

City of Lawrence

**Sustainability Advisory Board (SAB)**

August 12, 2009 (5:30 PM) Meeting Minutes

MEMBERS PRESENT:	Chris Cobb, Sarah Hill-Nelson, Matt Lehrman, Laura Routh, Simran Sethi, Brian Sifton
MEMBERS ABSENT:	Dickie Heckler, Beth Johnson, Daniel Poull, Cindy Strecker
STAFF PRESENT:	Kathy Richardson
GUESTS PRESENT:	
PUBLIC PRESENT:	Jeanette Walther

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**Call Meeting to Order (Laura Routh, Secretary)**  
**Take Roll Call to Determine Quorum of Members**

**ANY PRESSING ITEMS**

Laura Routh requested that her comments regarding staff's report on waste diversion strategies for Lawrence be attached to the SAB Minutes. She stated she emailed these comments to Commissioners and the City Auditor. There was no board discussion regarding this document or Laura's comments (see attached).

**APPROVAL OF MEETING MINUTES**

**Motion** and second to approve the July 8, 2009 minutes (Sifton/Sethi).  
Vote: Motion was passed unanimously.

**Discuss Status of Recycling and Waste Programs in Lawrence**

Laura Routh drafted a list of SAB recommendations on recycling and waste programs which the board will submit to the City Commission. The board discussed the list of recommendations and asked Laura to edit the document to reflect their discussions at this meeting. Here are the edits:

1. Discussed switching the order of PAYT and city-wide city-sponsored curbside recycling since waste reduction is the more important.
2. Discussed wordsmithing and adding explanation to some of the listed items.
3. SAB agreed to delete the item on licensing curbside recyclers and recycling centers.
4. Discussed the recommended waste reduction and recycling goal. What is the goal? Higher recycling rate? Focus on waste reduction by lowering pounds per person per day? Or keep "50 by 15"? The board commented that "50 by 15" is a catching phrase but no one understands what it means. SAB agreed that Daniel Poull (absent) needs to be involved in the conversation if SAB plans not to use the "50 by 15" recommendation.
5. SAB agreed to delete the part of analyzing the yard waste collection program for efficiency and cost savings.

**Action:** Laura Routh will edit the list of recommendations and email the revised one to SAB.

Laura also commented that the City Commission will ask SAB to recommend 3 people for the Public Incentive Review Committee. This topic will be discussed at the SAB September meeting.

## **SAB Brochure Progress**

SAB discussed the latest draft of the SAB brochure. The board agreed that the current brochure needs a lot of work. SAB discussed whether or not they need a brochure. Sarah Hill-Nelson suggested changing the brochure to a single panel flyer or bookmark, instead of a full brochure.

**Action:** Sarah Hill-Nelson will create a SAB bookmark to replace the brochure by next meeting.

## **Lawrence Energy Conservation Fair Update**

Kathy Richardson sent an update on the Lawrence Energy Conservation Fair and Sustainable Homes Tour with the WRR staff report (see attached). Reminder: the Energy Fair will take place on Saturday, September 12<sup>th</sup> from 10 am to 4 pm at the Community Building located at 115 W 11<sup>th</sup> Street. The Tour buses will leave from the Community Building at 10 am and 1 pm.

SAB agreed to have an informational booth at the Energy Fair. Brian Sifton and Simran Sethi volunteered to be at the SAB table. Brian will fill out the event registration form.

The following SAB members signed up to volunteer with Energy Fair tasks:

Distribute Posters prior to the event – Laura Routh

Event Set Up (7:30 am to 9:30 am) – Cindy Strecker, Brian Sifton, Chris Cobb

Event Break Down (4:00 pm to 5:00 pm) –

Tour Guide (9:45 am to 4:00 pm) – Daniel Poull

## **Peak Oil Task Force Update**

Chris Cobb attended the last Peak Oil Task Force (POTF) meeting and gave an update. POTF is currently working on its recommendations. Although Chris Cobb had volunteered to attend the POTF meetings as the SAB representative, he reminded the board that he will no longer be a SAB member as of the first of the year 2010. Chris will complete his SAB second term appointment in December so he thought the board may want to choose a different representative for the POTF meetings. SAB decided to place this as an agenda item for the September meeting.

## **Waste Reduction & Recycling Report**

The WRR report was emailed to SAB (see attached).

## **Guest comments and miscellaneous**

Sarah Hill-Nelson announced that there will be a public meeting tomorrow at 5:30 pm at the North Lawrence Depot to discuss Bowersock's proposal to add a new power house.

Jeanette Walther commented she has concerns with the cost of implementing city-wide curbside recycling. Currently her family recycles using the drop off recycling bins throughout town. She believes the current options for recycling work for most in this community and if a family wants curbside service they can sign up with one of the private curbside recycling companies.

## **Meeting adjourned 7:30 p.m.**

Next meeting: September 9th, 2009 at 5:30 pm.

## **Attachments:**

- Laura Routh's comments - Evaluation of Waste Diversion Strategies for Lawrence Report
- Waste Reduction and Recycling Division Report



## Waste Reduction and Recycling Division Report for the Sustainability Advisory Board (08/12/09)

### **FIBERS REPORT**

#### OLD CORRUGATED CONTAINERS (OCC)

Cardboard	Tons	Revenue
Current YTD	<b>771.31</b>	<b>\$36,321.90</b>
Prior YTD	720.40	\$91,272.24
Avg. Price/ton thru July 2009:	<b>\$47.09</b>	Avg. price/ton thru July 2008: \$126.70

#### OLD NEWSPAPERS (ONP)

Newspaper	Tons	Revenue
Current YTD	<b>326.60</b>	<b>\$8,749.56</b>
Prior YTD	399.35	\$52,089.36
Avg. Price/ton thru July 2009:	<b>\$25.80</b>	Avg. Price/ton thru July 2008: \$130.44

#### OFFICE WASTE PAPER (SOP)

Sorted Office Paper	Tons	Revenue
Current YTD	<b>21.91</b>	<b>\$1,971.90</b>
Prior YTD	16.80	\$3,631.30
Avg. Price/ton thru July 2009:	<b>\$90.00</b>	Avg. Price/ton thru July 2008: \$216.15

#### MIXED WASTE PAPER (MIX)

Mixed Paper	Tons	Revenue
Current YTD	<b>164.60</b>	<b>\$1,965.10</b>
Prior YTD	109.66	\$9,998.35
Avg. Price/ton thru July 2009:	<b>\$11.94</b>	Avg. Price/ton thru July 2008: \$91.19

<b><u>TOTAL</u></b>	<b><u>YTD</u></b>	<b><u>TONS</u></b>	<b><u>REVENUE</u></b>
		<b>1,284.41</b>	<b>\$49,008.47</b>
Prior YTD		1,246.20	\$156,991.25

Note: Mixed Paper and Cardboard prices have risen for August, and Newspaper has remained the same.

## HOUSEHOLD HAZARDOUS WASTE (HHW) PROGRAM REPORT

Month	HHW Drop-Offs	Battery Bags in Mail	Appt No Show	Home-bound	Saturday Collection	Abandoned Waste	Orphan Waste	SQG Inventory	SQG Drop-off	Product Reuse Appt
January	153	6	18	0	0	4	0	17	15	13
February	106	1	6	0	0	3	0	13	14	15
March	183	2	14	0	0	5	0	5	4	25
April	180	3	10	0	11	3	0	10	10	49
May	214	4	27	0	31	1	0	14	13	68
June	285	3	20	0	44	3	0	9	9	74
<b>July</b>	<b>319</b>	<b>0</b>	<b>24</b>	<b>0</b>	<b>31</b>	<b>3</b>	<b>0</b>	<b>13</b>	<b>12</b>	<b>75</b>
August										
September										
October										
November										
December										
<b>TOTAL</b>	<b>1440</b>	<b>19</b>	<b>119</b>	<b>0</b>	<b>117</b>	<b>22</b>	<b>0</b>	<b>81</b>	<b>77</b>	<b>319</b>

## COMPOST PROGRAM

The new electronic gate at the Compost Facility is operational and working great. Sixty eight (68) landscapers have signed up and were issued access fobs.

## YARD TRIMMINGS COLLECTION: YEAR TO DATE

	January 2009	February 2009	March 2009	April 2009	May 2009	June 2009	July 2009
Total Tons collected curbside	NA	NA	1,210.53	1,013.77	1,138.74	1,081.67	673.63
Commercial YW received	1.9	17.1	180.20	181.8	225.5	187	220.2
Other YW received (Christmas Trees)	28.06 (2,245 trees)	NA	NA	NA	NA	NA	NA
Total tons this month	29.96	17.1	1,390.73	1,195.57	1,364.24	1,268.67	893.83
Average Preferred Container Compliance	NA	NA	98.9%	99.3%	99.5%	99.7%	99.8%

## **Lawrence Energy Conservation Fair**

The City of Lawrence Waste Reduction and Recycling Division will host the 9<sup>th</sup> Annual Lawrence Energy Conservation Fair on Saturday, September 12<sup>th</sup> from 10 a.m. to 4 p.m. at the Community Building located at 115 W 11<sup>th</sup> Street. The Sustainable Homes Tour buses will leave from the Community Building promptly at 10 a.m. and 1:00 p.m. Information about the Fair and Tour is posted on the City's website <http://www.lawrenceks.org/wrr/energyfair>.

**SPONSORS** - Confirmed Sponsors of the Lawrence Energy Conservation Fair are listed below.

### **\$750 Sponsors**

Black Hills Energy  
Cottin's Hardware and Rental  
Cromwell Environmental  
GreenTech Efficiency Solutions

### **\$500 Sponsors**

Absorbent Ink (In-Kind)  
Hughes Consulting Engineering

### **\$250 Sponsors**

Ground Source, Inc.  
Lawrence Chamber of Commerce (In-Kind)  
Scott Temperature

**EXHIBITORS** – A total of 28 exhibitors have registered for the Lawrence Energy Conservation Fair so far. The deadline for the exhibitor registration is next Monday, August 17<sup>th</sup>. The registration form and event guidelines are posted on the following webpage: <http://www.lawrenceks.org/wrr/energyfair>

**SUSTAINABLE HOMES TOUR** – Applications were received from several homes and businesses in the Lawrence area. Staff and volunteers met to review the applications. The AM and PM tour schedules will soon be finalized and tour posters will be created. Staff submitted a grant proposal to National Solar Tour to help cover advertising costs.

**PUBLICITY** – Staff has submitted the following:

Posted event information on: WRR website, City of Lawrence Google calendar, and various community online calendars  
Posted event information on: City's Facebook and Twitter  
Mailed out Save the Date postcards (count: 400)  
Running event slides on City's Channel 25  
Sent out two News Releases "Call for Entries" for both the Energy Fair and Homes Tour  
Submitted event information to various community newsletters (The Merc, Jayhawk Audubon Society, Kansas Land Trust, Downtown Lawrence Inc., Homebuilders Association, Sierra Club, and Neighborhood Associations)  
Submitted event information to email groups (City's Reduce, Reuse and Recycle group, Lawrence Sustainability Network Announcements, and Lawrence Sustainability Action Network)  
Mailed out August Utility Bill Insert (count: 31,000) (see design below)  
Planned - distribute event posters (count: 150) and flyers (count: 400)  
Planned - place event information in Free State Brewery display case  
Planned - distribute Sustainable Homes Tour booklet and posters  
Planned - advertise event in KPR, LJWorld online, Lawrence Journal World print, and The Kansan  
Planned - send out two News Releases "Event Announcements" for both the Fair and Homes Tour

Front of August Utility Bill Insert:

# LAWRENCE ENERGY CONSERVATION FAIR 2009

Learn how to save **money,**  
**energy** and the **environment.**

**SATURDAY, SEPTEMBER 12th • 10am-4pm**

**Community Building • 115 W. 11th Street • Lawrence, Kansas**

**FREE  
ADMISSION**

- EXHIBITORS
- ALTERNATIVE FUEL VEHICLES
- SPEAKERS & WORKSHOPS
- SUSTAINABLE HOMES TOUR
- CHILDREN'S ACTIVITIES



City of Lawrence

WASTE REDUCTION & RECYCLING

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Back of August Utility Bill Insert:

Make plans to attend the 9th Annual Lawrence Energy Conservation Fair on Saturday, September 12th from 10am to 4pm. The Fair will take place at the Community Building located at 115 W. 11th Street.

**For more information: 785-832-3030**  
**[www.LawrenceRecycles.org](http://www.LawrenceRecycles.org)**

We would like to recognize our primary sponsors:



Printed on recycled paper with 30% post-consumer fiber.



The Lawrence Transit System will offer free rides on the T all day Saturday, September 12th, providing the experience and benefits of public transportation on all fixed routes. For more information, visit [www.lawrencetransit.org](http://www.lawrencetransit.org)

The Sustainable Homes Tour will showcase renewable energy building design, materials, construction methods and energy saving appliances. Tour tickets will be sold at the Fair and buses will leave at 10am and 1pm from the Community Building.

## EVALUATION OF WASTE DIVERSION STRATEGIES FOR LAWRENCE 2009 UPDATE

Laura Routh comments and questions in green, below (web links in blue).

Please note that my comments/questions below are being submitted to staff and the Commission by me, as a citizen. The following comments and questions are not intended to represent the opinion of the SAB.

- Possible questions for the auditor to consider are noted with bullets.

### Introduction

The city's Sustainability Advisory Board asked the Solid Waste Division in 2008 to commission a survey on recycling. Those results were reviewed by the City Commission. The City Commission and City Manager's Office requested an update of the waste diversion strategies and costs presented in 2004.

The SAB specifically recommended the City commit to a goal of 50% by 2015. Will this recommendation be addressed by the Commission or staff?

The Solid Waste Division looked at waste diversion strategies for Lawrence in 2004 and concluded in that report that the current recycling strategy should be continued and expanded on.

**As described in the newspaper excerpts below, the City's Solid Waste Division has been making the same argument against curbside recycling (without providing much substantive or supporting data) since 1992:**

**October 28, 2004:** [www2.ljworld.com/news/2004/oct/28/city\\_recycling\\_would/](http://www2.ljworld.com/news/2004/oct/28/city_recycling_would/)

*"The department is recommending that city commissioners once again take a pass on establishing the program, which has been periodically studied since the early 1990s. "We don't think a program would increase the total amount of material recycled to any great extent, and the cost of the program is pretty high," said Bob Yoos, solid waste division manager. But the fact city residents already do a better-than-average job of recycling makes it more difficult to justify a curbside recycling program, Yoos said. He said a 1995 study commissioned by the city found that a curbside recycling program would increase the city's recycling rate by no more than 3.5 percent. He said despite its age, he was confident the study was still accurate".*

**May 2, 2001:** [http://www2.ljworld.com/news/2001/may/02/city\\_briefs/](http://www2.ljworld.com/news/2001/may/02/city_briefs/)

*"...curbside recycling remains prohibitively expensive for the time being. Bob Yoos, the city's solid waste division manager, reported on the city's recycling program Tuesday to the Lawrence City Commission. He said that, between public and private sector efforts, more than 21,500 tons of materials were recycled in Lawrence in 2000 -- a recycling rate higher than the national average and believed to be the highest in the state. Curbside recycling, Yoos said, would pick up much of those materials and probably increase the total amount by 3.5 percent. Compared to the \$5 million needed to start up such a program, the benefit would be negligible. Commissioners have said implementation of a curbside recycling program is one of their top goals for the next year".*

**March 13, 1995** [http://www2.ljworld.com/news/1995/mar/13/survey\\_on\\_recycling/](http://www2.ljworld.com/news/1995/mar/13/survey_on_recycling/)

*"Most Lawrence residents say they're ready for city-sponsored curbside recycling, but don't start separating your glass, aluminum and paper just yet. Municipal curbside recycling isn't included in the city's immediate plans, although 56 percent of the people surveyed in November said they would like to see the city crank up a comprehensive recycling program. The reason: The city's already working on a*



*recycling timetable, and the first units already online are the most efficient, said Bob Yoos, the city's solid-waste superintendent. Curbside recycling would cost the city \$1 million for equipment alone, and keep only 2,000 tons of glass, cans and paper from the landfill. "It would be very convenient, but very expensive," Yoos said this morning. "A lot of communities are finding that there are much more cost-effective ways to reduce waste." Taken together, city recycling programs have diverted 29 percent of the city's waste stream from entering the landfill -- the best rate in Kansas, Yoos said".*

**April 17, 1992:**

[http://www2.ljworld.com/news/1992/apr/17/study\\_lauds\\_local\\_effort/](http://www2.ljworld.com/news/1992/apr/17/study_lauds_local_effort/)

*"The city should expand recycling of yard wastes, but running a city-wide curbside recycling program would be impractical and too costly for residents. These are the findings of a 69-page Department of Public Works sanitation report on city recycling that Lawrence city commissioners will consider on Tuesday. For some communities, just the savings in landfill costs is enough to justify a city curbside program, Yoos said. Not so in Lawrence. "We have very reasonable landfill disposal costs, so our cost savings aren't very significant," Yoos said. "Essentially, it would increase the cost to the ratepayer."*

### **In regard to recycling, I believe that the City of Lawrence can and must evolve.**

Recycling opportunities, both public and private, had achieved a 34 percent recycling rate in 2003 which was believed to be the highest in the state and higher than typically achieved utilizing curbside collection of recyclables (*emphasis mine*). This is Bob's opinion.

- **Is there a reference or citation that can be verified to support the aforementioned statement?**

In a survey of citizens conducted in 2007, residents reported high satisfaction with solid waste services. Indeed, 91% reported being very satisfied with residential trash collection. And, on some level, why wouldn't citizens be happy with the status quo? **In Lawrence, a resident can dispose of unlimited amounts of waste for one low monthly rate. In 2008, the monthly rate was \$12.68.** Bob indicated at our July 2009 SAB meeting that 10-15% of the City's cost for managing waste is associated with actual disposal or tipping fees at the landfill. That seems to me to even further reinforce the notion that we ought to maximize the costs we are expending for collection by making recycling a priority.

Interestingly, in that same survey, only 50% of citizens surveyed indicated satisfaction with City drop-off recycling sites. The survey report actually stated that *"Residents were least satisfied with the City's drop-off recycling sites (50%) and the City's efforts to inform residents about recycling opportunities (50%)."*

[http://www.lawrenceks.org/\\_survey/Lawrence2007DFSurvey\\_DRAFTfinalreport\\_April21.pdf](http://www.lawrenceks.org/_survey/Lawrence2007DFSurvey_DRAFTfinalreport_April21.pdf)

Citywide curbside recycling has been a desire of the citizens of Lawrence for decades (see previous articles cited on page 1). As one example of the effort that some have expended to realize this goal, it should be noted that last year, a *concerned citizen*, Alison Roepe, collected and shared a petition with the SAB and the City Commission that contained 1688 signatures in support of the creation of a Citywide curbside recycling program. For too long, those who choose to recycle have borne nearly the full burden of both cost and effort. City officials have remained intransigent.

It's time for a change.

Specific recommendations in the 2004 report were:



1. Support for a statewide beverage container deposit law (“bottle bill”) which would remove glass, plastic and aluminum beverage containers from the waste stream;

While a bottle bill would be a great waste reduction step, realistically, this is a political non-starter in Kansas. State elected officials, and even the Director of the Bureau of Waste management have publically rejected the idea. <http://www.bottlebill.org/news/articles/2008/KS-2-8-MeasureWouldAddFive.htm>

**Thus, this recommendation is not a legitimate waste reduction or recycling opportunity to be offered in lieu of real services to Lawrence citizens.**

2. Expand newspaper, cardboard and office paper recycling programs to additional entities (such as schools) and provide additional drop-off sites

As I understand it, the City is currently serving more than 500 commercial customers. Essentially, some businesses are receiving City-sponsored curbside recycling service when residents are not.

- **Why does the City give this service away for free? Does that create unfair competition for the private sector? I believe that commercial solid waste services must be part of the solid waste division audit.**
- **Do commercial customers pay a fair market price for the services that City provides?**
- **How do our rates compare with the private sector rates for similar services in other regional markets?**
- **Why aren't commercial generators of cardboard required to pay for collection and recycling? In many markets where the private sector provides service, cardboard collection costs extra.**
- **Could this potential source of revenue be used to help fund a residential curbside or city-wide program?**

3. Increase recycling of wood waste at the city's compost facility

- **What are the current costs per ton for this service, including operation, equipment and collection?**
- **Can we realize any cost savings in reducing the collection schedule for yard waste that could free up money for recycling?**

4. Increase public education on waste reduction.

- **Does the City have or intend to develop a goal for waste reduction (i.e. 50% by 2015?).**
- **What is the City's method of measurement for determining the effectiveness of current waste reduction activities?**

**It seems to me that for us to develop a successful diversion plan, we must first understand, specifically, the composition as well as the origin of our waste streams. We then need to establish goals for achieving specific reductions. Johnson County, KS has an excellent model for solid waste planning. [http://iced.iocogov.org/solid\\_waste/swmc/sw\\_plan.htm](http://iced.iocogov.org/solid_waste/swmc/sw_plan.htm)**

In order to determine how we will reach any such waste reduction goal, we should conduct a waste characterization study to quantify the amounts and types of waste generated. The numbers we currently use are very out of date and do not give us the information that we need.

### **Recycling Program Expansions Since 2003**

Paper recycling through city programs has increased from 1,461 tons in 2003 to 2,111 tons in 2008. Two mixed paper drop-off sites were added to the city drop-off program in 2007 and five additional mixed paper sites were added in 2008. The total number of city-operated drop-off sites for paper increased to eleven in 2008.

Brushy waste and tree trimmings were added to yard waste collections in 2008 and are converted to compost or mulch

The yard waste collection program should be part of the pending solid waste division audit, and should address the following questions:

- **What percentage of housing units in Lawrence participate in this program?**
- **Are multi-family units (MFDs) provided yard waste collection?**
- **What percentage of yard wastes collected end up at the landfill or being burned, as opposed to composted?**
- **What is the real cost per ton, including overhead, processing, collection and staff time, for the yard waste program?**
- **Could the City lower the cost estimate for a curbside recycling program if they offered less frequent collection for yard waste?**

Two electronics drop-off events were provided in 2008. More than 56 tons of electronics were diverted from the landfill by 1,189 participants.

Waste reduction has been a focus for educational events by city staff. The staff is a sponsor for the annual Earth Day event and has sponsored the Lawrence Energy Conservation Fair as well as attended numerous other events or organizational meetings.

- **Should Lawrence adopt a waste reduction and recycling goal (eg: 50%by 15)**
- **How are we measuring the effectiveness of current waste reduction activities?**

A survey of Lawrence residents was commissioned in 2008 to gather input to help better understand the recycling needs of the community. Seventy-three percent (73%) of those surveyed indicate they currently recycle utilizing the mix of public and private recycling opportunities.

**I am concerned that because the City has not done sufficient solid waste planning, we don't really know which citizens recycle, what they recycle, how much they recycle, or how often they recycle.**

The data derived from the aforementioned survey is not specific enough to support staff's dismissal of a City-sponsored curbside recycling option.

### **Evaluation of City-Operated Curbside Collection of Recyclables**

Currently five privately operated businesses offer curbside collection of recyclables in Lawrence. Three of these have been in operation since 2003 or longer.

Licensure has been a request of SAB for several years.

- **Should the City consider licensure of both recycling service providers and recycling end points such as Wal-Mart and 12<sup>th</sup> and Haskell?**

Neither facility is permitted by KDHE because KDHE does not currently require such facilities to be permitted. Both sites have been the subject of complaints related to litter and unlawful disposal. Currently, customers of private vendors and end points have no assurance that their recyclables are being properly managed.

A sixth has recently applied for registration to collect recyclables from the curbside in Lawrence. Residents can choose whether to subscribe to these services for a monthly fee. Several levels of services offered at varying price points (generally \$7-16 per month) are available from these businesses.

- **Does staff know who (in terms of curbside vendors) takes what, where, and in what amounts?**

Again, I do not believe that the City has yet done sufficient solid waste planning to assert that the current program offering are adequate.

- **Is it prudent for us to continue to rely largely on the private sector to provide recycling services when we have NO control over the legitimacy of programs or accountability?**
- **What mechanisms are in place if/when an end point stops accepting a given material?**
- **What if Wal-mart closes the recycling center? Virtually the entire curbside "program" as provided by private vendors and promoted by the City, relies on Wal-mart. Shouldn't we have a back up plan?**

Recently the Sustainability Advisory Board requested an update on curbside collection of recyclables. The Board specifically wanted to see an evaluation of city-wide curbside collection provided by the Solid Waste Division or city-wide curbside collection provided by private providers.

As part of the audit, it might be helpful to have a side-by-side comparison of solid waste disposal costs and estimated recycling costs.

Perhaps we ought to focus on gaining greater efficiencies at the trash/yard waste end of the system, thereby helping to defray or spread out the costs to allow for a City-sponsored, City-wide recycling system, be in curbside or comprehensive drop-offs. I believe that this is the sort of thing that the auditor may wish to look at.

Cost estimates were developed for providing curbside collection of recyclables utilizing city resources. Curbside collection could be provided primarily to 20,000-22,000 one to four-unit houses (out of approximately

37,800 total housing units). Larger complexes are typically served by containers (dumpsters) and not suitable for curbside collection.

- **Is there a reference or citation that can be verified to support the aforementioned statement?**
- **What has the City done to investigate options for MFD recycling?**
- **Do we know if any of any of the private service providers are servicing apartment units or complexes?**

The City of Kansas City, MO offers curbside recycling to housing complexes with 6 or fewer units. As noted in a table of waste management comparisons provided earlier, some communities provide recycling to MFD through bulk or communal collection. Improving MFD service link:

<http://www.epa.gov/osw/conserve/downloads/f99022.pdf>

- **If Kansas City (with all their alleys and myriad urban logistics) can do it, why can't we?**

Some neighborhoods would not be able to receive curbside collection of recyclables because they too are served by containers (e.g. Oread Neighborhood) due to the high density of housing and parking needs. I do not believe this is an accurate statement. Many, many urban communities with dumpster and alley service provide curbside recycling, including Kansas City, MO.

Instead of continually staying that it can't be done, perhaps we need to do some research and figure out who is doing it well. I would like to see the City of Lawrence show some initiative to resolve this challenge.

Materials collected for recycling would likely be fibers (newspaper, mixed paper, etc.), steel and aluminum cans, and plastic (PETE, HDPE) containers. Staff does not recommend the curbside collection of glass due to negative markets and high cost of handling.

The highest recycling rates are often found in communities that provide residents with an economic incentive to recycle, or pay as you throw (PAYT). By charging residents according to the amount of trash they throw away, we can provide a direct incentive to recycle. Curbside recycling could be further incentivized and costs lowered by using an automated system in which residents set out all recyclables in the same bin (co-mingled), instead of staff having to separate the materials into different bins themselves.

### **Cost**

Two cost estimates were developed (see attachments) for curbside collection: one for a city-operated collection and operation of a Material Recovery Facility (MRF) for processing (sorting, baling, contaminant removal, loading onto transport trailers, etc.) and one for city-operated collection and direct daily transportation to the Deffenbaugh Industries Material Recovery Facility in Edwardsville, Kansas. That is the only MRF in the area.

- **Might the City consider a public-private partnership for development of a MRF or curbside program?**
- **Might the City consider the development of a regional MRF, perhaps with JoCo/Shawnee Co, to help defray costs?**

Estimates for both scenarios were developed for weekly or biweekly collection of recyclables (see table below).

#### **COST COMPARISONS FOR CITY-OPERATED CURBSIDE COLLECTION OF RECYCLABLES**

	<u>City-operated MRF</u>		<u>Transport to Edwardsville MRF</u>	
Collection frequency:	<u>Weekly</u>	<u>Biweekly</u>	<u>Weekly</u>	<u>Biweekly</u>
Cost/year (over 7 years)	\$3,704,005	\$2,830,604	\$3,516,952	\$2,406,389
Cost/household/year (1)	\$168	\$129	\$181	\$121
<b>Cost/household/month</b>	<b>\$14.00</b>	<b>\$10.75</b>	<b>\$15.11</b>	<b>\$10.10</b>

(1) City-Operated MRF: **AVERAGE COST PER YEAR (attachment i) plus AVERAGE COST PER YEAR (attachment ii) divided by 22,000**

Transport to Edwardsville: **AVERAGE COST PER YEAR (attachment i) plus AVERAGE COST PER YEAR (attachment iii) divided by 22,000**

Note: Typically fewer recyclables are collected with biweekly collection than with weekly collection

- **Is there a reference or citation that can be verified to support the aforementioned statement?**
- **How do these estimated costs compare with our current costs for trash collection and yard waste collection?**
- **Does the aforementioned scenario presume transport of recyclables in garbage trucks? These trucks get horrible gas mileage. Why are we not looking at a more efficient transfer vehicle, i.e. transfer trailer or roll-off, perhaps for both garbage and recycling?**

While the lowest cost estimate is for collecting recyclables biweekly and transporting the recyclables to Edwardsville, that alternative carries more uncertainty. Volatile fuel prices could increase that cost significantly as the miles driven per vehicle are more than doubled. This is currently true for trash collection, too, yet we continue to allow unlimited disposal.

Vehicles will have to be replaced more frequently due to higher mileage and increased wear and tear. More personnel and vehicles may be needed because a significant portion of the work day will be dedicated to driving to and from the MRF rather than collecting recyclables.

The City currently uses an incentive pay structure whereby collection employees are paid for their route.

- **Do we pay collection employees 8 hours pay for less than 8 hrs work? Such task-based pay structures pose a number of potential problems, including safety and cost-effectiveness issues<sup>1</sup>.**

Further, as I understand it, many of the trash trucks driving from Lawrence to the landfill have 3 men on board, driving to and from the landfill. This seems equally inefficient.

- **Why does it take 3 employees to do what one could do (drive and automatically dump materials at the landfill)?**

Perhaps the greatest risk is that we would be dependent on a privately owned facility that may not always want our recyclables or may ask for payment for taking those recyclables.

### **WE ARE DEPENDENT ON A PRIVATE FACILITY NOW! (The Wal-Mart Recycling Center)**

Since we would be delivering loose, unprocessed recyclables with a high possibility of contaminants in relatively small loads, the operators of the MRF may not find our material desirable, especially in a down market such as we are in now. **Again, long-haul transportation of recycling to a far-away MRF in garbage-truck quantities is incredibly wasteful and VERY inefficient. I believe that local transfer of recyclables must be considered.**

- **Has the City contacted the Deffenbaugh MRF to find out what their specs and price points are?**

The result would be that we have no market for our recyclables and would instead find ourselves with an accumulation of recyclables and likely discontinuing their collection. We would also receive much lower revenues due to delivering unprocessed, loose recyclables. **The aforementioned statements are largely staff's opinion; this sort of conjecture is not helpful, and provides no objective data or real information with which to assess the options available.**

### **Benefit**

The single greatest benefit would be that of convenience to the household but they would pay the monthly rate to receive that benefit. Currently, we estimate that 2,000-3,000 households choose to pay one of the five privately-operated collection businesses for the convenience of having their recyclables collected at the curbside.

**I believe that we need real data our current curbside service providers. As recommended by SAB in the past, licensure of providers would allow real data to required. It does not make sense for us to be making decisions based on assumed numbers.**

It is important to remember, but often misunderstood, that a great deal of the material that would be collected with a curbside collection program is already being collected through existing programs in Lawrence.

**Without a more up to date waste characterization that better defines what types and percentages of wastes are being landfilled currently, the aforementioned statement can only be considered as opinion, not fact.**

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<sup>1</sup> [http://scseng.com/Papers/Rogoff\\_What\\_in\\_the\\_World\\_SW\\_Collection.pdf](http://scseng.com/Papers/Rogoff_What_in_the_World_SW_Collection.pdf)



A curbside collection program would greatly reduce the amount of material being collected at the Wal-Mart Community Recycling Center, the 12<sup>th</sup> and Haskell Recycling Center, by private curbside recycling businesses (they would be out of business), and through the city-operated drop-off facilities.

It is presumed that a City-sponsored curbside program would eliminate many of the private sector vendors. However, it must be noted that when this conversation occurred several years ago, the SAB recommended to staff and the City Commission that they consider a franchise system whereby local recycling vendors could be contracted with to provide curbside recycling services throughout the city. In spite of SAB's recommendations at that time, no such action was taken by staff or the City Commission.

I agree with staff that the current configuration of unregulated private haulers cannot provide a comprehensive recycling system for the entire City. However, recycling is shown to generate far more economic activity than disposal, and by supporting such small business development, the City could also create offer much needed economic development opportunities for our community. Stimulus monies for such an effort may be available<sup>2</sup>. SAB has historically and wholeheartedly supported small recycling businesses and local recycling efforts.

That said, let the record show that SAB has formally recommended licensure of private curbside haulers and recycling endpoints, to ensure accountability and allow for collection of legitimate data for planning. Staff has continuously rejected this proposal.

A comprehensive recycling program could greatly benefit our local economy by creating jobs and thus supporting the tax base. A report by the Institute for Local Self Reliance (ILSR) found that 15,000 tons of solid waste creates an average of one job if landfilled, two jobs if incinerated, seven jobs if composted, and nine jobs if processed for recycling. The economic potential of recycling is further expanded if a community recovers enough materials to attract new scrap-based remanufacturing industries. A recycling facility could be an important part of a green-collar economy and offers substantial economic development opportunities.

Further, it seems a bit disingenuous for the City to make an argument about the impacts that a City-sponsored curbside recycling program would have on local businesses given that the City itself has a solid monopoly on garbage collection (residential and commercial hauling) in the City, currently.

- **If protection of the private sector curbside vendors is such an issue for the City, why doesn't the City outsource some or all other waste services?**

The actual increase in material recycled with a city-operated curbside collection program is likely to be less than 2,000 tons in addition to the 20,414 tons recycled in 2007. The additional tonnage would largely be paper that is not currently being recycled.

Without a waste characterization to determine what types and percentages of wastes are being landfilled currently, the aforementioned statement can only be considered as opinion, not fact.

The vast majority of our City's recycling rate is made up of yard waste (in 2007, a total of approx. 20,000 tons of material was recycled in Lawrence; of that, 13,437 tons was yard waste). When one watches what types of trash are put out for collection in Lawrence, and what types of trash exist in Lawrence loads disposed of at the landfill, one sees an enormous volume of recyclable material being landfilled.

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<sup>2</sup> <http://www.emagazine.com/view/?4601&src=QHA290>



## **Contracted Curbside Collection of Recyclables to a Private Provider**

The city could choose to put out a Request for Proposals (RFP) for a private provider for curbside collection services. A private company should provide turnkey services taking responsibility for collection, processing, marketing and also customer service responsibilities.

Outsourcing of billing and customer services for curbside recycling should not necessarily be presumed. As referenced in an early waste management comparison table, there are many ways to structure such a contract, and the City can and should have some ownership in any such program and participate in education, outreach and engage in strong overall contract management if such a system is to succeed. The City must be committed to implementing a good system.

There are several large companies within the region that have the capability of providing such services.

There are currently five privately owned small businesses that provide curbside collection of recyclables to customers that choose to subscribe to their services in Lawrence. These businesses utilize existing drop-off sites (Wal-Mart, 12th and Haskell Recycling Center, Lonnie's recycling, and city-operated drop-off sites) to deposit the recyclables they collect. It is staff's opinion that none of these small proprietors would have the resources to provide turnkey service to 22,000 households. **Current service provides can grow, and we can help! We could use the need for comprehensive City-wide recycling as an opportunity to support local business expansion!**

**We need to be willing to think outside the box, work with our economic development specialists and should seek to maximize the benefits of recycling to the local economy.**

Staff also believes that if a program for curbside collection were to be pursued, the option of using a qualified private provider would be the preferred option. The provider would assume all costs and risks and the city would have a known cost depending on what was agreed on in a contract. It is likely that the costs would be lower than if the city operated the program because large recycling providers already have personnel, equipment, infrastructure, implementation experience and more leverage in recycled materials markets.

## **Issues and Concerns**

### **Recycling Markets**

Markets for recyclables, similar to the stock market, can be highly volatile. Currently recycling markets are at historic lows. For this reason, it is not good policy to develop programs expecting revenues for sales of recyclable materials to pay for the programs. In fact, some markets, glass for example, are negative meaning that one must pay to get rid of the material. Many communities have discontinued collection of glass. Mixed paper is also a dead market currently. Paper mills are not purchasing mixed paper at this time due to low demand for products.

**The city's analysis is very limited. It examines collection costs for curbside, but ignores the costs of managing trash for landfilling, and fails to examine alternative program options.**

**Every ton of waste that is recycled represents a ton of waste that is not landfilled. There are a myriad of internal and external costs that are avoided by recycling.**

## Customer Satisfaction

It is difficult to predict what the level of customer satisfaction would be with different recycling scenarios. The 2008 Recycling Survey revealed that 72 percent of Lawrence citizens currently recycle which is a very high number. It also indicated that 59.6 percent of citizens would pay \$6.00 per month for curbside collection of recyclables. However, as the price went above \$6.00, willingness to pay went down. Only 45.2 percent were willing to pay \$9.00, 21.8 percent were willing to pay \$12.00 and 15.5 percent were willing to pay \$15.00.

The 2007 Citizen Survey indicated 86 percent of residents were satisfied with residential trash service which was termed a very high rating. *In that same survey, only 50% of citizens surveyed indicated satisfaction with City drop-off recycling sites. The survey report actually stated that "Residents were least satisfied with the City's drop-off recycling sites (50%) and the City's efforts to inform residents about recycling opportunities (50%)."*

## **Variable Rate Pricing for Residential Trash**

Variable rate pricing, commonly referred to as "pay-as you-throw" (PAYT) is used in many communities. Under PAYT, residents are usually charged by the number of cans or bags they set out for collection. PAYT is most common in communities faced with long hauls to the nearest disposal site or those with relatively little space left in the local landfill, both of which can create very high disposal costs.

- *Is there a citation or reference for this statement? I do not believe the aforementioned statement is entirely accurate.*

Commercial collection rates in Lawrence are already under a variable rate system since the monthly fee is based on the size of dumpster and the frequency of collection for each customer. Those rates are set to include the cost of providing current recycling services to commercial entities.

- *Do we know how our commercial rates compare with the private sector? Are we subsidizing commercial waste generation?*

Residential rates are the same for each ratepayer but they cover much more than the cost of trash disposal. They also pay for bulky item collection, tire collections, white goods collection and Freon recovery, residential recycling drop-off sites, the household hazardous waste facility, yard waste collection and composting, a portion of the electronics collection events, and waste reduction and public education and outreach efforts.

- *What are the relative costs per ton, including equipment, overhead, capital, staff and collection costs, for these programs? Again, a side-by-side, full cost accounting of all programs and services would be helpful so that we can identify costs and opportunities.*

There is almost no direct correlation with the amount of material disposed of in the landfill and the monthly residential trash rate. In 2008, actual disposal fees were ten percent (10%) of the residential fee. The other 90 percent supported the personnel and equipment necessary to provide scheduled collection to each home, the above mentioned recycling programs, and overhead and administration costs.

*The purpose of PAYT (and recycling) is not purely cost reduction, but also conservation and incentivizing waste reduction and recycling.*

*Recycling can help us mitigate climate change by reducing our methane emissions. By recycling, we can lessen the degradation of land and ground water from landfills. Fewer trees will be cut down for paper, and we can reduce reliance on petroleum for plastics. PAYT gives a significant incentive to*

reduce and recycle. But so long as the City offers unlimited disposal of trash for one low price, those who opt to recycle will continue to pay more than those who don't. We are rewarding wastefulness and punishing those who conserve. It's bad policy and it's not fair.

- In determining costs per ton for the City's management and disposal of yard waste and garbage, are the cost of vehicles, and equipment included or are they assigned to a separate equipment budget?
- Are costs for fuel, oil, tires, and other supplies, as well as labor costs for vehicle maintenance and fringe benefits included in cost per ton calculations? Or do these appear within other City budgets such as central vehicle or labor accounts?
- Are the overhead costs (including facilities, Division staff, administrative costs, etc.) calculated into the costs per ton for garbage collection?
- Are the solid waste division's insurance and liability costs carried within city legal and insurance budget, or with the solid waste division accounts?

The solid waste division should provide a full cost accounting to identify all of the costs associated with providing the various services offered by the division, including garbage and yard waste collection and disposal/management. Costs per ton should include both direct and indirect costs, regardless of when related disbursements or expenditures may have occurred in the past. Direct costs might include all costs clearly and exclusively related to providing solid waste services such as salaries, bonds, software, supplies, equipment, and utilities. Indirect costs might include ancillary City expenses that benefit solid waste management activities, i.e. HR/admin; legal services, budgeting and budget management services, personnel administrative costs, public information services, and data processing services.

### **Reliability of Analysis**

The Solid Waste staff has confidence that the analysis options and estimates of costs contained in this report are reasonably reliable. However, detailed estimates for construction and real estate costs were not conducted. In addition fuel costs are predicted to be potentially highly volatile in the future. If curbside collection of recyclables or variable rate pricing options were to be considered further, we would recommend a third party analysis be provided by a professional solid waste consultant that would focus on the feasibility of curbside recycling and PAYT including, but not limited to:

- cost;
- benefits;
- and implementation.

I believe that SAB should be allowed to participate in the development of any RFP or contract created to conduct further research.

### **Plans for Increased Waste Diversion**

#### **Source Reduction**

The Solid Waste Division supports and encourages product stewardship to reduce materials in the waste stream such as a state-wide beverage container deposit law (bottle bill) which would create take-back programs that would remove beverage containers from the waste stream reducing collection, disposal and recycling costs, and

reduce litter. Stores that will take back used electronics or other goods are other examples of product stewardship.

Public education and outreach programs have been put into place although funding was reduced in 2008 due to fiscal restraints. We hope to expand on these when possible.

### **Recycling**

The Division is continuing the increase in paper recycling through city drop-off sites and commercial collection programs. Current market constraints have slowed the expansion.

Additional electronics collection events are planned for 2009.

Public education is seen as a key to increased recycling as more people become aware of existing recycling opportunities and the positive environmental benefits from recycling.

### **RE: Attachments i, ii, iii:**

In my opinion, much of the analysis provided in these attachments represents long-standing bias against any sort of substantive change. Frankly, some of the recycling numbers provided below seem exaggerated or padded to make the end number as large as possible, thereby creating a sticker shock that seeks to eliminate open and honest consideration of change.

It seems to me that there are efficiencies that can be realized between solid waste collection, yard waste collection and curbside recycling.

- By doubling up on some resources: i.e. admin office space and staff, supervisory vehicles, collection staff, etc., and improving overall efficiency of current collection services, couldn't the numbers provided for recycling (in i-iii) be pared down?

**ESTIMATED COSTS FOR CURBSIDE COLLECTION OF RECYCLABLES**

Can we see a comparable break down for solid

(Present year 2009 dollars; cost of debt or bonds not included)

**Note: Does not include costs of a Materials Recovery Facility or transportation to a nearby Material Recovery Facility (MRF)**

<b><u>COLLECTION COSTS</u></b>	<b><u>Weekly Collection</u></b>	<b><u>Biweekly Collection</u></b>
<b>Start-Up Costs</b>		
Collection vehicles	\$4,000,000 \$200,000 ea. plus 3 standby	\$2,200,000 \$200,000 ea. plus 2 standby
Field Supervisor vehicles	66,000 3 vehicles @ \$22,000 ea.	44,000 2 vehicles @ \$22,000 ea.
Recycling containers	900,000 45,000 @ \$20 ea.	1,360,000 68,000 @ \$20 ea.
Miscellaneous	50,000 Computers, radios, etc.	45,000 Computers, radios, etc.
Operations facility/land	750,000 Office, parking, crew area	750,000 Office, parking, crew area
<b>SUBTOTAL</b>	<b>\$5,766,000</b>	<b>\$4,399,000</b>
<b>Annual Operational Costs</b>		
Operator I	\$1,064,000 19 @ \$56,000 incl/benefits	\$616,000 11 @ \$56,000 incl/benefits
Field Supervisor	180,000 3 @ \$60,000 incl/benefits	120,000 2 @ \$60,000 incl/benefits
Laborer	90,000 2 @ \$45,000 incl/benefits	90,000 2 @ \$45,000 incl/benefits
Administrative Support position	45,000 \$45,000 incl/benefits	45,000 \$45,000 incl/benefits
Collection vehicle fuel	210,834 \$14,040 fuel/collection vehicle	111,618 \$14,040 fuel/collection vehicle
Collection vehicle maintenance	174,600 \$9,700 maint. ea.	106,700 \$9,700 maint. ea.
Supervisor vehicle fuel/maintenance	9,000 \$2,000 fuel; \$1,000 maint. ea.	6,000 \$2,000 fuel; \$1,000 maint. ea.
Recycling container replacement	160,000 8,000 @ \$20 ea.	160,000 8,000 @ \$20 ea.
Education/promotion	30,000 Newspapers, radio, fliers, etc.	30,000 Newspapers, radio, fliers, etc.
Utilities, overhead	12,000 Gas, electrical, custodial, etc.	12,000 Gas, electrical, custodial, etc.
Miscellaneous	25,000 Uniforms, office supplies, etc.	25,000 Uniforms, office supplies, etc.
Contingency	75,000 Unexpected expenses	75,000 Unexpected expenses
<b>SUBTOTAL</b>	<b>\$2,075,434</b>	<b>\$1,397,318</b>
<b>TOTAL COSTS OVER 7 YEARS</b>	<b>\$20,294,038</b>	<b>\$14,180,226</b>
<b>AVERAGE COST PER YEAR</b>	<b>\$2,899,148</b>	<b>\$2,025,747</b>

**Assumptions**

Households participating (excludes multi-family complexes of 3 or more units): 22,000

One person collection vehicle with curbside sorting

Cost of fuel/gallon (in dollars) 3.18 (Source: Department of Energy/EIA, December, 2008)

Actual collection time/day (hours) 7

Stops/route/day - weekly: 320

Collection vehicles/day - weekly: 17 (hybrid vehicles)

Stops/route/day - biweekly: 300

Collection vehicles/day - biweekly: 9 (hybrid vehicles)

Four routes/week/collection vehicle

225 miles/week/collection vehicle = 11,700 mi./yr.

Collection vehicle gets 3.0 mpg on route

Costs amortized over 7 years

attachment ii

**ESTIMATED COSTS FOR MATERIAL RECOVERY FACILITY**

(Present year 2009 dollars; cost of debt or bonds not included)

**CAPITAL COSTS**

Processing Building	\$1,040,000	In addition to office/crew area
Supervisor vehicle	22,000	1 vehicle @ \$22,000
Processing Equipment	900,000	Balers, forklifts, conveyors, etc.
Miscellaneous	25,000	Computer, safety equipment, etc.
SUBTOTAL	<u>\$1,987,000</u>	

**Annual Operational Costs**

Laborers	\$270,000	6 @ \$45,000 incl/benefits
Supervisor	60,000	1 @ \$60,000 incl/benefits
Administrative Support position	45,000	\$45,000 incl/benefits
Processing equipment maintenance	20,000	Fuel, lubricants, moving parts, etc.
Supervisor vehicle fuel/maintenance	3,000	\$2,000 fuel; \$1,000 maint.
Utilities, overhead	48,000	Gas, electric, custodial, etc.
Contingency	75,000	unexpected expenses
SUBTOTAL	<u>\$521,000</u>	

<b>TOTAL COSTS OVER 7 YEARS</b>	<b>\$5,634,000</b>
<b>AVERAGE COST PER YEAR</b>	<b>\$804,857</b>

**Assumptions**

Cost of fuel/gallon (in dollars)	3.18
Costs amortized over 7 years	

attachment iii

**ESTIMATED COSTS FOR TRANSPORTATION OF RECYCLABLES TO A NEARBY MATERIALS RECOVERY FACILITY (MRF)**

Closest MRF is the Deffenbaugh facility in Edwardsville, KS

(Present year 2009 dollars; cost of debt or bonds not included)

<u>ADDITIONAL COSTS</u>	<u>Weekly Collection</u>		<u>Biweekly Collection</u>	
<u>Start-Up Costs</u>				
Collection vehicles	\$600,000	\$200,000 ea.	\$400,000	\$200,000 ea.
Collection vehicle replacement	\$3,300,000	20 @ \$220,000 ea. (0.75 cost*)	\$1,815,000	11 @ \$220,000 ea. (0.75 cost*)
SUBTOTAL	\$3,900,000		\$2,215,000	
<u>Annual Operational Costs</u>				
Operator I	\$168,000	3 @ \$56,000 incl/benefits	\$112,000	2 @ \$56,000 incl/benefits
Collection vehicle fuel	205,810	\$9,707 fuel/collection vehicle	113,195	\$9,707 fuel/collection vehicle
Collection vehicle maintenance	100,000	\$5,000 maint. ea.	55,000	\$5,000 maint. ea.
Turnpike tolls	33,280	One trip/day	18,304	One trip/day
Contingency	25,000	Unexpected expenses	25,000	Unexpected expense
SUBTOTAL	\$532,090		\$323,499	
<b>TOTAL COSTS OVER 7 YEARS</b>	\$7,624,627		\$4,479,495	
<b>AVERAGE COST PER YEAR</b>	\$1,089,232		\$639,928	

**Assumptions with transportation of recyclables to a nearby MRF**

Households participating (excludes multi-family complexes of 3 or more units): 22,000

One person collection vehicle with curbside sorting

Cost of fuel/gallon (in dollars) 3.18 (Source: Department of Energy/EIA, December, 2008)

Actual collection time/day (hours) 6

Stops/route/day - weekly: 275

Additional coll. vehicles - weekly: 3 (hybrid vehicles)

Stops/route/day - biweekly: 250

Additional coll. vehicles - biweekly: 2 (hybrid vehicles)

Four routes/week/collection vehicle

Additional 280 miles/week/collection vehicle = 14,560 mi./yr.

Collection vehicle gets 5.4 mpg on highway

Turnpike toll per round trip \$8.00

\* Collection vehicles replaced every 4 years (allocate 0.75 of cost to 7-year analysis)

Costs amortized over 7 years