BEST MANAGEMENT PRACTICES for GLASS RECYCLING in NORTHERN COLORADO

?

Submitted to
the City of Loveland, City of Fort Collins and Larimer County

Submitted by

LBA ASSOCIATES

with

SERA

Skumatz Economic Research Associates

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From: Bruce Philbrick, City of Loveland Solid Waste Division
Susie Gordon, City of Fort Collins Natural Resources Department
Stephen Gillette, Larimer County Solid Waste Department

RE: Report: Best Management Practices for Glass Recycling in Northern Colorado

A report (enclosed) called "Best Management Practices for Glass Recycling in Northern Colorado" was prepared by LBA Associates, Inc., and SERA, Inc., on behalf of a group of northern Colorado glass recycling stakeholders. This group was convened in late 2007 by the cities of Loveland and Fort Collins, and Larimer County, as a result of growing concerns about the level of recycling that occurs for glass in residential and commercial recycling programs.

When glass is combined with other materials and collected for recycling, a great deal of breakage occurs. Glass that breaks into small pieces cannot be reasonably sorted by mechanical or manual means and ends up as residue that may be used as alternative daily cover material (in lieu of soil) at landfills, or simply placed for disposal in landfills. It has long been an issue that low levels of glass are actually recovered and ideas about how to increase bottle-to-bottle glass recycling were needed.

Information continues to be unavailable about the actual glass recovery rate at the Recycle America Alliance (RAA) sorting facility in Denver, where most of Larimer County's recyclables, including glass, are transported for processing and marketing. However, the company did not refute an estimation given by the stakeholders group, which set glass recovery rates at 25-30% of all glass received at the RAA recycling facility.

This report analyzes local glass recycling in terms of existing collection efforts, processing, and end-use markets, and also reviews state and national policy options such as container deposit (bottle-bill) legislation. The stakeholders also requested an economic analysis to evaluate the most effective means to collect and recover glass, considering costs, job creation, economic development, and air emissions from landfills and collection vehicles.

The northern Colorado glass study includes a detailed economic analysis of actual recycling collection options, using data from the City of Loveland Solid Waste Division. These data allowed the consultants to accurately model costs for various collection options in terms of labor and equipment costs, volumes collected, etc. Private waste haulers have comparable collection systems to those modeled in the analysis; the results therefore could be applied for communities that have open subscription systems, as well as those with municipal collection operations.

Glass has long been associated with residential recycling programs; when the public thinks about recycling, glass is probably one of the first materials that come to mind. The northern Colorado glass recycling stakeholders, which includes representatives from for-profit recycling companies and recycling processors, trash/recyclables collectors, local citizenry and governmental agencies, is aware of the political sensitivity of making changes to recycling programs. An important focus of the study was to consider the public's acceptance of suggestions for how to improve the amount of glass that is recovered in collection programs. Even if a recommendation is made that appears to meet economic and recovery-rate considerations, it may not be met with support from the community.

However, the long-established role of glass in recycling programs poses a challenge that we should not continue to ignore. As this report demonstrates, as an element in the recycling stream, glass increases operational costs and lowers the value of other recyclable commodities.

A final meeting of the stakeholders group will be held on May 30th. The consulting team will be available to present their findings. At this time, the stakeholders' objective is to reach consensus about what type of recommendations to provide to local decision-makers, and to chart a course for sharing the findings with our communities.

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The City of Loveland, City of Fort Collins, Larimer County and the consultant team of LBA Associates and Skumatz Economic Research Associates (SERA) would like to thank the following companies and individuals for their support of this project:

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Waste Management
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SECTION 1
INTRODUCTION

The purpose of the Best Management Practices for Glass Recycling project is to evaluate opportunities for improving the sustainability of glass recycling northern Colorado. The project was initiated by the City of Loveland, City of Fort Collins and Larimer County as a result of direction from a group of glass recycling stakeholders from northern Colorado. The project was supported by the consultant team of LBA Associates, Inc. and Skumatz Economic Research Associates, Inc. (SERA).

Currently, Colorado struggles with efficient and sustainable glass recycling. While documentation is difficult to obtain, it is suspected that a large portion of collected glass (perhaps as much as 50%) is not recovered due to breakage and ultimate management as residue fines (i.e., disposed of as trash or used as landfill cover). Additionally, while Colorado is blessed with two glass bottle manufacturers, only one can accept recycled glass directly from the point of collection or from a MRF processor (Owens-Illinois imports cleaned cullet from out of state). The Rocky Mountain Bottling Company (RMBC) has the ability to clean glass at their Wheat Ridge facility, and purchases more than 90% of recovered glass from Colorado generators[1]. However, while RMBC has strong demand for more glass, the purchase price is often insufficient to cover the cost of diverting, processing and hauling recovered glass from state programs. These key issues make the social and fiscal aspects of glass recycling in Colorado extremely problematic, often undermining what would otherwise be a sustainable operation.

The City of Loveland hosted a meeting with local glass recycling stakeholders to identify potential options for Colorado. The initial stakeholder meeting was held on October 30, 2007. Stakeholders discussed concerns with glass, as well as possible solutions. However, the group determined that the lack of technical information and data was a limiting factor in coming up with a recommendation for the best solution.

Following this meeting, the cities of Loveland and Fort Collins, and Larimer County, assembled a request for proposal from qualified vendors to conduct an extensive analysis of the northern Colorado glass situation. LBA Associates and SERA were hired to determine if there are feasible solutions to these issues, and what their benefits and costs would be. The project that followed tackled a range of approaches including:

- National best management practice (BMP) research
- Detailed economic and environmental analysis of several programmatic options
- Assessment of potential new market opportunities
- Consideration of future state policy

A second stakeholder meeting was held on February 27th, and included citizens, local governments, private and public haulers, MRF operators, two glass bottle manufacturers and an end user. The group was presented with initial research completed by LBA and SERA. Subsequently, a number of programmatic, collection, market and

[1] In 2006, over 70,000 tons of glass was recycled in Colorado. While haulers and processors confirmed that 94% of their product was sold to RMBC that year, the bottling company received only a portion of this tonnage.

policy options were discussed (see Appendix A for meeting notes). The following pages of this report summarize additional research completed in response to these options.

SECTION 2
NATIONAL RESEARCH

SERA conducted a telephone, web, and e-mail survey of ten communities in the middle and western United States to research the best management practices (BMPs) for glass management. The researched communities were separated into the following collection program alternatives[2]:

- "Pure" single-stream, including glass (San Jose, CA, Denver, CO and King County WA)
- Single-stream with glass in a separate container (Thurston County, WA, Eugene, OR, and Cedar Rapids, IA)
- Single-stream with glass collected at drop offs only (Flagstaff, AZ, Salt Lake City, UT)
- Dual-stream (Boulder, CO)

The interviews generally were conducted with recycling or solid waste management staff from the city or county. Whenever possible, interviews were also conducted with staff at the MRF and/or landfill. The main points of the interviews are summarized in Table 1. Detailed information is provided in a detailed spreadsheet presented at the February 27th stakeholder meeting and provided under separate cover.

LBA and SERA also conducted a literature review and detailed interviews with many national and regional actors – including MRFs, association staff, brokers, recycling coordinators, and others to gather information on glass capture and recovery rates; costs and the impacts of commingled glass on collection, processing, and manufacturing; marketability impacts on all materials; and benefits of collection and processing BMPs.[3] Detailed results of this review are similarly provided under separate cover.

General findings from these two research efforts include three key areas of information.

2-1 National Research Yielded Predictable Results for the Pros and Cons of Collected Glass Options

1. Significantly more recycling tonnage is collected in single-stream programs, and more materials are collected from pure single-stream (all recyclable commodities commingled) than in modified system (with set-asides of some materials).[4] Based on statistical analysis of scores of programs, single-stream adds 2 to 5 percentage points of new recycling (by weight) beyond dual-stream programs.[5]

[2] The original list of communities to be researched included a community in TX that dropped glass collection completely. However, after repeated attempts via emails and telephone communication the community was unable to be interviewed regarding their program.
[3] We found virtually no information on collection aspects of this last topic.
[4] Jakko Poyry and SERA, "Total Cost Analysis for Single Stream", prepared for AF&PA by SERA, Superior, CO, 2002.
[5] Ibid.

TABLE 1 SUMMARY OF NATIONAL SERA RESEARCH

	COLLECTED AT DROP SITES	COLLECTED AS SET ASIDE	COLLECTED AS SINGLE-STREAM	COLLECTED AS DUAL-STREAM
Volume	**Low**-One County in WA saw glass tonnage decrease by 55%	**Medium** to **High**	**High**	**High**
Average lbs/person/year	16.7 lbs	17.7 lbs (6% over D/O)	23.4 lbs (40% over D/O)	25.6 lbs (53% over D/O)
Truck/Collection	30 yd roll-offs or permanent drop-offs	Side loader truck with separate hoppers or separate truck	Fully automated truck	Semi or fully automated
Program Costs	**Low**	**Medium to high**	**High**	**High**
Program Costs from WA Study[a]	$5.48/HH/Month	$6.27/HH/Month (14% over DO)	$6.43/HH/Month (17% over D/O)	N/A
Marketability	**High**	**High**	**Medium**	**High** (Denver went from $69/ton dual stream to $38/ton SS)
Who Likes It	MRFs, Haulers	MRFs, Haulers, Residents	Haulers, Residents	MRFs, Haulers
Pros	Inexpensive, clean streams	Resident satisfaction, high volume collection, lets haulers see recyclables, clean streams, flexible	Highest resident satisfaction, collection efficiencies, can't change easily	Cleaner streams, higher revenues for haulers/MRFs, status quo in many places
Cons	Low volume, messy drop-offs, residents do not like	Need semi-automated collection, education on separation, haulers don't like as much	Marketability and per ton revenue decreases, residuals are higher	Stagnated diversion rate, collection costs can be higher, workers comp. if using bins
BMPs	Signage, education campaigns, easier to do if never collected, residents will not like that they are paying for C/S but not receiving	Customized trucks with hoppers, use the old 18-gallon bins, bottle bill helps, collect discarded 5-gallon buckets to give to residents, lots of education	MRF technical designs, lots of Ed. on materials, set MRF max. residue recyclables	Education, EOW collection of alternating materials, FA carts to keep materials dry and increase efficiency

[a] Overall household costs include recycling rebates paid to residents (report by Thurston County, WA)

2. More glass is collected in single-stream programs[6]. This impact was also demonstrated in the case study interviews (Thurston County, WA saw a 70% increase in glass tons collected in a single-stream versus four-stream program and Portland, OR saw a 21% went their program changed from dual-stream to single-stream).

3. Collection using fully automated collection is significantly cheaper (5% to 25%) than dual-stream systems or modified single-stream (with set-asides).[7] Highly commingled collection systems allow the use of automated collection equipment.

2-2 MRF Performance & Residue

1. There are no universal patterns in the costs or the quality of materials based on MRF type. The new high-tech single-stream MRFs often perform better than the average dual-stream MRFs they are replacing. The overall performance and separation is better in many cases (largely because container lines are improved); however, glass (and other contaminants) in paper remains a controversial issue. Single-stream MRFs can (and are presumably designed to) separate materials, but speed, management dedication/attention, appropriate screens or equipment or presorting to address glass, and community education are considered keys to good separation.[8]

2. Many U.S. MRFs are using up-front screens to pull glass away from paper early in processing. Napa, CA found most glass bottles were unbroken or in large pieces after single-stream collection, and they note significant additional net revenue from adding one sorter up front to color-sort the unbroken bottles.

3. Many systems collecting glass in the single-stream program find the systems produce lower quality and less marketable glass (e.g., the Portland, OR recovery rate of only 50%).

4. There is sparse and rarely accurate information on MRF residue or bale contamination published or available. The SERA AF&PA study found that residuals from single-stream are about 3% to 8% higher than dual-stream (with significant variations by age, size of facility, etc.). Netting out the differences in residuals leaves single-stream with a net increase of about 1% to 3% of additional recycling after processing (compared to dual-stream programs).[9] Some additional indicative (single case) data on residuals follows:

   - 7.34% for MRFs
   - 6.79% for dual-stream MRFs
   - 6.34% for MRFs that don't process glass
   - 11.70% for single-stream processing including glass (note that Mecklenburg County, NC reported a residue rate of 15%)
   - 8.10% for single-stream processing without glass

[6] Ibid. The increase includes glass.
[7] Ibid. The savings depends on the collection efficiency prior to conversion.
[8] Ibid.
[9] Ibid. The increase includes glass.

2-3 Differences based on Perspective

1. Households (generators) prefer the ease of more commingled collection, the broader array of materials that are often collected in single-stream programs, and the lower cost of single-stream programs.

2. Haulers (or communities) generally prefer the ease and significantly lower collection costs from single-stream collection and single containers. Although revenues from MRFs are often lower than dual-stream, haulers usually still save money from single-stream programs that include glass. If the program omits glass entirely, they may or may not make more money depending on whether the increase in revenues per ton more than makes up for the significantly fewer tons collected. Single-stream can be an easy program in which to add recyclable materials.

3. Processors, brokers, and end-users prefer the quality of source-separated materials.

Material recovery (including glass), even net of residuals, is higher from single-stream programs (including fully commingled single-stream) than for dual-stream or modified single-stream programs (set-asides or inserts for glass or paper).[10] Costs are generally lower through the stages of collection and processing (and sale). From the perspective purely of a generator or a hauler, single-stream (including glass) is a "win". The AF&PA study indicates the savings for collection is $10 to $20/ton; for collection and processing the net savings is about $5 to $0/ton.[11]

The "rub" comes in (and if) when consideration is made of the end-user (generally paper mills). Evidence indicates the contamination of recycled fiber with glass shards (and in some cases, plastics) increases wear and tear on machinery and problems in the paper quality. Interviews clearly convey this view; the limited amount of quantitative data indicates a cost to mills of $5 to $13/ton of recovered paper. Taken as a "net" including collection and processing, single-stream (including glass) shows an average of zero change in cost to perhaps $3 extra cost per ton through the value chain compared to dual-stream programs.[12]

These national research results were considered in developing the options to be modeled in the Section 3.

[10] Ibid.
[11] Ibid. The vast majority of the programs studied in this report included glass.
[12] Ibid. Unlike the samples for collection programs and MRFs, the sample of mills interviewed was not random and statistical; instead, it over-sampled mills with "problems". While end-users always care about the last part of the value chain, haulers, generators, processors, and many cities often have more parochial or self-interested views of the situation; as a consequence, single-stream collection and processing is growing rapidly.

SECTION 3
ECONOMIC & ENVIRONMENTAL ANALYSIS OF SHORT-LISTED OPTIONS

After the stakeholder meeting, discussions were held to identify specific single stream collection alternatives to be modeled. SERA modeled these seven systems. Note that the first tier of "leading" options resulting from this modeling effort is typed in **bold**, and the next tier of "leading" options is *italicized*):

Option A — Status quo – current weekly dual-stream collection

Option B — Single-stream collected every other week (EOW)[13] excluding glass; glass collected via drop-offs and accumulated in a separate bunker[14]

Option C — Single-stream collected EOW, with glass excluded; glass collected once monthly in a separate automated cart (separately provided)

Option D — Single-stream collected EOW with glass excluded; glass collected once monthly in a separate "bin" using bins households have already

Option E — Single-stream collected EOW with glass collected in a special container that fits inside the single-stream cart – but keeps glass segregated from other materials[15]

Option F — Single-stream collected EOW with glass commingled with the other single-stream materials

Option G — Single-stream collected EOW with glass commingled with the other single-stream materials – but with a special up-front sorting process at the MRF to pull out and color sort at least the unbroken amber and clear glass[16]

Table 3 (below) shows the summary results of the modeling work. Appendix B includes an Excel™ spreadsheet with a cost scenario model that shows the various assumptions and calculations made for each scenario. The

[13] In each case, the single-stream EOW collection is provided via fully automated trucks, using 95 gallon automated containers. We assumed the containers were already being purchased. If they are not, the results will need to add approximately $0.75 - $1 per household per month to cover these costs (these estimates will be refined with other revisions to the model).

[14] This scenario includes construction of a relatively inexpensive bunker built of blocks and rebar with jersey barriers, constructed at the current transfer / recycling center facility. Separated glass is accumulated there until it is put directly into trucks to market.

[15] Under this alternative, we found that for the few communities that had used this system, one had dropped it. The collection steps for this alternative require retrofits to the truck, additional labor to empty and replace the "insert" and slower collection. The data to model this were nearly impossible to obtain.

[16] MRFs do not always take extraordinary efforts to sort out glass, although many are concerned about glass embedding in paper and affecting market prices and wear and tear on equipment at mills. Some facilities are using up-front screens to pull the broken glass away from the paper as one of the first steps in the process. However, Napa, CA found that much of the glass from single-stream trucks is not broken. They suggested that, rather than breaking the remaining bottles to go through the initial screen, a MRF add one sorter up front to sort out the unbroken (or barely broken) glass and color separate. Their system shows that one sorter can sort up to 8,090 tons of glass a year, and they pulled significant market value in this way. This assumption was embedded in the model for Scenario G, although we were conservative, assuming the staffing to achieve the goal would be twice the report from Napa, to take account of the assistance the staffer received from others along the Napa sort line. Option G (using this system)is slightly less expensive overall than Option F because the revenue improvements are expected to offset the increased MRF staffing / cost.

analysis of results for the strongest performers – in cost and diversion – is summarized in Table 2.[17] Note that the reported costs are for trash and recycling collection combined.

TABLE 2 SUMMARY RESULTS for LEADING OPTIONS BASED on ALTERNATIVE CRITERIA

SINGLE-STREAM & GLASS SYSTEMS THAT . . .	LEADING OPTIONS	NOTES / DESCRIPTION
...are Least Expensive *(costs include trash & recycling collection)*	**Option G** *($11.75/hh/mo)* **Option F** *(11.78/hh/mo)* **Option B** *($11.85/hh/mo)*	Options B (glass through drop-off and assembled at a bunker) and Options G and F, which collect all materials (including glass) as single stream, (G installs an additional sorter at the MRF to color sort unbroken glass up-front.)
... provide Greatest Diversion	**Option G** *(36%)* Options C, *D*, *F (35%)* Possibly Option E[18] *(36%)*	Option G, which collects all materials (including glass) as single stream, and installs an additional sorter at the MRF to color sort unbroken glass up-front, diverts the most material to market. The variations of single stream embedded or with set asides collected monthly also provide strong diversion (Options C, D, F).
... lead to greatest state-wide job creation and economic development (and greatest reduction in emissions from landfilling)	**Option G** Options C, *D*, *F* Possibly Option E[19] Deliver $88-$139K in economic development statewide (0.5-0.7 jobs)	The options with greatest diversion also maximize the reintroduction of recycled materials into the economy (and divert most from landfills), maximizing the impacts on jobs and economic development – and minimizing the emissions from landfill.
... minimize emissions from vehicle miles traveled.	Options **B**, E, *F*, **G**	None of these options entail a separate truck driving around once a month. They approximately halve the on-route recycling driving currently occurring. All options save from current weekly collection methods.

In conclusion, Tables 2 and 3 illustrate that all of the single-stream / glass programmatic options appear to be slightly more cost-effective than Loveland's status quo program. Options F & G (Single stream, all embedded) and B (single stream with drop-off glass brought to a bunker) provide strong cost performance, and F & G diverts a bit more. Option G incorporates an additional pre-sort and/or slower processing at the MRF in order to retain paper quality (and prices). If the County is concerned about the reliability of sorting glass from paper (and potentially hurting market prices for paper), or about the ability to negotiate related to MRF operational issue, then Option B may provide the best overall performance, however at greater expense, lower material recovery, and greater inconvenience for residents.

[17] We examined the changes in costs associated with running four recycling trucks every other week compared to three trucks. The increase in cost was about $0.50 per household per month, with costs still leading to a reduction in cost compared to the status quo (Option A).

[18] Option E has the least reliable data on cost and system. The system is becoming less common and data are sparse.

[19] Option E has the least reliable data on cost and system.

TABLE 3: RESULTS COMPARING SINGLE STREAM/GLASS SCENARIOS TO STATUS QUO (LOVELAND)

NORTHERN COLORADO SINGLE STREAM GLASS PROJECT
COST SCENARIO MODEL
Single Stream Scenario Comparison Sheet - Data Supplied by City of Loveland

Prepared for City of Fort Collins, City of Loveland, and Larimer County
Constructed by Lisa A. Skumatz, Ph.D. / Skumatz Economic Research Associates (SERA), Version V8a, under subcontract to LBA Associates
762 Eldorado Drive, Superior, CO, Phone: 303/494-1178 skumatz@serainc.com

User instructions: User modifies white cells.
Grey computed by model; purple rarely changed.
Summary results at top; data entry/computation below.

Scenario Description: Assumes 3 recycling trucks for EOW collection

	SUMMARY RESULTS TABLE *Scenario Names=>*	A. Status Quo / Current Weekly Recycling Dual Stream (Base)	B. SS EOW with dropoff glass & bunker	C. SS EOW with glass in separate automated cart collected 1/mo	D. SS EOW with glass in "bin" collected manually 1/mo	E. SS EOW with glass insert - Poor/unreliable Information avail.	F. SS EOW with glass embedded	G. SS EOW with glass embedded / modified sort at MRF
1	Cost per household per hh/mo (trash & recy, excl education)****	$13.25	$11.85	$12.39	$12.04	$13.11	$11.78	$11.75
2	Education cost per hh/mo	$0.00	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08
3	Tons recycled curbside (to market)	5,815	5,912	5,963	5,963	6,736	6,400	6,534
4	Tons recycled separately (assumed to market; 65 base tons are glass	1,421	1,766	1,817	1,817	1,351	1,351	1,351
5	Tons landfilled	15,004	14,492	14,390	14,390	14,083	14,419	14,285
6	Change in cost of recy collections/hh/mo (pos=increased cost)	$0.00	-$1.35	-$1.26	-$1.26	-$0.96	-$1.35	-$1.35
7	Change in cost of other recycling / hh / mo (pos=increased cost)	$0.00	$0.00	$0.09	$0.09	$0.00	$0.00	$0.00
8	Change in cost of processing / hh / mo (pos=decreased cost)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.04
9	Change in "rebate" (revenues) per hh/mo (incr=positive)	$0.00	$0.09	$0.10	$0.10	$0.05	$0.03	$0.04
10	Change in landfill cost / hh/mo (decrease=positive)	$0.00	$0.04	$0.05	$0.05	$0.07	$0.05	$0.06
11	Change in capital cost / hh / mo (increase=positive)	$0.00	-$0.10	$0.25	-$0.10	$0.84	-$0.10	-$0.10
12	Change in outreach cost / hh/mo (increase=positive)****	$0.00	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08
13	Percent recycled	32.5%	34.6%	35.1%	35.1%	36.5%	35.0%	35.6%
14	Change in vehicle miles traveled (changed to EOW)	0	-26,104	-23,020	-23,020	-18,200	-26,104	-26,104
15	Extra cost for fuel costs, per hh/mo, year 1(not separately in rates)	$0.00	-$0.17	-$0.15	-$0.15	-$0.12	-$0.17	-$0.17
16	Extra cost for fuel costs, per hh/mo, year 10	$0.00	-$0.23	-$0.20	-$0.20	-$0.16	-$0.23	-$0.23
17	Change in MTCE (from recycled tons)&&&	113.7	614.2	622.4	622.4	647.0	620.0	630.8
18	Change in tons CO (from diesel miles traveled)&	0.0	-0.3	-0.3	-0.3	-0.2	-0.3	-0.3
19	Change in Tons NOX (from diesel miles traveled)&	0.0	-0.5	-0.4	-0.4	-0.3	-0.5	-0.5
20	Change in tons THC (from diesel miles traveled)&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	Change in tons VOC (from diesel miles traveled)*&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	Change in tons Benzene (from diesel miles traveled)*&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Change in tons Formaldehyde (from diesel miles traveled)*&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Change in tons Acetalydehyde (from diesel miles traveled)*&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	New jobs in recycling - CO-wide&&&&	0.0	0.1	0.1	0.1	0.7	0.5	0.6
26	New economic output - CO-wide&&&&	$0	$14,568	$22,293	$22,293	$138,544	$87,899	$108,157

SECTION 4
COLORADO MARKET OPPORTUNITIES

The purpose of this section was to conduct a brief assessment of potential glass markets for Colorado, and evaluate the possibility of these markets significantly supporting glass recycling. Prizm Sustainability led this effort. Research was limited to new and developing opportunities in the region. Unfortunately, small business incubators could not readily release information concerning new companies that would potentially be interested in using recycled glass as a material in their product or process.

4.1 Existing Local Markets

Sand Blasting Sand blasting is an existing market in northern Colorado that could be suitable for an industrial ecological relationship[20] with glass. Sandblasting is a process where by small pieces of abrasive material are used to smooth a surface. Local sand blasters report restrictions on the use of all silica-based materials (such as glass) for sand blasting because of their ability to cause lung disease[21]. There are two local sand blasters - Loveland-based Northern Colorado Sandblasters and Fort Collins-based Armadillo Coatings. These companies require glass reduced to 1/8" and smaller, and consume a combined four tons/week, which they obtain from the Denver area. This quantity equates to only 200 tons/year, which is only 4% of the glass landfilled in Larimer County[22]. Therefore, the quantity of glass potentially diverted is small and the need for further processing (as well as health and safety) is considerable.

Full-Scale Use of Glass as Aggregate Substitute in Roadway Subbase & Hot Mix Asphalt In 2006, Boulder County researched the ability to use recycled glass as an aggregate substitute in full-scale roadway base and bituminous concrete (asphaltic concrete) mixes[23]. Their research concluded that not enough glass is currently generated in Colorado to support even a 5% material substitution for aggregate in these mixes. Aggregate and hot mix asphalt plants also noted that this substitution would not provide enough benefit to offset the cost of hauling glass to their sites; crushing, cleaning and blending the glass with aggregate; and the addition of chemical additives needed to compensate certain negative glass properties.

[20] Industrial ecology is a concept where waste is eliminated, and the by-products generated from one business or process create materials for another local business or process.

[21] However contacts at both OSHA and the EPA are unaware of restrictions or bans on glass use in this application. Based on documentation from the Washington Center and National Institute of Occupational Safety and Health (a subset of the Center for Disease Control), crushed glass and the dust it generates should be monitored and taken seriously, but are not the same threat as silica sand and other crystalline silica materials. Definitive research would need to be conducted in this area to see if other restrictions exist, such as within industry groups or the Colorado Department of Public Health and Environment, before pursuing sand blasting as a viable existing market for glass.

[22] It was estimated during the 2006 Larimer County waste composition study that 5,000 tons of glass was landfilled that year.

[23] The Boulder County glasphalt project was conducted by LBA Associates, Inc.

4-2 Potential New Markets

This research focused on uses for 3/8"-minus glass material, as this includes many of the fines generated from existing local MRFs, and is the size expected to be generated from new optical glass sorting processes (expected in 2008 at the Boulder County and WMRA/Waste Management Franklin St. facilities). Three applications use 3/8"-minus glass successfully include:

- Aggregate for use in roads and construction
- Terrazo or decorative composite material used for floors, countertops, etc.
- Glass tile and landscape material used for homes and other buildings

The following table shows each possible use, along with recommended tonnage, additional equipment needed, and where this application is currently happening, or has recently happened.

TABLE 4 SUMMARY of NEW MARKET REQUIREMENTS

	Estimated Annual Tons	Equipment	Case Study
Aggregate Substitute for Roads & Parking Lots	>200[a]	Crusher to produce 3/8"	City of Steamboat Springs, CO
Terrazzo	>25[c]	Crusher/screen to produce 3/8" & 1/8"	Vitrastone, located in Durango, CO
Glass Tile	<10-100[b]	Crushed to 1/8" (may also require washing)	Glass Roots, located in Bozeman, MT

[a] Based on the amount successfully used by Steamboat Springs (population 18,000)

[b] Based on a range established by a start up business, Portland-based Stardust Glass, and a 15 year old business, Seattle-based Bedrock Industries

[c] Based on a start up business usage from Vitrastone

Case study information supporting these new market findings is provided in Appendix C for:

- City of Steamboat Spring, CO - use of recycled glass as aggregate in roads & parking lots
- Vitrastone in Durango, CO - use of City of Durango's crushed glass in terrazzo tile production
- Glass Roots in Bozeman, MT - use of curbside glass in glass tile production

In conclusion, none of the researched opportunities identified new markets with the ability to divert significant quantities of glass from other markets. Beyond the low demand, all of the markets require some level of processing in addition to sorting that already occur curbside, at drop sites or in Colorado MRFs. Of the partnerships between local governments, none appear to have long-term success rates due both to low demand and unsustainable costs. However, once 3/8"-minus glass is consistently produced in northern Colorado, multiple markets could potentially be supplied.

SECTION 5
STATE & NATIONAL POLICY OPPORTUNITIES

The purpose of this section was to evaluate the feasibility of pursuing a state bottle bill and non-legislative options that might support an increase in sustainable diversion of glass in Colorado. The bottle bill research was conducted by Marjie Griek, and based on knowledge of the legislative climate in Colorado, as well observations from current legislation in other states to expand, modify or add new bottle bill requirements. Non-policy options such as incentive-based programs, new sorting equipment and refill systems was also explored.

5.1 State Bottle Bills

There are a significant number of states that are either working to expand their existing programs or have introduced container deposit legislation this year. While 11 states currently have a bottle bill, only Hawaii has passed new legislation in the last twenty years or so. A summary of bottle bill legislation currently in play is provided in Appendix D.

Colorado is not a good candidate for bottle bill legislation, on the whole. There is a powerful and wealthy lobby that was able to soundly defeat two bottle bills introduced back in the 1980s, and create a recycling association in Colorado that courted many members who worked diligently to keep bottle bills and any other legislation from passing.

However, if Colorado were to ever consider trying to pass container legislation, now would be the time. There are businesses within the state that in the past have traditionally fought this type of legislation. The current expectation is that they would not oppose a bottle bill if brought forth at this time basically because they are starving for feedstock for their products. Colorado has temporarily suspended the TABOR rules, which would allow us to set up the system to collect fees and have them used for grants, litter clean up, solid waste management planning, or any other related purpose without causing economic problems for the state. In fact, the additional income from these fees could be distinctly advantageous. With a democratic majority in both the House and Senate and a democratic Governor, odds would be in favor of a bottle bill. Granted, it would not be an easy process, but seemingly possible under the current circumstances.

5.2 Federal Legislation

Massachusetts Rep. Ed Markey (D) has introduced federal bottle deposit legislation (H.R. 4328) to include glass, plastics (including water bottles), and aluminum containers. A portion of the unredeemed deposits would be available to the states for programs that reduce greenhouse gases. Additionally, the bill would prohibit the disposal of any container by any retailer or distributor (or agent thereof) that is part of the program in a landfill or solid waste facility.

The Senate Environment and Public Works (EPW) Committee has passed Senate Bill 2191, *America's Climate Security Act of 2007*, which would reduce industry greenhouse gas emissions (GHG) by implementing a cap and trade system. A recycling amendment, offered by Sen. Tom Carper (D-DE),

recognizes recycling's role towards the reduction of GHG emissions. The recycling amendment establishes offset allowances for new recycling projects, provides for the use of at least 5% of the state allowances to be applied to recycling activities, and provides for a life cycle study on the benefits of recycling, particularly related to manufacturing with recycled materials.
Update: Carper's amendment passed out of EPW without the offset allowance provision. Bill will be heard by the full Senate early in 2008.

5.3 Non-Legislative Options

Incentive-based programs typically will collect more materials than traditional programs and keep streams separate, thereby increasing value and reducing residual losses. These programs have a better chance of success in our independent state, although the costs for developing infrastructure could be prohibitive.

Incentive-Based Drop-Off Program

TOMRA North America has introduced Automated Recycling Centers, or ARCs (see photo left), introducing the US market to this technology. The ARC's will be used for a pilot program in non-deposit locations to test consumer response to incentive-based recycling. Fifteen recycling centers will be installed in three test markets during the first half of 2008. The pilot will run until mid-2009.

The ARC is based on material recognition and compaction technology developed by TOMRA. The center also communicates with consumers through a combination of voice and visual guidance. It can also offer consumers incentives such as giveaways, product discount coupons, and the possibility to donate to charity.

Incentive-Based Curbside Collection Program RecycleBank works with communities and haulers to develop an automated collection process which weighs what each customer's recycles, then rewards them with coupons, discounts or charitable donations within their community (primarily in east coast states). The program has been proven to increase recycling rates in the locations they serve, motivates individuals to action, rewards them through savings and boosts the local economy.

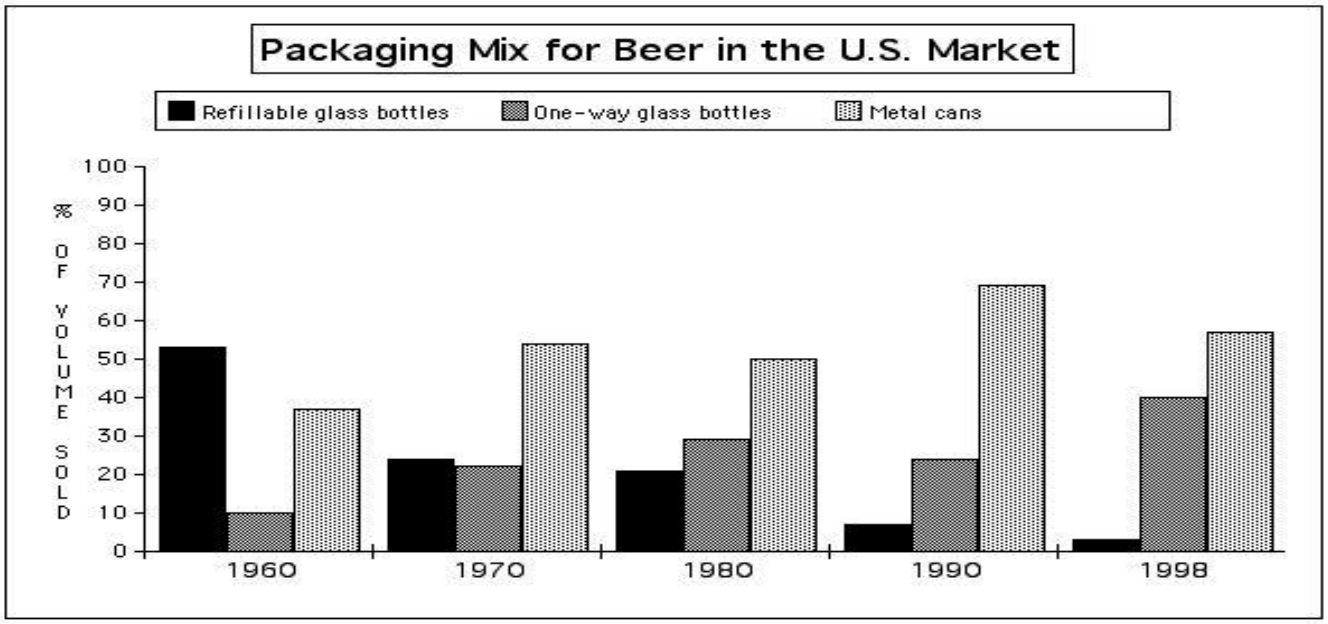
New Sorting Technology A California Department of Conservation grant aims to improve the quality of glass coming out of materials recovery facilities receiving recyclables from single-stream collection sources. The $430,000 grant provides for construction and testing of a prototype low-impact sorter that will recover high-quality beverage container glass for reuse in making new glass bottles. The prototype was constructed by GreenWaste Recovery, Inc. "Most glass bottles do not seem to be broken in the collection truck," says Richard Gertman of Environmental Planning. "It's happening at the MRF." The processing system is designed to minimize breakage at the early stages of collection and processing to keep glass out of the paper and remove glass contaminants.

Refillable Container Options As shown below, in 1960, locally-owned and operated refilling systems were the preferred way in the US of handling soft drinks and beer. Similar to today's bottle deposit laws, when purchasing a beverage in a refillable container, you paid a deposit for each bottle. When you returned the

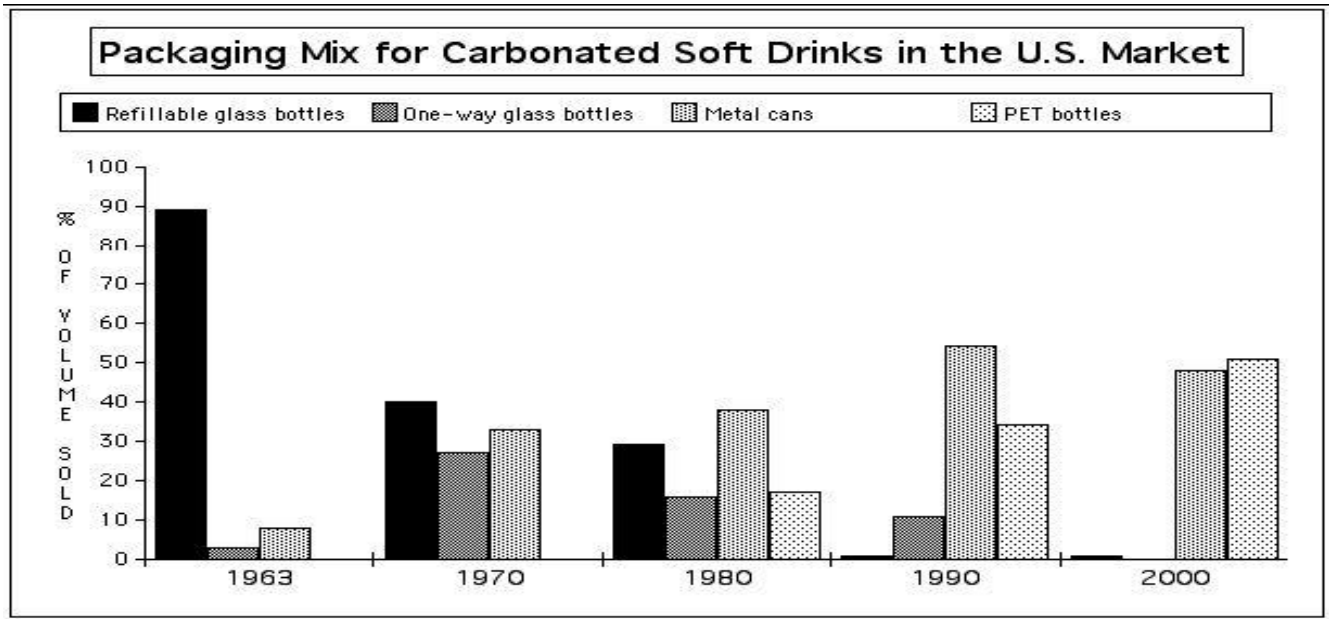
bottle, you received the deposit back or could put it toward the next purchase. A local bottler retrieved the empty bottles from the store during their next delivery and returned them to the bottling plant to be washed and refilled. In 1959, a soda pop bottle typically made 21 such trips.[24] This system is still prevalent in places such as Germany, Finland, The Netherlands, and Prince Edward Island and Quebec, Canada. The use of refilling laws and 'eco-taxes' make these systems work well. However, without that type of incentive, retailers balk at refillable containers.

Typically, refillable containers appear to be successful for regional programs and with like-kind bottles. For example, dairies in the northeastern United States still successfully reuse their containers for home delivery. In Canada, the beer industry uses refillable bottles in Prince Edward Island, New Brunswick, Ontario and Quebec with a near-100-percent return rate, which help ensure that bottles are reused 15-20 times[25]. In addition, some Canadian policies supporting the refillable infrastructure, such as Ontario's tax on non-refillable containers, may help Canada's beer industry remain competitive with U.S. imports. In the US, such taxes and policies are lacking. Retailers desire to have a distinct brand and be identifiable by their packaging thwarts efforts to consolidate bottle-washing facilities. Packaging facilities must retrofit or add on wash and sanitizing lines or companies must build a stand-alone facility. Without the economies of scale, this infrastructure investment is not one they are willing to take on. A facility that services multiple entities would be the most economically feasible but not one that has a lot of appeal to businesses without policies to back up the process.

It is interesting to see our move away from refillable containers as shown in these two graphs from Brenda Platt and Doug Rowe, *Reduce, Reuse, Refill!* (Washington, DC: Institute for Local Self-Reliance, April 2002), produced under a joint project with the GrassRoots Recycling Network.



[24] *Reduce, Reuse, Refill!* (Washington, DC: Institute for Local Self-Reliance, April 2002), Brenda Platt and Doug Rowe
[25] Brewers Association of Canada. "A Clean Environment as an Essential Ingredient."



In conclusion, despite the relatively environmentally-friendly Colorado General Assembly and momentum by many other states to expand or add bottle bill legislation, the chances of doing the same in Colorado are low. Incentive-based programs that may increase glass (and other material) recycling will likely be implemented more aggressively in Colorado by the private sector as economics prove more solid, but this is unpredictable. With respect to the use of refillable containers, challenges would be significant including new policy, financial and other incentives to encourage private sector businesses to work together.

APPENDIX A

Best Management Practices for Glass Recycling in Northern Colorado
February 27, 2008 Stakeholder Meeting Notes

Following a presentation of national survey results on a variety of glass recycling programs and on current/pending state bottle bill legislation, the stakeholders discussed potential options for improving glass management in Northern Colorado.

Program Options Discussed

- Options for moving glass collection from curbside to drop site only
    - Consider relative economic & environmental impacts against status quo system
        - Evaluate drop site collection only
        - Phased in drop site collection
    - Balance service change (i.e., moving glass from curbside to drop site) with new service such as adding new material(s) to curbside collection or making yard waste collection more accessible
- Increase collection of commercial (bars & restaurant) glass
    - Evaluate ability to collect commercial glass at drop sites
- Implement aggressive public education campaign
    - Include honest message about difficulties/cost of glass recycling
    - Clarify that this is not a "new" problem
    - Explain the cost of recycling versus the cost of landfilling

Collection Options Discussed

- Add baffles or similar to vehicle hoppers to decrease breakage
- Decrease compaction
- Tip commingled materials on soft layer at MRF
- Decrease number of times handled - Larimer County MRF acts primarily as transfer station (such as with drop site only collection or direct generator to market haul)
- Develop glass transfer location to increase haul efficiency
- Reverse vending / automated collection

Processing Options

- Slow MRF speed
- Decrease material depth on belt
- Run sorted glass materials through twice
- Increase sorters on line - and increase sorter training
- Increase manual sorting of glass - or increase equipment technology (e.g., optical sorting for contaminants)
- Consider cost impacts of changing commingled glass sorting
    - More manual, slower processing and/or adding automated sort equipment

Market Options Discussed

- Increase recovery of glass collected - i.e., through more direct collection methods or improved processing
- Increase quality of glass - less contamination as important as shipping amber
- Increase bottle-to-bottle recycling - by supplying Rocky Mtn Bottling Company with greater quantities of high-quality amber cullet

Policy Options Discussed

- Mandatory recycling - at local level
- Recycling incentives (e.g., RecycleBank) - especially one to encourage drop site collection of glass
- Require recycling as part of issuing liquor license

Miscellaneous Notes

- In 2006, approximately 70,000 tons of glass was collected from generators
- 95% of all glass managed was destined for Rocky Mtn Bottling Company
- RMBC received roughly 20,000 tons - but could use in the vicinity of 75,000 tons local cullet per year
- Estimated recovery rates of collected (captured) glass is roughly 25-30%
- Alpine noted that with changes noted under Program Options a maximum recovery rate of 50% may be achieved - without recovery is closer to 20%
- RMBC specifications for amber bottles allow for a 80/20 ratio of amber/mixed color glass - their mixed bottle specifications are approximately 30/30/30 for all three colors
- These specifications are tied to quality, however - as contamination increases, the specifications may become more stringent

- HB1288 recycling grant opportunities
    - New drop site(s) for mixed color glass collection
    - Low-tech transfer site to consolidate glass shipments to Wheat Ridge

Please provide any input to these meeting notes to Laurie Batchelder Adams at 303-733-7943 or lbaassoc@qwes.net. The next step in this glass project will be the economic and environmental analysis of the most feasible options noted above. Results will be available in late April.

APPENDIX B
SERA COST SCENARIO MODEL

NORTHERN COLORADO SINGLE STREAM GLASS PROJECT
COST SCENARIO MODEL

Single Stream Scenario Comparison Sheet - Data Supplied by City of Loveland

Prepared for City of Fort Collins, City of Loveland, and Larimer County

Constructed by Lisa A. Skumatz, Ph.D. / Skumatz Economic Research Associates (SERA), Version V8a, under subcontract to LBA Associates
762 Eldorado Drive, Superior, CO, Phone: 303/494-1178 skumatz@serainc.com

User instructions: User modifies white cells.
Grey computed by model; purple rarely changed.
Summary results at top; data entry/computation below.

Scenario Description: Assumes 3 recycling trucks for EOW collection

SUMMARY RESULTS TABLE *Scenario Names=>*	A. Status Quo / Current Weekly Recycling Dual Stream (Base)	B. SS EOW with dropoff glass & bunker	C. SS EOW with glass in separate automated cart collected 1/mo	D. SS EOW with glass in "bin" collected manually 1/mo	E. SS EOW with glass insert - Poor/unreliable Information avail.	F. SS EOW with glass embedded	G. SS EOW with glass embedded / modified sort at MRF
Cost per household per hh/mo (trash & recy, excl education)****	$13.25	$11.85	$12.39	$12.04	$13.11	$11.78	$11.75
Education cost per hh/mo	$0.00	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08
Tons recycled curbside (to market)	5,815	5,912	5,963	5,963	6,736	6,400	6,534
Tons recycled separately (assumed to market; 65 base tons are glass)	1,421	1,766	1,817	1,817	1,351	1,351	1,351
Tons landfilled	15,004	14,492	14,390	14,390	14,083	14,419	14,285
Change in cost of recy collections/hh/mo (pos=increased cost)	$0.00	-$1.35	-$1.26	-$1.26	-$0.96	-$1.35	-$1.35
Change in cost of other recycling / hh / mo (pos=increased cost)	$0.00	$0.00	$0.09	$0.09	$0.00	$0.00	$0.00
Change in cost of processing / hh / mo (pos=decreased cost)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.04
Change in "rebate" (revenues) per hh/mo (incr=positive)	$0.00	$0.09	$0.10	$0.10	$0.05	$0.03	$0.04
Change in landfill cost / hh/mo (decrease=positive)	$0.00	$0.04	$0.05	$0.05	$0.07	$0.05	$0.06
Change in capital cost / hh / mo (increase=positive)	$0.00	-$0.10	$0.25	-$0.10	$0.84	-$0.10	-$0.10
Change in outreach cost / hh/mo (increase=positive)****	$0.00	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08
Percent recycled	32.5%	34.6%	35.1%	35.1%	36.5%	35.0%	35.6%
Change in vehicle miles traveled (changed to EOW)	0	-26,104	-23,020	-23,020	-18,200	-26,104	-26,104
Extra cost for fuel costs, per hh/mo, year 1(not separately in rates)	$0.00	-$0.17	-$0.15	-$0.15	-$0.12	-$0.17	-$0.17
Extra cost for fuel costs, per hh/mo, year 10	$0.00	-$0.23	-$0.20	-$0.20	-$0.16	-$0.23	-$0.23
Change in MTCE (from recycled tons)&&&	113.7	614.2	622.4	622.4	647.0	620.0	630.8
Change in tons CO (from diesel miles traveled)&	0.0	-0.3	-0.3	-0.3	-0.2	-0.3	-0.3
Change in Tons NOX (from diesel miles traveled)&	0.0	-0.5	-0.4	-0.4	-0.3	-0.5	-0.5
Change in tons THC (from diesel miles traveled)&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change in tons VOC (from diesel miles traveled)*&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change in tons Benzene (from diesel miles traveled)*&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change in tons Formaldehyde (from diesel miles traveled)*&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change in tons Acetalydehyde (from diesel miles traveled)*&	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New jobs in recycling - CO-wide&&&&	0.0	0.1	0.1	0.1	0.7	0.5	0.6
New economic output - CO-wide&&&&	$0	$14,568	$22,293	$22,293	$138,544	$87,899	$108,157

Cost / Logistical Assumptions for each scenario - user changes those in white cells; grey are calculated by model; purple settings tend to stay as they are.

Households	20,954	20,954	20,954	20,954	20,954	20,954	20,954
Population	60,000	60,000	60,000	60,000	60,000	60,000	60,000

	A	B	C	D	E	F	G	H	I	J
13		*SUMMARY RESULTS TABLE* *Scenario Names=>*	A. Status Quo / Current Weekly Recycling Dual Stream (Base)	B. SS EOW with dropoff glass & bunker	C. SS EOW with glass in separate automated cart collected 1/mo	D. SS EOW with glass in "bin" collected manually 1/mo	E. SS EOW with glass insert - Poor/unreliable Information avail.	F. SS EOW with glass embedded	G. SS EOW with glass embedded / modified sort at MRF	
44		Cost per Household (trash and recycling, excl outreach)	13.25	$11.85	$12.39	$12.04	$13.11	$11.78	$11.75	
45		Operating cost per hour - trash truck with staff	$50.97	$50.97	$50.97	$50.97	$50.97	$50.97	$50.97	
46		Operating cost per hour - recycling truck with staff	$46.48	$46.48	$46.48	$46.48	$46.48	$46.48	$46.48	
47		Operating cost per hour - special recycling truck with staff	$46.48	$46.48	$46.48	$46.48	$46.48	$46.48	$46.48	
48		Assumed hrs/day for trash truck	10	10	10	10	10	10	10	
49		Assumed hrs/day for recy truck	10	10	10	10	10	10	10	
50		Assumed hrs/day for special recycling truck	10	10	10	10	10	10	10	
51		Trash trucks on route	6	6	6	6	6	6	6	
52		Days each trash truck is on route per YEAR	208	208	208	208	208	208	208	
53		Recycling trucks on route	5	3	3	3	5	3	3	
54		Days each recycling truck is on route per YEAR (208=weekly coll'n)	208	104	104	104	104	104	104	
55		Number of special recycling trucks on route	0	0	4	4	0	0	0	
56		Days each special recycling truck is on route/YEAR	0	0	12	12	0	0	0	
57		Incremental operating hours trash trucks per year	0	0	0	0	0	0	0	
58		Incremental operating hours recy trucks per year	0	-7,280	-7,280	-7,280	-5,200	-7,280	-7,280	
59		Incremental operating hours special recy truck per year	0	0	480	480	0	0	0	
60		Assumed set out percent - trash (not used except check)	95%	95%	95%	95%	95%	95%	95%	
61		Assumed set out percent - recycling (not used except check)	60%	60%	60%	60%	70%	75%	75%	
62		Assumed set out percent - yard waste (not used except check)	24%	24%	24%	24%	24%	24%	24%	
63		Miles per gallon fuel - trash truck	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
64		Miles per gallon fuel - recycling truck	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
65		Miles per gallon fuel - special recycling truck	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
66		Cost per gallon fuel	$3.27	$3.27	$3.27	$3.27	$3.27	$3.27	$3.27	
67		Miles per average recycling route - On route excluding transfer, etc.	25	42	42	42	25	42	42	
68		Miles per round trip to transfer or glass bunker (midtown to Loveland Bunker)	8	8	8	8	8	8	8	
69		Total number of trips to transfer / bunker - per trash truck	1	1	1	1	1	1	1	
70		Total number of trips to transfer / bunker - per recycling truck	0	0	0	0	1	0	0	
71		Miles traveled per truck per day - Trash (incl. 1 RT to landfill 18 mi)	38.8	38.8	38.8	38.8	38.8	38.8	38.8	
72		Miles traveled per truck per day - Recycling route (incl 1 RT to MRF 18	43.0	59.7	59.7	59.7	51.0	59.7	59.7	
73		Miles traveled by "special" recycling truck - per truck per day	0	0	64.25	64.25	0	0	0	
74		Change in public education cost due to pgm (per hh / year)****	$0.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	
75		Cost for new containers (per container per HH)	$0.00	$55.00	$91.00	$55.00	$85.00	$55.00	$55.00	
76		Capital cost for new bunker or truck retrofit	$0	$3,000	$0	$0	$35,000	$0	$0	
77		Replacement cost per truck (trash)	$234,000	$234,000	$234,000	$234,000	$234,000	$234,000	$234,000	
78		Replacement cost per truck (recycling, excluding special)	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	
79		Assumed end of life value per truck (assume trash & recy similar)	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	
80		Years to spread container capital cost	15	15	15	15	15	15	15	
81		Years to spread other capital cost	15	15	15	15	15	15	15	
82		Years to spread truck replacement costs	5	5	5	5	5	5	5	
83		Cost for capital (percent interest rate) for containers	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	
84		Cost for capital (percent interest rate) for other capital	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	
85		Cost for capital (percent interest rate) for truck replacement	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	
86		Total capital cost (annual)	$3.39	$3.29	$3.64	$3.29	$4.23	$3.29	$3.29	

	A	B	C	D	E	F	G	H	I	J
13		*SUMMARY RESULTS TABLE* *Scenario Names=>*	A. Status Quo / Current Weekly Recycling Dual Stream (Base)	B. SS EOW with dropoff glass & bunker	C. SS EOW with glass in separate automated cart collected 1/mo	D. SS EOW with glass in "bin" collected manually 1/mo	E. SS EOW with glass insert - Poor/unreliable Information avail.	F. SS EOW with glass embedded	G. SS EOW with glass embedded / modified sort at MRF	
87		Extra MRF processing cost, per ton (if not embedded in "rebate")&&	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$8.65	
88		Net savings (rev) per ton for extra glass sort (special processing)&&	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$10.00	
89		Capital inflation rate (not currently used)	3%	3%	3%	3%	3%	3%	3%	
90		Operations inflation rate (not currently used)	3%	3%	3%	3%	3%	3%	3%	
91		Fuel inflation rate	3%	3%	3%	3%	3%	3%	3%	
92		Base tons recycling per household/yr	0.278	0.278	0.278	0.278	0.278	0.278	0.278	
93		Percentage pt increase in curbside recycling(incl participation & captur	0.0%	2.5%	3.0%	3.0%	4.5%	4.5%	4.5%	
94		Percent of recycled mat'l salable (assuming"100%" now) (route)**	100.0%	100.0%	100.0%	100.0%	100.0%	95.0%	97.0%	
95		Tons of glass NOT collected in single curbside truck (separate coll'n)(c	0	415	466	466	0	0	0	
96		Percent of glass usable**	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
97		Dollar per ton rebate / tip fee for material at recycling center (base)	$18.00	$18.00	$18.00	$18.00	$18.00	$18.00	$18.00	
98		Dollar per ton rebate / tip fee for material at recycling center (NEW)	$18.00	$18.00	$18.00	$18.00	$18.00	$18.00	$18.00	
99		Revenue per ton for dropoff (incl. glass) collected separately***	$58.30	$58.30	$58.30	$58.30	$58.30	$58.30	$58.30	
100		Base tons recycled	5,815	5,815	5,815	5,815	5,815	5,815	5,815	
101		Base tons disposed	15,004	15,004	15,004	15,004	15,004	15,004	15,004	
102		Base dropoff tons that are glass	65	65	65	65	65	65	65	
103		Tip fee per ton at landfill ($6.08/cu yd)	$20.20	$20.20	$20.20	$20.20	$20.20	$20.20	$20.20	
104		Assumed pounds per cubic yard (trash)	600	600	600	600	600	600	600	
105		Original total rebate for recycled tons (curbside and dropoff)	$187,514	$187,514	$187,514	$187,514	$187,514	$187,514	$187,514	
106		Computed total tons recycled (route-collected)	5,815	5,912	5,963	5,963	6,736	6,736	6,736	
107		Computed tons to market (route-collected less unsalable)	5,815	5,912	5,963	5,963	6,736	6,400	6,534	
108		Computed tons diverted to market including glass	5,815	6,327	6,429	6,429	6,736	6,400	6,534	
109		Change in tons to landfill	0	512	614	614	921	585	719	
110		Percent of curbside collection that is glass	14.5%	0.0%	0.0%	0.0%	14.5%	14.5%	14.5%	
111		Tons of material collected in single curbside truck that is glass	843	0	0	0	843	843	843	
112		Pounds per capita curbside recycling (computed as a check)	194	197	199	199	225	225	225	
113		Change in landfill costs (savings positive)	$0	$10,340	$12,408	$12,408	$18,612	$11,808	$14,530	
114		New material revenues (curbside and dropoff)	$187,514	$209,372	$213,270	$213,270	$200,018	$193,956	$196,381	
115		Change in material revenues (increased rebate positive)	$0	$21,857	$25,755	$25,755	$12,504	$6,441	$8,866	
116		Total Vehicle Miles Traveled (VMT)/yr - Trash trucks	48,464	48,464	48,464	48,464	48,464	48,464	48,464	
117		Total Vehicle Miles Traveled (VMT)/yr - Recycling trucks	44,720	18,616	21,700	21,700	26,520	18,616	18,616	
118		Total recycling vehicle miles traveled (total all trucks for year)	93,184	67,080	70,164	70,164	74,984	67,080	67,080	
119		Change in total vehicle miles traveled (all trucks for year vs. base)	0	-26,104	-23,020	-23,020	-18,200	-26,104	-26,104	
120		Subtotal change in landfilled cost/hh (per mo) (decrease=positive)	$0.00	$0.04	$0.05	$0.05	$0.07	$0.05	$0.06	
121		Subtotal change in recy colln cost / hh (per mo) (decr=positive)	$0.00	-$1.35	-$1.26	-$1.26	-$0.96	-$1.35	-$1.35	
122		Subtotal change in "other" recycling cost / hh/ month (incr=pos)	$0.00	$0.00	$0.09	$0.09	$0.00	$0.00	$0.00	
123		Subtotal change in recy values / hh (per mo) (incr=positive)	$0.00	$0.09	$0.10	$0.10	$0.05	$0.03	$0.04	
124		Subtotal change in recyc processing/hh (per mo) (decr=positive)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.04	
125		Subtotal change in trash coll'n cost/hh (per month) (decrease=pos)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	
126		Subtotal change in auxiliary costs for program (capital)/hh/mo	$0.00	-$0.10	$0.25	-$0.10	$0.84	-$0.10	-$0.10	
127		Incremental fuel cost / hh /mo - total	$0.00	-$0.17	-$0.15	-$0.15	-$0.12	-$0.17	-$0.17	
128		Other (not used)								
129		Other (not used)								

	A	B	C	D	E	F	G	H	I	J
13		*SUMMARY RESULTS TABLE* *Scenario Names=>*	A. Status Quo / Current Weekly Recycling Dual Stream (Base)	B. SS EOW with dropoff glass & bunker	C. SS EOW with glass in separate automated cart collected 1/mo	D. SS EOW with glass in "bin" collected manually 1/mo	E. SS EOW with glass insert - Poor/unreliable Information avail.	F. SS EOW with glass embedded	G. SS EOW with glass embedded / modified sort at MRF	
130		Other (not used)								
131		Midpoint MTCE per 100 tons curbside recyclables diverted&&&	8	8	8	8	8	8	8	
132		Midpoint NOX per diesel mile traveled (in grams/mi)&	16.75	16.75	16.75	16.75	16.75	16.75	16.75	
133		Midpoint CO per diesel mile traveled (in grams/mi)&	10	10	10	10	10	10	10	
134		Midpoint THC per diesel mile traveled (in grams/mi)&	1.355	1.355	1.355	1.355	1.355	1.355	1.355	
135		Midpoint VOC per diesel lmile traveled (in grams/mi)*&	1.1	1.1	1.1	1.1	1.1	1.1	1.1	
136		Midpoint Benzene per diesel lmile traveled (in grams/mi)*&	0.012	0.012	0.012	0.012	0.012	0.012	0.012	
137		Midpoint Formaldehyde per diesel lmile traveled (in grams/mi)*&	0.088	0.088	0.088	0.088	0.088	0.088	0.088	
138		Midpoint Acetalehyde per diesel lmile traveled (in grams/mi)*&	0.033	0.033	0.033	0.033	0.033	0.033	0.033	
139		Grams per ton conversion factor	907,184.7	907,184.7	907,184.7	907,184.7	907,184.7	907,184.7	907,184.7	
140		Jobs per ton of new curbside recycling (Colorado-wide)&&&&	0.00	0.08	0.12	0.12	0.75	0.47	0.58	
141		Economic output from new curbside recycling (CO-wide)&&&&	$0	$14,568	$22,293	$22,293	$138,544	$87,899	$108,157	
142		Notes:								
143		& source: "Health Assessment Document for Diesel Engine Exhaust", www.epa.gov/region5/air/toxics/indeex.html pages 2.34-2.41								
144		&& source: Napa recycling - assumes one staff at front of sort line and partial assignment of 2 others - assume 2 FTE for conservative assumption. Napa says they can do up to 8090 glass tons;								
145		savings are the net swing in dollars for glass per ton based on the color sorting by the sorter staff.)								
146		Revenue assumptions adjusted for Loveland - average sorted glass revenue $23 in Napa; assumed here it would be half the value (about what they get in Boulder) (figure from Napa=$18.91/ton savings								
147		&&&source: Skumatz and Freeman 2006, "2006 PAYT Update…" report, Skumatz Economic Research Associates, Inc. (SERA), Superior, CO								
148		&&&&source: Skumatz and Freeman, 2008, "Colorado Roadmap…", report, Skumatz Economic Research Associates, Inc. (SERA), Superior CO								
149		** source: no reliable source on this. Gillette says their MRF says there are no rejects reported under dual stream. Can revised number in scenario ("plug" number)								
150		*** source: Gillette says MRF currently provides $0 for glass; assumed already-separated glass would command a price of whatever is shown in this row; replaced with $58.30/ton avg for dropoff tons from Philbrick								
151		**** source: Skumatz and Green, 2002 "Optimizing Education Expenditures…", prepared by Skumatz Economic Research Associates, Inc. (SERA), Superior, CO for IaDNR, Des Moines, IA								
152		*& source: Memo from Pam Milmoe (Boulder Environmental Coordinator) to Lisa A. Skumatz (Skumatz Economic Research Associates, Inc. Superior, CO), April 18, 200								
153		*NOTE: At this time, no adjustments downward in trash routes have been modeled, but model has that capability.*							*5/28/2008 10:56*	
154										

APPENDIX C
NEW GLASS MARKET CASE STUDIES

City of Steamboat Springs, CO - Aggregate Substitute in Roads and Parking Lots In the late 1990s, the City of Steamboat Springs was faced with a glass recycling challenge. Rocky Mountain Bottle Company was no longer taking the City's bottles, and the community felt strongly something had to be done to avoid landfilling all of the glass. After acquiring roughly $30,000 in grant money from both the state and federal governments, and another $21,100 from various other small grants and local support, the City placed an RFP for a glass crusher. After reviewing the proposals, a Steamboat Springs business, Connell Resources, offered to design and manufacture a custom-made glass crusher for the City that would meet their budget at $40,000. Connell Resources donated roughly an additional $30,000 in time, materials, labor and space to see this project through. The crusher was designed to handle between 1,095 and 2,920 tons of glass annually (3-8 tons/day). The City of Steamboat generated only 240 tons annually.

Connell Resources ran a gravel pit, and was able to place the glass crusher conveniently inside the pit. This meant that transportation costs would be equal between hauling local gravel and local glass. Bottles were taken to the pit, and once crushed, were used in parking lots and as the base course in roads as 50% of the aggregate (it was not soft enough to be the top course on gravel roads). The glass was not washed in any way. The semi-softened shards that came out of the crusher were approximately 3/8" in size. Crews who used the glass according to specifications never had issues with the sharpness or handling of the glass.

For roughly four years this localized glass reuse program worked well, and met the needs of the City. Connell Resources eventually changed ownership, however, and the in-kind pieces of the deal were no longer viable. This, coupled with Waste Management's ability to begin taking the glass to Rocky Mountain Bottle Company, ultimately ended the program.

While this project was successful for a short period, it was not financially sustainable over the long term. It did point out, however, the potential for local use of recycled glass in small roadway/parking lot projects. It is probable, however, that larger scale projects could not sustain the incorporation of glass into roadway projects.

Vitrastone - Terrazzo Countertops, Tiles & Floors In 2007, Ryan Waxman opened Vitrastone in Durango, Colorado. With years of experience making terrazzo, Ryan started his own company making a unique style of terrazzo[1]. Vitrastone makes a terrazzo using mostly 1/8" sand from recycled glass, as well as a little 3/8" glass, which is collected and crushed (resulting in a soft-edged glass product, not shards) by the City of Durango.

[1] Terrazzo is defined as "a composite material poured in place or precast, which is used for floor and all treatments. It consists of marble, quartz, granite, glass or other suitable chips, sprinkled or unsprinkled, and poured with a binder that is cementitious, chemical or a combination of both. Terrazzo is cured, ground and polished to a smooth surface or otherwise finished to produce a uniformly textured surface." (According to the National Terrazzo and Mosaic Association, Inc.)

The city owns an Andela glass crusher that produces the two sizes of glass used by Vitrastone. Their process includes tumbling the glass to some degree, which creates a softer product (rounder, less sharp edges) and improves handling. They do not wash the glass, which has created a dust issue of concern for some city employees. The city has researched the issue and found no imminent health concern (such as silicosis), but observed that the dust can be annoying for those who handle it on a regular basis. Durango sells this material for $10/yard. However, the city feels the viability of their recycled glass products is not strong. The market is small, with only a few dedicated consumers (Vitrastone being one). Most of their glass generally goes to Rocky Mountain Bottle Company, although they are currently facing a shipping dilemma - they cannot find a hauler willing or able to take the three truck loads of accumulated glass. Some of the non-amber glass is sold to the public and the city itself uses some for projects such as bedding under water pipes.

In his first year of operations, Vitrastone purchased roughly 25 tons of glass. When asked what he would do if the City of Durango no longer was able to supply him with glass, Waxman indicated that he would most likely have to close his doors, as purchasing glass from out of state is not something he could afford. The local proximity of the glass he currently gets, combined with the fact that the City of Durango does all the processing, allows the costs to stay lower and have contributed to the success of Vitrastone thus far. It should be noted that Waxman originally tried to interest the city in a partnership, with the hope of creating more local jobs using recycled materials. The effort was unsuccessful, however.

In the meantime, using Vitrastone's terrazzo provides local green builders US Green Building Council LEED rating points for using local materials. This selling point - applicable to any business providing green building materials - is something Vitrastone promotes proudly.

Glass Roots - Glass Tiles & Landscaping Material Glass Roots, located in Bozeman, Montana, is a brand new company that uses solar power to make glass tiles out of 100% recycled glass generated locally. Up until recently, the City of Bozeman was selling its glass from the curbside recycling program to a local Holcim cement plant, where it is used as an aggregate substitute in their cement. After Holcim stopped using glass, the city was been faced with a true recycling challenge (not unlike what most of the cities within Colorado would be facing were Rocky Mountain Bottle Company to stop taking glass). While the city still collects and crushes glass, their only outlet is as daily cover at the landfill. Jennifer Pearson, a Bozeman resident, opened Glass Roots in 2008 to in part help alleviate this recycling issue.

Currently Glass Roots uses only 10% of the city's glass in its production of glass tiles, but hopes to increase this to 100% in the near future. Due to a partnership with Xanterra, the operator of Yellowstone National Park's hotels, restaurant and stores, Glass Roots will also be receiving all of the glass from the entire park system. This will allow the business to expand into the production of terrazzo and landscaping materials. The vast amount of glass material locally, coupled with a willing partnership from the local branch of a large business, are key factors in keeping costs down and the ability to expand products. However, funding is still insufficient for the start-up business on both a local and state level. Unlike the Pollution Prevention Advisory Board grant money recently available in Colorado, there is no state-level grant promoting sustainable business opportunities in Montana. Any grant money has been specifically geared toward renewable energy.

While exact tonnages were not available from Glass Roots, two other glass tile manufacturers did provide quantity information. Stardust Glass, a new business located in Portland, Oregon, uses roughly 10 tons/year of clear glass that is purchased through a broker. They dye the glass as needed themselves. On the other end of the spectrum, Bedrock Industries, located in Seattle, Washington, collects roughly 100 tons/year, although they only use some of this tonnage in actual production. Bedrock Industries collects glass locally, within a 25-mile radius of their business, and pay residents $0.20/lb. They do not dye their product.

Additional data can be provided on the following market topics or from the following resources:

1. *Documents from City of Steamboat Springs Project*
2. *Articles of interest*
   - *Fiberglass and Composite Manufacturing, P2Pays*
   - *Silicosis in Sand Blasters, NIOSH and CDC, 2002*
   - *Respiratory Health Aspects of Ground Glass Vs. Ground Silica, CWC 1995*
   - *Glass Roots Gives New Life to Bozeman Glass, New West, 1-16-2008*
   - *Stardust entrepreneurs get fired up, SustainableLife, 4-10-2007*
   - *Green Guardian, Twin Cities recycling guide*
   - *P2Pays, uses of glass in and on roads in Minnesota*
   - *SWAN, list of uses for glass in Alaska (while many small communities do indeed own and operate glass crushers very effectively, much of the glass is still used as a daily cover)*
3. *National Terrazzo and Mosaic Association, Inc.*
4. *Vitrastone, Durango-based terrazzo company*
5. *EnviroGLAS, Texas-based terrazzo company*
6. *Glass Roots, Montana-based start-up*
7. *Bedrock Industries, Seattle-based business with 15 years experience*
8. *Clean Washington Center, including an extensive list on possible uses for glass material*
9. *Individual sources:*
   - *Todd Zentner, OSHA Denver Office, 303-844-5285, ext 111*
   - *Nancy Andrews, City of Durango, 970-375-4830*
   - *Wendy DuBord, City of Steamboat Springs, 970-879-8851*
   - *Shannon at Northern Colorado Sandblasting, 970-308-2991*

APPENDIX D
BOTTLE BILL SUMMARY

Arizona Arizona House Bill 2760 would add a five-cent deposit to all 24-ounce containers for beer, soft drinks, distilled spirits, wine, wine coolers, juices, teas, coffee, and water. For containers over 24 ounces, it's a 10-cent deposit. A one-cent handling fee would be established as well. The bill also establishes a state-run Beverage Container Recycling Fund, and gives six months for retail outlets, including grocery, convenience, and liquor stores, to establish on-side redemption centers.
Update: House leadership disallowing the Environment Committee to hold hearings on this bill.

Connecticut In the Constitution State, Senate Bill 357 looks to expand the beverage redemption system to include water bottles, establishing a five-cent redemption value on such products. The measure also looks to make several other amendments, including limiting the per-day amount of containers an individual could redeem to no more than 50.

Florida All organizations, associations, businesses, and institutions receiving state funds would be required to recycle beverage containers, including glass bottles, under proposed legislation (House Bill 301 and Senate Bill 692). This would also include the state capitol and legislative offices. Any recycling program proceeds would go back into operation and administrative costs. If approved, the law takes effect July 1, 2008.

Iowa Governor Chet Culver is supporting an increase to six cents, up from five cents, for the state's consumer deposit program. This is partly in response to redemption center operators telling state legislators that they want their handling fee increased. The Governor also expressed a desire to see the program include non-carbonated beverages.
Update: Governor now seeking to expand deposit program rather than raise deposit.

Kansas Bottle-bill legislation introduced in early 2007 has received new life. Senate Bill 258 establishes a recovery system for beverage containers housing all forms of alcoholic beverages, cereal malt beverages, mineral and soda water and carbonated soft drinks. The measure institutes a five-cent deposit for each container purchased, as well as offers redemption centers a two-cent handling fee. One notable provision regarding the deposit level states that, by July 1, 2009, if Kansas' beverage container recycling rate is below 60 percent, the per-container deposit will increase to 10 cents.

Hawaii SB 2711 permits the state to distribute surplus funds — taken from the island's Deposit Beverage Container Special Fund — to local counties to support the establishment and maintenance of beverage bottle and related county-run recycling programs. Counties would use the funding to reimburse refund values, pay handling fees to redemption centers, fund the reverse vending machine rebate program, and fund the redemption center and recycling infrastructure improvement program.

Massachusetts The Massachusetts Legislature is considering expanding the state's current bottle deposit system to include water and other non-carbonated beverage containers. Under the proposed measures, this five-cent deposit would increase to 10 cents and include non-carbonated drinks, such as tea, sports drinks, and water beverages. Currently, a five-cent deposit is required on bottles and cans that contain carbonated beverages, such as soft drinks and beer.

Update: Recently tabled by the legislature's Joint Committee on Telecommunications, Utilities and Energy.

Michigan Governor Jennifer Granholm (D) signed into law SB 513, which amends the state solid waste disposal regulations. This includes the provision that more than a de minimis amount of beverage containers, including glass, may not be disposed of in a landfill. Additionally, landfill operators may not knowingly accept more than a de minimis amount of beverage containers. The law goes into effect March 27th, 2008.

Minnesota The Minnesota House has introduced three House Files — 4046, 4047 and 4048 — that would create a beverage container redemption program for the Land of 10,000 Lakes. HF 4046 creates a comprehensive system that covers any "drink in liquid form for human consumption." The measure requires manufacturers to register in the state by July 1, 2009, setting registration fees for bottlers in the state at $5,000 for manufacturers that sell 10,000 or more bottles annually and $2,500 for those that sell fewer than 10,000 bottles. It also would cause them to be responsible for setting up collection and recycling programs, encouraging them to work with retailers, wholesalers, local governments, etc., to do so. Furthermore, the measure requires that manufacturers achieve a recycling rate of no less than 80-percent for the previous program year. Penalties under the measure were left blank for later inclusion. The second bill, HF 4047, establishes a redemption value of no less than 10 cents for each beverage container sold in state, while HF 4048 enacts a landfill ban on all covered beverage containers July 1, 2010.

New Jersey Assemblywoman Valerie Huttle (D) has filed legislation that would create a bottle-deposit program. The bill would require a 10-cent deposit on most plastic, metal, and glass containers under 24 ounces and a 20-cent deposit on containers between 24 ounces and a gallon. Beer, wine, carbonated and non-carbonated beverages, juices, teas, water and liquor are included in the bill's definition. Milk and dairy products would be exempt. Governor Jon Corzine has signed AB 1886, the "Recycling Enhancement Act", which restores a $3 per-ton recycling tax on all solid waste not transported to either a recycling center or MRF. Revenue from this program is estimated to bring $24 million per year to the state, which will be used by state and local agencies to enhance their recycling programs. Sixty-percent of this money will be used specifically for municipal and county recycling.

North Carolina House Bill 1518 requires holders of certain Alcoholic Beverage Control (ABC) permits to recycle all recyclable containers of all beverages sold at retail on the premises and to prohibit the disposal of those containers in landfills or by incineration effective January 1, 2008. One town is instituting a pilot program to help local businesses recycle their containers, which need to be separated by type, and glass by color, by supplying bins and collection.
Update: With ABC permit holders now required to recycle glass, plastic, and aluminum containers in North Carolina, Downtown Raleigh Recycles is boosting outreach to bars and restaurants. This includes adding a fourth recycling collection day to accommodate heavy weekend bar traffic, recycling workshops for bar/restaurant owners, and paid advertisements.

Pennsylvania Bottle bill deposit legislation (Senate Bill 1035) introduced by State Senator John Rafferty (R) would place a minimum five-cent deposit on carbonated, non-carbonated beer and other malt beverages. Wine and dairy are not included in the list of affected beverages. While glass, aluminum, and plastic would all be subject to the pending deposit, juice boxes, paperboard, and all other aseptic

packaging would be exempt. The majority of unclaimed deposits would be designated for the state's hazardous waste clean up program.

Rhode Island Senate Majority Leader Theresa Paiva-Weed has introduced Senate Bill 2771, which creates consumer deposit legislation for beverage containers. The bill would require consumers to pay a 5-cent deposit on all plastic and glass bottles and aluminum cans containing carbonated and non-carbonated drinks, juice, sports drinks, water, soda, wine and beer. Aseptic packaging would be exempt.
Update: This is new since February.

South Dakota House Commerce Committee has unanimously approved a measure that establishes a beverage container redemption system. Under House Bill 1177, the system establishes a per-beverage container litter reduction fee of five cents for containers that house liquids, including beers, ales and other malted beverages; spirits and mixed spirits; wine and mixed wine; tea and coffee drinks; soda; carbonated and non-carbonated water; and dairy products. A one-and-one-half-cent handling fee would be established as well. All proceeds from the litter reduction fee would be deposited into a newly created beverage container litter reduction grant fund. For the program's first year of operation, only plastic beverage containers would be recognized by the redemption system. All plastic, aluminum, and other metal beverage containers would be accepted as of the second year, with glass and all other metal containers being added to the program as of the third year. Additionally, redemption centers would be in charge of establishing a per-day figure for individuals redeeming beverage containers; however, the established figure could be no less than 250 containers. If approved, the statewide redemption system would take effect July 1, 2009.
Update: Was tabled in February.

Tennessee Last year, SB1408 and HB1829 were introduced in legislature but not brought forward. The same bills will be "recycled" in 2008. There are four major parts:

- Redemption centers are entirely voluntary under the bill, and must meet certification requirements for such things as location, hours of operation, access, safety and hygiene (a 3-cent-per-container handling fee will insure plenty of applicants.) Retailers who wish to act as redemption centers must apply for certification like everyone else.
- Distributors are not involved in the post-redemption process. Instead, a network of private recycling firms will provide pickup, verification, processing and brokering services in return for all or some of the scrap value. Containers will be sorted by material and color only, and counts will be independently certified by weight and/or volume.
- The state handles the money, collecting the initial 5-cent deposits and 3-cent handling fees from the distributors, and disbursing payments to the redemption centers. Unclaimed deposits remain with the program and must be used exclusively for purposes related to the bill. All program costs, including an estimated 24 new staff positions within the Division of Solid Waste Management, will be covered by the handling fees.
- A portion of the unclaimed deposits ($10 million) will be used to continue to fund the popular "county litter grants" program, which uses county prisoners to pick up litter and also supports litter education by counties as well as Keep Tennessee Beautiful. Existing "litter taxes" on beer and soft drinks, which have funded the program since 1981, will be eliminated.

Utah HB 469 would allow a recycling fee to be levied onto the purchase of all containers housing malt beverages.
Update: New since February.

Vermont Legislators will consider SB 307, which would amend the state's consumer deposit program and require that operators of redemption centers participate in a container commingling program. The bill would also require beverage container manufacturers or distributors to pay an additional one-half cent per container, for those that are not commingled.

Virginia The Virginia Legislature introduced a resolution that would require the state to undertake a study on container redemption and recovery. Rep. John Cosgrove (R) introduced legislation (HB1549) that would require all "on-premises" Alcoholic Beverage Control licensees to recycle glass containers, if they are located within 50 miles of a recycling center. The legislation is similar to an existing law in North Carolina requiring ABC permit holders to recycle bottles and cans. Virginia legislation also includes a $50 civil penalty (per day) for each establishment in violation. This bill is currently in the Assembly Committee on Laws awaiting further action.

West Virginia The West Virginia Beverage Container Recycling and Litter Control Act was introduced in both the House (HB 2773) and Senate (SB 135) on January 9th. The deposit amount recommended is 10 cents and all airtight beverage containers of glass, aluminum, or plastic, under 1 gallon (excluding dairy products) would be covered.
Update: Bill went relatively unnoticed this regular session, as lawmakers made it the sixth straight year such a program was denied. Bottle bill proponents hope Mountaineer State lawmakers will give the issue plenty of study time during this year's monthly interim meetings.

Alberta, Canada Considering changing deposit rules to increase deposit from $.05 to $.10 ($CDN) and adding milk containers to the list of containers subject to the rules. The rules would establish separate deposit rates for different sized containers, levying a $.20 deposit on containers larger than 1 liter.