



Alternative Glass Collection Programs

Recovering clean glass from waste streams for recycling

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Background

The Clean Glass Initiative was established by Strategic Materials (“SMI”) to not only grow and promote glass recycling in geographic areas where glass recycling has been reduced or discontinued from curbside collections - or is not readily available to residents and businesses - but also to enhance the quality of collected material. Through local partnerships, and programs, SMI has created the following document to serve as a guide for successful glass collection, in cities or geographic regions where collection is economically viable for recycling.

This document is intended as a working document. New content and revisions will be made on a regular basis, as more is learned and information is shared. The purpose of this document is to serve a guidebook for the Strategic Materials team to learn from each other and to best equip potential recycling partners with a solution.

Who Partners with Strategic Materials?

Strategic Materials will work with anyone to help increase glass recycling. However, municipalities, cities, government sanitation departments, and other regulatory bodies are most commonly reaching out, looking for a solution for their region. Other involvement and partnership may come from corresponding local recycling organizations.

If MRFs approach SMI for a solution, glass typically stays in a traditional single-sort curbside collection program. With Strategic Materials' Technology Division assistance, MRFs are able to recover more glass with fewer contaminants, resulting in higher value material.

Collection Program Benefits:

- Landfill Avoidance
 - Glass is forever recyclable and never wears out. It does not belong in a landfill.
 - Glass will take thousands of years to fully degrade.
 - Extended landfill life
- Local & National Job Support
 - Employs local haulers to transport collection containers
 - Container glass and fiberglass manufacturing careers
 - Municipality jobs
 - Recycling waste materials industry employment
- Marketing Opportunity
 - Glass value and desirability increased when compared to single stream recycling.
 - Sustainable practices are valuable for local businesses and establishments. Consumers patronize “green friendly” bars, restaurants.
 - Potential for branding collection bins, which travel all around the city

Geographic Opportunity for Success

Success is critically dependent on factors – (1) transportation costs (2) quantity of glass available for collection (3) quality of collected glass.

Additionally, typical successful programs meet one or all of the following criteria:

- 1- Metro areas with a weak glass recycling infrastructure or curbside collections program (e.g. Georgia - Atlanta metro area)
- 2- Rural areas that can serve as “tuck-in” volume to existing glass collections programs & Strategic Materials processing plants, allowing for viable logistic costs. (e.g. Greenville / Spartanburg, SC to Atlanta, GA)
- 3- Development areas with targeted growth for end markets like container glass or fiberglass insulation, but will need to support with higher than traditional landed cost (e.g. West Texas, New Mexico, and Arizona)
- 4- Densely populated areas with high volumes of “waste” glass in the stream

Alternative Collection Types:

Outside of traditional curbside collection of glass, there are two main alternate types of collection Strategic Materials recommends for success rate in collecting large quantities of quality of glass:

1. Drop-off Convenience Sites (a) rural, (b) metro
2. Collections services (usually Bar & Restaurant but can extend to other locations) – urban

1a. Rural Drop-Off

Glass collection outside of the normal economical drop-off radius of 50 miles requires additional / different steps and can require the city or local businesses to pay an additional nominal fee that allows for longer distance transportation costs.

For example, Greenville-Spartanburg area of South Carolina is almost 200 miles from the nearest Strategic Materials plant (Atlanta, GA). An “aggregation site” or “collection hub” must be located to maximize the logistics effort to bring the collected material to the processor. In this example, a large capacity 18-wheel tractor with an open top dump trailer will be used to transport the glass. With the estimated value of the material to be \$20 per ton, 23 tons on the truck, and freight estimated at \$2 per mile, a small but positive cash flow can be expected.



“Aggregation sites” or a “Collection Hub” can combine drop-off boxes with concrete bunkers or just a concrete bunker collection system. Sites can be located at municipal sites such as the local landfill. Environmentally

conscious local businesses - like BMW in the Greenville-Spartanburg area - can also sponsor an aggregation site. An aggregation site must have the ability to load a truck (front-end loader), a concrete pad to avoid contamination of the collected glass, and preferably a bunker to allow the material to be stored with minimal movement.

The sum of collection costs and landfill tipping fee avoidance adds up to an immediate and marginally financially successful drop-off site program. However, when adding in the avoidance of curbside collections costs and landfill costs, drop-off programs become immensely successful from a financial standpoint.

A detailed analysis spreadsheet utilizing community variables to determine the value of this sort of program in every community is included in the Best Practices section.

Rural Drop-off Site Implementation – How to Get Started:

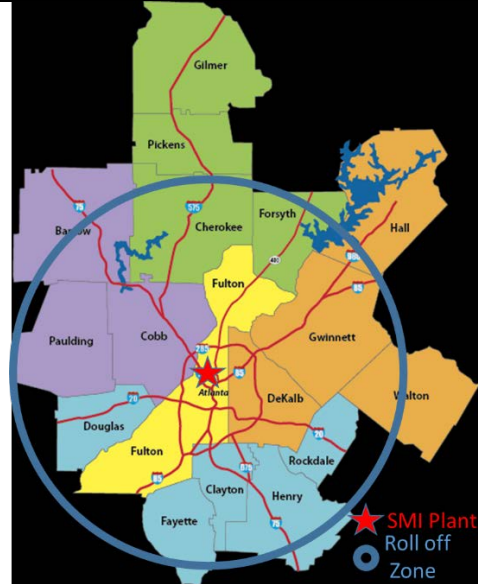
- 1- Identify population within 50 miles of drop-off site. For reference, each person statistically generates about 8 lbs. of glass per month. Is enough glass available for collection to support the logistics effort?
- 2- Locate strategic partners (municipality / business / college / other) for collection site management
- 3- Contract with processor for receipt of collected materials

After the sites are identified, bins will be designed (see Best Practices section), and placed in strategic city locations. It is critical to promote and market the bin locations to local residents and communities.

1b. Metro Drop-off

Patterned after the rural convenience sites, urban drop-off centers are

created by locating a well-marked glass collection bin (may also be referred to as a “roll-off bin”) in a highly-populated, highly-visibility area such as grocery store parking lots, city entertainment areas, thrift stores, parks, and churches. Places people routinely go.



Close proximity to a Strategic Materials plant is recommended as these bins hold only about 5 to 8 tons of glass and cost about \$150-300 to transport to processing plant which equates to \$20/ton best case freight cost to \$60/ton worst case freight cost. Although these sites are typically unmanned, having a site sponsor to police the site and to notify service provider when the box is full helps with the community acceptance and economics. Site sponsors can be the municipality or a grocery store employee. Municipalities can utilize these roll off bins in conjunction with an aggregation site to minimize the logistics costs to the processing plant. Strategic Materials will pay at our door up to \$25/ton depending on plant location, color of material, local markets, and most importantly, amount of contamination found in the drop-off material. In addition to the glass value, the community can save the cost of collection of curbside refuse and landfill disposal costs which typically exceed \$150/ton. When coupled with other attributes such as landfill life extension, energy savings, new

recycling industry jobs and increased ability to attract new industry to the community, the drop-off centers can make good economic and lifestyle sense.

Metro Drop-off Site Implementation – How to Get Started:

DeKalb County, Georgia's new drop-off program could be considered a role model or "Best Practice" of how to start a program.

Steps involved were:

1. Determine community support by surveys, town meetings and municipal services requests
2. If possible, determine glass content in current curbside collections
3. Determine probable locations for collection sites
4. Obtain community support for collection sites
5. Municipality distributed collection bins in 16 sites throughout the county
6. Public announcement and education, along with a community communications plan.
7. Municipality monitoring bins through existing Public Service employees
8. Municipality transporting bins and material to Strategic Materials plant
9. Strategic Materials provides monthly reports with material quality, monthly tonnage, number of deliveries and payments

Local Haulers

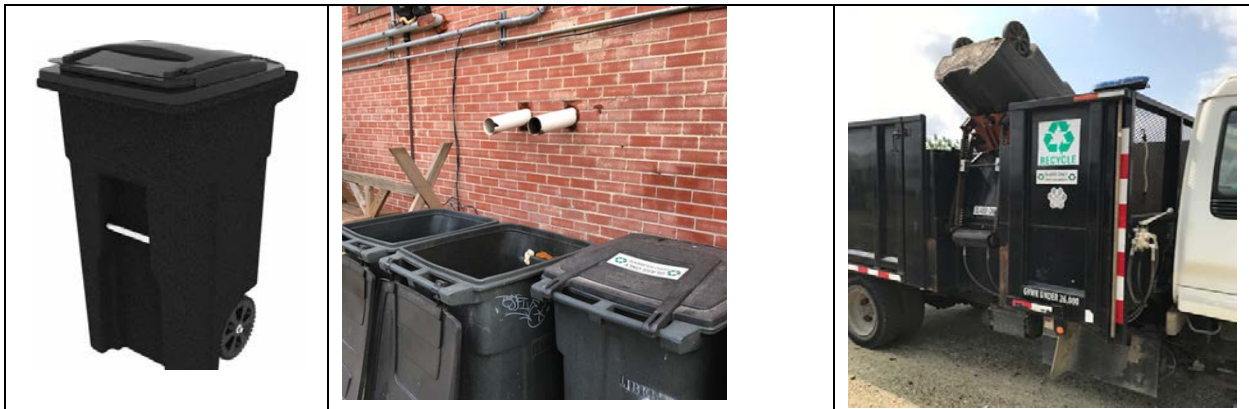
It is critical to identify municipalities and independent collectors, who are willing to partner with Strategic Materials to reduce material going to landfill. Strategic Materials will help foster their growth through availability of professional guidance, compiled industry best practices and by providing a guaranteed glass outlet for municipalities and preferred collectors.

2. Bar & Restaurant (Urban)

Strategic Materials targets municipalities with a recycling mandate for commercial businesses or where independent collectors have expressed interest to initiate or have already started a bar & restaurant collection program.

Local Haulers

Trash generated onsite is a major cost to a bar & restaurant (B&R). Municipal collectors do typically not service commercial establishments, but instead by private haulers like Waste Management, Republic Services or a local collector. B&Rs typically pay over \$200 per month to these private haulers for trash removal but costs can be significantly reduced if they start recycling their glass bottles. Strategic Materials wants to foster the growth of small businesses to contract for this service.



For example, a typical Chili's or Appleby's will use 3 roll carts, but larger bars can use considerable more - up to 12 or 15. Each cart will weigh about 200+ lbs. when full.

Getting Started as a collector:

A local collector will need a truck, 96-gallon roll carts, and an accurate collector's analysis spreadsheet to begin to solicit business from B&Rs. He should be prepared to start a routine collection schedule, typically servicing

at least once per week, and be on call for “emergency” pick-ups. Roll carts should be marked with collector’s name, phone number, what can be recycled, and can also include the Strategic Materials logo. After establishing a route, the phone number on the cart will passively bring in additional business.

The truck must have the ability to haul loose material that is not in carts or bags. Gooseneck trailers have also been successfully used. Both considerations will need a tipping mechanism (about \$15K) to lift the roll cart and dump it. While many collectors have attempted to “swap carts”, bringing out an empty and putting a full one on the truck to return to the depot of processor, this only compounds the effort and increases time to complete the daily collections. The tipping mechanism may seem expensive, but it saves time and space on the truck to allow for more efficient collection, leading to an increased number of collections before returning to the processor / aggregation site.

Education of B&R personnel is imperative as collected material can easily be contaminated by food and other waste, eliminating any glass value.

A cost analysis spreadsheet using local variables to help B&Rs understand their true costs of present trash removal and recycling is included in the Best Practices addendum.

A written agreement with the glass source should be obtained to provide a confident future for the collector.

Additional comments concerning a small collector:

A start-up hauler can begin with a small investment in some collection carts and a pick-up truck. The collector can take empty carts to B&Rs and remove the full ones. This is not an efficient method for collections but it will allow a timid, somewhat anxious collector to begin his business.

Growth of the business can fuel investment in a pull behind trailer that can carry 30+ carts allowing for servicing 10 to 15 customers before transporting to processor or aggregation site. The most efficient method is a specialty built single axel truck with a lift mechanism, but the investment is upwards of \$75,000 even for moderately used equipment.

A B&R collector should aspire to 40 service stops per day per truck with payment usually averaging about \$15 to \$20 per stop. This payment along with the buyback from Strategic Materials should allow the B&R collector profitability.

Best Practices

Best Practices for Municipalities and Preferred Collectors

1. Drop off Center
 - a. Spreadsheet for Municipal analysis
 - b. Carts & roll offs examples
 - c. Bunkers for storage (concrete pad, wooden or block walls)
 - d. Front end loader
 - e. 18 Wheel truck
 - f. Communication Plan
2. Bar & Restaurant Collections
 - a. Spreadsheet for Collector & B&R analysis
 - b. Carts
 - c. Collection at bar
 - i. Carts
 - ii. Tube thru wall
 - d. Do's & Don'ts for B&R
 - e. Tag hanger – No recycle
 - f. Cart labels
 - g. Collector truck
 - h. Collector trailer
 - i. Tipping mechanism

- 3. Aggregation site
 - a. Bunkers
 - b. Roll offs
- 4. Logistics to Processor
 - a. Open top dump trailer
 - b. 18-wheel tractor
- 5. Branding

1. Drop off Center

- a. Spreadsheet for Municipal analysis, This Excel spreadsheet allows municipal governments to calculate the true cost of recycling vs trash hauling. Please contact BClark@StrategicMaterials.com to obtain a fully functioning copy.

EXAMPLE ONLY Highlighted boxes to be completed by the user. The remaining cells will calculate automatically.		
Fill in for community		Change Units in this Column
Number of households to be served by collection site program	100,000	
Generation Rate (tons per HHLD per year)	0.1	
Total Glass Generated (tons per year)	10,000	
Glass Recycling Program Participation Rate	20%	

Glass Recycling Capture Rate ²	66%	
Total Glass Captured (tons per year)	1,320	
Total Tons Collected per month	110	
Municipal Refuse Collection Cost Avoidance	\$ 120	\$/ton
Fee Paid for Glass Collection by Municipality to SMI	\$ 25	\$/ton
Municipalities Net Cost to Recycle Glass	\$ (70)	\$/ton

b. Carts / roll offs – Collection sites can utilize various methods for depositing of glass containers. As always, goal should be to minimize handling, larger roll-off containers and, even, bunker systems where front end loaders are available, are preferable to the smaller roll carts.



c. Bunkers for storage (concrete pad, wooden or block walls) - Bunkers can be used at collection or aggregation sites, if a front end loader is available. These are simple to construct and using the concrete block, easy to reconfigure to changing requirements.

Wooden, railroad ties, are exceptionally welcome as additional ceramics / stones are not inadvertently introduced to the glass by scraping the walls.

Glass is not affected by moisture and these bunkers can be placed outside without cover for storage. However, bunkers should always be constructed on a concrete pad to prevent contamination of the stored glass with soil, stone or other non-glass materials.



- d. Front end loader – Required to load a truck with an open top dump trailer. If a ramp, dock or natural topography can be used in conjunction with the loader less time and effort will be required.



- e. 18 Wheel truck – Large truck & open top dump trailer will haul 22 to 15 tons of glass material. This is a key when aggregation sites are used for interim storage of glass. Maximum truck loads will reduce the logistics costs per ton of hauled glass, netting the most value for the glass.



- f. Communication Plan
Example communication plan below was contributed by DeKalb County, GA, with minor edits from Strategic Materials.

Communication Plan

The communication plan aimed at publicizing the program should begin 2 weeks prior to implementation date.

Plan includes:

Website – Explanation of plan goals, collection site map & addresses. Any special conditions at sites should be identified such as “open only during park hours” or “no dropping before 8:00 am.”

Media Coverage – Every possible opportunity for print and radio announcements should be made

Deliverables – Municipality should have an **official program flyer/ad, frequently asked questions (FAQ), container location listing and container location map**. These should be placed on the website but also available at public libraries, collection sites, courthouses, churches, recreation centers, day cares, schools, sanitation department, etc. **Public service announcement** available to play at movie theaters and downloaded from website. The official flyer will be also be distributed to HOAs, DeKalb County schools, placed in libraries and senior centers, as well as in the Sanitation Division’s lobby. A **news release** with the program’s highlights distributed. A **media alert** for the program launch event will follow a few days prior to the event. A **post-event news release** for the program launch event will be completed and distributed.

Customer Service and 311 Call Center Training – sanitation department, county phone answering service, and department secretaries trained on the program prior to the launch event

Social Media Municipality Facebook and Twitter accounts to include glass recycling program options.

Partnerships – Recognition in all media blasts for all collaborative partners: Department of Parks, Recreation & Cultural Affairs, County Libraries, Senior citizen facilities, School Districts, Fire Rescue and business partners (Target, HomeDepot, etc. Strategic Materials Inc. will be the sole glass recycling program processor.

Internal Communication – Program announcement thru “call holding” and with paychecks thruout the municipality

Program Launch Event

Official program launch event with official invitation extended to city managers, mayors and elected officials from local municipalities as well as executives from glass recycling partner and processor, Strategic Materials Inc.

Container Delivery Schedule

All collection containers to be in place by start date

Servicing of Containers

All containers maintained and serviced by a special team within the Sanitation Division. A more definitive collection schedule for servicing the containers established within the first few weeks of the program. Servicing frequency to be determined by residents' use of the containers.

2. Bar & Restaurant Collections

a. Spreadsheet for Collector & B&R analysis

Highlighted boxes with the thick black border are to be filled in by the user. The remaining cells will calculate automatically. See BClark@StrategicMaterials.com for fully functioning electronic copy	
Fill in for bar or restaurant	
How much glass is in your waste stream?	
Enter ONE applicable generation rate in the three rows to the right. Row 19 will automatically calculate tons per week of glass	
	50
Tons of glass going to landfill (per week)	0.25
What size is your dumpster?	4
How many times to is your collection?	2
How much do you pay for garbage	\$ 150

Cubic yards of glass per week	1.32
Percent of dumpster that is glass	33%
How full are your dumpsters when they are serviced?	80%
Cubic yards of waste generated per week (including glass)	6.40
Cubic yards of waste generated per week when glass is removed from waste stream and recycled instead	5.08
Recommended new dumpster size	6
Recommended number of collections per week	1
Estimated new rate for garbage	80
Cost savings by reducing amount of trash	\$ 70
Number of glass recycling carts needed (assumes carts will be nearly full)	3
Start up fee per cart	\$ 40
Total start up cost	\$ 80
Glass recycling fee	\$ 79
Net cost to recycle glass	\$ 9

A slightly different analysis tool is available for the prospective collector of glass from Bars & Restaurants.

Highlighted boxes with the thick black border are to be filled in by the user. The remaining cells will calculate automatically. Contact BClark@StrategicMaterials.com to obtain a fully functioning copy for use.

Fill in for collector	
Number of bars in collection area	100
Number of carts per bar	3
Number of carts collected per week based on percent participating (assumes # of carts per bar in row 40)	
40%	120
50%	150
60%	180

	70%	210
		\$
How much does it cost per cart per pickup		2.55
Cost of collection at differing participation rates per week		
	40%	\$ 666
	50%	\$ 783
	60%	\$ 879
	70%	\$ 956
How much glass is out there to collection?		
Bar and restaurant generation rate (tons/month per bar)		0.45
All glass that could be collected tons per month		45
How much will Collector Make?		
	40%	\$ 94
	50%	\$ 7.50
	60%	\$ 1
	70%	\$ 374.50

b. Carts – 96 gallon carts are the preferred collection method at a Bar & Restaurants, “B&Rs”. These sturdy carts can easily be moved when filled even weighing about 200lbs. Configurable to small locations; some can be stored elsewhere (under steps or across alleyways) until needed. Labels stick directly to the cart providing simple directions and recycler contact information.



c. Collection at bar

Carts



Tube thru wall provides reduced handling at B&R. Requires only a routine (daily?) movement of a full cart and reduces the contamination created inside the B&R.



d. Do's & Donts

DOs

- 1- Separate the trash, aluminum cans and plastics from the recyclable GLASS containers. Only GLASS containers can be placed in the recycling carts.
- 2- Glass Bottles and containers are the recyclable containers.

- 3- All Glass bottle colors can be placed in the cart, no color separation is required.
- 4- Cart must be accessible. Notify **XXXXXXXX** if cart is placed in a locked enclosure or moved to a different location.

Don'ts

- 1- No bags or food containers, cans or plastic can be placed with the beverage containers. Absolutely no ceramics; plates, cups saucers will be accepted.
- 2- Do not place trash in the GLASS cart
- 3- No glass drinking containers, window materials are permitted
- 4- Do not place ceramics in the recycling carts. Porcelain & china dishes along with ashtrays & drinking glasses are trash.

e. Tag Hanger

_____ **Bags** _____ **Not Beverage Containers**

Please remove the rejected materials

Collector will return on the next scheduled collections day

BevCon phone # 919 596 9883

f. Reject Letter sent to site owner

Glass Recycling Customer Issue Ticket

Ticket # ___(Date / #)_____

Type: Contaminated Cart - Bags or Non-Beverage Containers in cart
Urgency: _____ Customer : # _____

Site: Name _____
Address _____
City _____

Received from Driver: Time: _____/ Date: _____

Driver name: _____

Sent to _____: Time / date _____

Next scheduled Pick up: **date**

Issue: Driver reports bags or non-beverage containers in cart. See below photo.

Please email BevCon@strategicmaterials.com when issue is resolved.

Thank you for your continued business and the opportunity to recycle your

g. Labels

Examples below. It is best to show visual guides on labels, especially in areas where English may be a second language for workers.





Trash in the cart letter: These are used by collectors after inspection of cart during routine pick-up. Each cart is inspected and discrepant, non-glass, material should be rejected by the collector. A letter such as the below example or a hang tag with similar wording is left for the B&R to correct the glass for recycling.

- h. **Collector truck** – Many B&Rs are located in areas that are difficult to service, alleyways, downtown areas, with poor access. Newer delivery based trucks have short wheel bases and tight turning circles to help accomplish the pick up of recyclables. Diesel engines will yield about 10 MPG vs the traditional trash truck's 3 MPG, almost paying for itself in fuel economy over its lifespan of 5 to 7 years.



- i. **Collector trailer** – Another viable method for collections from B&Rs is the use of a gooseneck trailer and small flatbed or pick-up truck. Regulated to only 26,000 lbs by DOT this will make the payload about 10,000 lbs. Also the length of the entire rig is somewhat difficult to maneuver in close quarters. But at less than ½ the cost of the larger recommended truck, these may be viable in start-up situations.
- j.

With both the trailer and the truck, dump beds are a requirement.



- k. Tipping mechanism – Several manufacturers (Diamondback & McNeileus) make tipping mechanisms that can be fitted to either the truck or the trailer. In the case of the truck, these are hydraulically activated by the power takeoff, “PTO”, of the trucks engine. Using the trailer this tipper is tied into the trailer electric hydraulic system.



In some states (in North Carolina for certain) fuel used to power the truck engine when just operating the PTO is NOT subject to road fuel tax. This previously paid tax can be rebated by the state tax office with some simple paperwork.

3. Aggregation site

a. Bunkers



b. Roll-offs



Strategic Materials Marketing can supply digital images for typical roll off graphics.

4. Logistics to Processor

- a. Open top dump trailer & tractor & front end loader – delivery to the processor is typically outsourced by the collector or aggregation site owner. It is

required to have the use of a front end loader to utilize the maximum load to the processor.



5. Branding

Bin Color: Orange – awaiting exact Sherwin-Williams paint color + Pantone Matching Color

Generic Decals must be used: This included the glass decal, Spanish + English languages. When in partnership, both SMI logo + partner logo can be used as well. SMI logo is preferred in all applications in lieu of using company name in text.

Figure 1:



Figure 2:



Custom Items: In partnership, custom designs can be integrated into additional decals as long as it supports education of what should be placed in the bin and works towards making the bin a success.

Other best practice design: Depending on partnership or program, we can also solicit custom graphic sponsorships by local universities, companies, organizations e.g. helps cover the cost of the bin + local community advertising and partnership engagement.

About Strategic Materials

With over a 100 year history, Strategic Materials is North America's largest and most comprehensive glass recycler, with nearly 50 locations in the United States and Canada. The company focus has been and continues to be on creating value for customers through innovation and continuous improvement. The company is a technology partner to cleaner, more efficient glass production, providing customers and suppliers with economical and environmentally viable solutions for reuse of waste streams including glass and plastic. For more information visit www.strategicmaterials.com

Interested in sharing your glass collection stories or have an addition or revision to make? Email info@strategicmaterials.com