's analysis which may assist the County.

- Town of Cary, North Carolina
<http://www.townofcary.org/news/news2009/curbsiderecycling.htm>
- Clark County, Washington - Curbside Recycling Pilot Program
<http://www.cityofvancouver.us/solidwaste.asp?menuid=10465&submenuID=10531&itemID=62148>
- City of Gaithersburg, Maryland
http://www.gaithersburgmd.gov/poi/default.asp?POI_ID=309&TOC=307;309;&id=3915
- Village of Howard, Wisconsin
<http://jasmith17.wordpress.com/2009/06/07/single-stream-recycling-new-bins/>
- Saint Louis County, Missouri – Guidelines for New Recycling Carts
<http://www.stlouisco.com/doh/waste/Get%20Rolling%20Recycling%20Cart%20Welcome%20Booklet.pdf>

Split Carts and Trucks

- City of Davis, California
<http://cityofdavis.org/pw/recycle/garbage.cfm>
- City of San Jose, California
<http://www.sjrecycles.org/residents/truck.asp>
- Split-body trucks for organics collection
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