

Stewardship Ontario E&E Fund Project 197:
City of London
Multi-Residential Recycling –
Optimizing Recycling Performance

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1. Executive Summary

1.1 Project Description

Projects E&E 36 and E&E 197 are two parts of a City of London initiative to collect data, analyze the data and implement test strategies to improve recycling in multi-residential buildings. E&E 36 was completed in March 2006 and succeeded at collecting information about recycling performance and characteristics of London's buildings. The current project, E&E 197, completed the following tasks:

- analyzed the data collected in E&E 36
- identified key barriers to increased recycling in multi-residential buildings
- implemented test strategies in buildings to remove barriers, and
- reviewed the cost and benefits to the strategies that were tested

The Project budget was \$40,000 which included \$20,000 from Stewardship Ontario's E&E Fund, \$10,000 from City of London and \$10,000 (in-kind) contribution from the London Property Management Association. The Project was managed by the City of London and members of the London Property Management Association (LPMA) played an advisory role and their staff assisted in monitoring during the implementation of the test strategies. 2cg Waste Management Inc. provided consulting services to the project which included project coordination, data collection and analysis and documenting the results.

1.2 Background

With funding support from Stewardship Ontario's Effectiveness and Efficiency (E&E) Fund, the City of London implemented the project "Multi-Residential Recycling: Optimizing Recycling Performance by Using a Focused Delivery Framework" project. The project consisted of 2 Parts:

- Part 1: E&E Project 36 – completed in March 2006
- Part 2: E&E Project 197 – current project

In Project 36¹, each of the multi-residential buildings serviced by the city was measured to estimate its recycling performance or recycling rate expressed as kg/unit/year. Following this, a detailed survey of 60% of the buildings was carried out to identify recycling program features and building characteristics. This project resulted in an extensive database to describe London's multi-residential buildings. Project 36 did not complete detailed data analysis to link recycling performance and recycling barriers.

¹ The final report for this project is available at http://www.stewardshipontario.ca/bluebox/pdf/eefund/reports/36/36_report.pdf

Project 197 built on the research completed in Project 36 through: data analysis to identify the barriers that are correlated with recycling performance; developing a comprehensive strategy for removing these barriers and determining the costs and benefits of implementing the strategies.

Project 197 included three Phases:

- Phase 1: In-depth analysis of the data collected in E&E 36
- Phase 2: Implementation of strategies to remove barriers to recycling
- Phase 3: Cost benefit analysis of the strategies

The output of Phase 1 was a comprehensive list of barriers and these were narrowed down to three key barriers for further testing. The strategies to be tested in Phase 2 focused on three areas:

1. Increase recycling capacity – provide more space to store recyclables
 - add more carts
 - increase collection frequency
2. Convenience – make recycling more convenient to residents
 - Change recycling depot to more convenient location
 - Add a recycling depot location
3. Promotion – inform and remind residents to recycle
 - Place reminder posters by garbage chutes as a frequent reminder to recycle
 - Use symbol-only posters in location with large non-English speaking population

1.3 Summary of Findings

The following is a brief summary of the results of testing the three strategies (Phase 2).

1.3.1 Strategy 1: Increase Capacity

Increasing the amount of capacity to store recyclables between collections was found to have the most significant effect on recycling rates. This was tested at four building sites. The increase in capacity at the test buildings ranged from 50% to 140% and the resulting increase in the recycling rate ranged from 35% to 100%

1.3.2 Strategy 2: Increase Convenience

It proved difficult to establish a positive relationship between improved convenience and increased performance at the test buildings. At one building a decrease in the recycling rate occurred. At this site a second drop-off point was set up to provide residents with two locations to drop off recycling. It is not clear why recycling would have decreased in this case, unless there were other unknown factors that had a negative impact on recycling. At the second location, where the recycling depot was changed to a more convenient location an increase was noted. However, additional carts were also placed by the property management during the test period (unplanned). As a result, the increase

in recycling noted in this trial may have been as a result of the increased capacity instead of the improved convenience.

1.3.3 Strategy 3: Increase Promotion & Education

Two versions of a poster were developed to reinforce simple recycling 'how to's' and provide a friendly reminder to recycle. One version was also designed to address a large non-English speaking resident group at one of the building complexes. This was tested at four building complexes with variable results ranking from -5%, 0%, 15% to 60% change from baseline. The 60% change was discounted because at this location additional carts were placed by the property management during the test period (unplanned).

1.3.4 Cost Benefit Analysis

In Phase 3 of Project 197 the costs and benefits of implementing the test strategies were reviewed. Of the three strategies tested, only one - increasing capacity - had significant results to indicate that implementing this across the entire program would increase recycling tonnes. The cost/benefit analysis of this strategy indicated that adding 1,500 carts would result in an estimated 1,400 – 1,600 additional tonnes annually. This is based on an observed rule-of-thumb that each additional 95 gallon cart will divert an extra one tonne of recyclables. The estimated costs of supplying this amount of extra capacity takes account of the capital cost of the carts amortized over five years, the annual processing and collection costs and the revenue. It is estimated that the annual cost per tonne would be in the range of \$30 to \$40 per year, dropping to \$10 - \$20 per year in the sixth year after the carts have been paid for.

2. Introduction

2.1 City of London's Multi-residential Recycling Program

In many Ontario municipalities the multi-residential sector has traditionally under-performed in recycling compared to the single-family sector. In the City of London, the average curbside capture rate in 2006 was 220 kg/household/year compared to 70 kg/unit/year for the multi-family sector. Accounting for the different generation rates of recyclables in multi-residential units compared to single family dwellings, the capture rate for multi-family is about half that for single family.

At the time of the study, the City of London serviced approximately 39,000 multi-residential units through a two-stream program using 95 gallon (360 litre) carts. Old corrugated cardboard is to be broken down, bundled and placed beside carts for collection.

Strategies to improve recycling performance in the multi-residential sector are often based on a “one size fits all” approach. Often, the result is the inefficient use of resources with little impact on recycling rates. To be more effective, solutions (promotion & education, social marketing, operational measures) need to be tailor-made to a building type within a manageable operating framework. The building type is determined by a number of variables including recycling performance (high, medium, low) and the prevalence of barriers (not enough capacity, recycling not convenient, etc.) and building characteristics (size of building, type of garbage disposal system, etc.) With this in mind projects E&E 36 and 197 were developed to collect detailed data about the buildings and develop customized strategies to remove barriers.

In Project 36, each of the multi-residential buildings serviced by the city was assessed to determine its recycling performance (i.e. capture rate). Following this, a detailed survey of 60% of the buildings was carried out to identify recycling program features and building characteristics.

Project 197 is a continuation of this work, and is organized according to the following three phases:

- Phase 1: undertake in-depth analysis of the results from Project 36 to identify barriers to recycling and how they are linked to performance
- Phase 2: develop and test strategies to remove barriers
- Phase 3: Perform a cost benefit analysis of the strategies developed and tested in Phase 2

A discussion of each Phase and results are presented in Section 3.

3. Project E&E 197

3.1 Phase 1 - Data Analysis

During Phase 1 the data collected in Project 36 was analyzed to determine what relationship existed between recycling performance and recycling program features. In particular the analysis focused on program features that were identified as potential barriers to increased recycling. This included features such as ‘capacity’ or how much space was available to store recyclable between collections

The outcome of this analysis was to propose a number of strategies specific to identified barriers that could be tested for improving recycling performance. The barriers that were identified in the analysis and the potential strategies are detailed in the table below.

Table 1: Strategies for Increasing Recycling Performance

Barrier	Potential Strategies
<p>Capacity: Not enough recycling capacity especially for larger buildings – not enough carts to store recyclables between collections.</p>	<p>Increase storage capacity so that carts do not overflow before the scheduled collection. Possible options:</p> <ol style="list-style-type: none"> 1. Twice weekly collection at buildings that have limited space to store extra carts 2. Provision of extra carts at buildings that have space to store extra carts 3. Provide plastic bags for storage of overflow
<p>Convenience: Smaller buildings that are part of a larger collection point have poor quality recycling areas (e.g. quality, distance and convenience) and reduced input from staff</p>	<p>Increase the convenience of recycling. Possible options:</p> <ol style="list-style-type: none"> 1. Add additional recycling areas to multi-building complexes collection points to reduce distance to recycling carts 2. Set up areas within the buildings for ‘mini-recycling’ stations, e.g., in mail rooms or laundry rooms. 3. Improve recycling area appearance (neatness, lighting, signage, etc.) 4. Provide in-unit or transfer containers for use within the home as convenient stations to capture recyclables when they are generated.
<p>Access to information: Promotional material access is inconsistent across all building</p>	<ol style="list-style-type: none"> 1. Develop new resident pack (include fridge magnet). Try new method of distribution such as bulk mail. 2. Refresh tenant and superintendent literature. 3. Durable signage for garbage chute areas 4. Better telephone access to staff (e.g. MR hotline) 5. Enhance web-information for superintendents (downloadable info would be good) 6. Enhance web-information for residents (downloadable info would be good) 7. Regular resident newsletter 8. Use media outlets to discuss recycling goals and opportunities 9. In-lobby staffed info booth to increase recycling awareness and include information and in-unit recycling bags for purchase 10. City staff to schedule routine site visits to buildings. 11. Develop award for good performing buildings
<p>Variable knowledge of recycling & support of program by superintendents</p>	<ol style="list-style-type: none"> 1. Develop a superintendents training course 2. Develop multi-residential advisory panel to get superintendents to help superintendents (and provide City with feedback)

3.2 Phase 2: Implementation of Strategies

This part of the project included identification of buildings, selection of a strategy for each building, baseline monitoring of each building, implementation of strategies and follow-up monitoring, and calculation of results.

Before any strategies were implemented, baseline monitoring was conducted at all buildings for four to six weeks to establish a measure of recycling performance. The measure used was the average recycling rate (kg/unit/week) for each building.

Recycling performance was again monitored after each strategy had been implemented for up to six weeks to enable a comparison with the baseline recycling performance.

3.2.1 Selection of Buildings and Strategies for Testing

The City of London partnered with the London Property Management Association (LPMA) and employed the consulting services of 2cg Waste Management Inc. for this project. LPMA members reviewed the project parameters and draft reports and volunteered their buildings as test sites and their building staff to assist during implementation and monitoring. While there was some choice of which strategies would be tested in which buildings, it was often determined by the attributes and specific barriers of the buildings that were volunteered (e.g. Larger buildings were targeted for the Increasing Capacity strategy as the data analysis of Phase 1 indicated they lacked storage capacity).

Initial site visits were conducted in October 2006 to determine if the buildings would be suitable for the project and to verify baseline information such as location, number of carts, etc.. Ten sites were visited, representing 21 buildings (see table below). Barriers to recycling were identified in each of these buildings. Ten building locations were used to test different strategies. In addition to the test buildings one additional building was selected as a control.

All of these sites had one or more pre-determined barrier(s) to recycling (based on the results of E&E 36). At each of the building locations only one strategy was used to facilitate single variable analysis of the results. At two buildings, extra carts were inadvertently added by the property manager thereby introducing a second variable. The following strategies were implemented at different buildings:

- Increase recycling capacity:
 - a. Add more carts
 - b. Twice weekly pickup
- 2. Increase convenience
 - a. Add additional recycling areas
 - b. Place carts in convenient locations in building
- 3. Improve access in information
 - a. Design new posters for garbage chutes
 - b. Design new posters for multi-lingual applications

The strategies were assigned to specific buildings based on a number of factors including data collected from Project 36, perceived barriers noted during the site visits completed in October 2006, what was practical in consideration of property staff and management, and project budget. The table below presents an overview of each building and the strategy that was selected for implementation.

Table 2: Summary of Strategies Implemented

Building*	Units	Buildings	Barrier	Strategy
CPT #1	317	3	Capacity	Increase pickup frequency
CPT #2	131	1	Capacity	Increase pickup frequency
CPT #3	308	2	Capacity	Increase carts
CPT #4	134	2	Capacity	Increase carts
CVN #1	194	1	Convenience	Set up mini recycling stations in building
CVN #2	114	3	Convenience	Add extra depot in parking lot
P&E #1	148	1	P&E	Posters by garbage chutes
P&E #2	176	1	P&E	Posters by garbage chutes
P&E #3	226	1	P&E	Posters by garbage chutes
P&E #4	56	5	P&E	Posters in building (language free)
Control	148	1	-	No strategy

* CPT = increase recycling capacity, CVN = increase recycling convenience, P&E = increase recycling promotion and education

3.2.2 Methodology - Baseline Monitoring

Baseline data was collected to establish the average kg/unit/week (performance) for each building. Most baseline data collection was completed in November-December 2006 by 2cg Inc. Additional baseline data collection was conducted in March-April 2007 by the City.

Weekly checks of each building were conducted on the collection day just before pickup. Visual assessments were made to determine:

- amount of material in each cart recorded as: empty, 1/4, 1/2, 3/4, or full
- contamination or non-recyclable materials in recycling stream
- 'stream-mixing' (i.e., if recyclables were placed in the wrong carts)
- cart overflow
- if cardboard set outs complied with program guidelines

Performance or kg/unit/week recovery rate was calculated based on the estimated volume of recyclables set out on collection day multiplied by a density factor (fibres or containers) and divided by the number of units in the building. The density factors used are shown in the table below.

Table 3: Density Factors for Fibre and Containers

Stream	Average Density	Approximate Kg per cart
Fibres	0.11 kg/litre	40 kg per cart
Containers	0.04 kg/litre	15 kg per cart

Note: Density factors based on weight measurements made by 2cg and City of London staff at two apartment buildings in London, 2007 (ten full 95 gallon carts of each material stream).

3.2.3 Methodology - Implementation Monitoring

Strategies for most buildings were implemented between March 21 and April 9, 2007. The last building had a strategy implemented by April 20.

Weekly checks of each building were conducted on the collection day just before pickup, collecting the same data as for baseline monitoring.

4. Summary of results and conclusions

This multi-residential recycling study was undertaken to test a number of strategies to overcome barriers to recycling. Ten buildings or building complexes were selected for this study and baseline monitoring of recycling was conducted in 2006. Recycling was again monitored, in 2007, after strategies were implemented at each building.

Table 1 presents an overview of the changes in recycling weight (kg/unit/week) for each building between baseline and implementation monitoring as well as the percent increase or decrease in overall recycling weights.

Table 4: Summary of Changes in Recycling Capture for all Buildings

Building	Building strategy	Baseline Avg kg/unit/wk	Implementation Avg kg/unit/wk	% change (rounded)
Capacity Building #1	Second collection	1.3	2.6	100
Capacity Building #2	Second collection	1.9	3.2	70
Capacity Building #1	Extra carts	0.9	1.5	70
Capacity Building #2	Extra carts	1.4	1.9	35
Convenience Bldg #1	Changed location + mini-station inside	2.3	1.9	-20
Convenience Bldg #2	Extra depot	0.5	1.0	na
P&E Building #1	Chute posters	2.0	2.0	0
P&E Building #2	Chute posters	2.2	2.1	-5
P&E Building #3	Chute posters	1.4	1.6	15
P&E Building #4	Language free posters	0.7	1.1	na
Control Building	no strategy	1.7	1.8	4

All details of procedures for monitoring methodology and results of baseline and implementation trials at each of the buildings are discussed above in Section 3. Summary results for each of the three strategies are presented below.

4.1 Strategy 1: Increasing Capacity

Increasing the amount of capacity to store recyclables between collections was found to have the most significant effect on recycling capture. Capacity was increased at two locations by adding more recycling carts, and by doubling the collection frequency at another two locations. Larger buildings were targeted for this strategy as the data analysis of Phase 1 indicated that lack of storage capacity was pronounced in these buildings.

Table 2 shows that recycling capture increased at these buildings between 35% and 100%. At CPT #1 and #2, capacity was increased by increasing the collection frequency and thereby doubling capacity. At CPT #3 and #4 capacity was increased by adding carts. The decision about how many carts to add was based on how many carts

were being filled by residents without any prompting by other means (P&E, increased convenience). Close monitoring ensured that the carts were never permitted to overflow. As soon as they came close to this point more carts were added.

Table 5: Strategy: Increasing Capacity

Building Information		Implementation (test period)			% Change compared to Baseline	
Location (collection point)	Number of Units	Number of Carts	Capacity: Litres per Unit ¹	Kg/unit recycled (annualized) ²	Increase in Capacity ³	Increase in amount Recycled
CPTY #1 ⁴	317	32	36	135	100%	100%
CPTY #2 ⁴	131	18	49	165	100%	70%
CPTY #3 ⁵	308	24	28	85	140%	70%
CPTY #4 ⁵	134	12	32	100	50%	35%

Notes:

1. Based on 360 litre carts. Curbside average is approx 75 litres/household (about 1.5 blue boxes).
2. Average of weekly recycling capture over six week period after capacity was increased. Multiplied by 52 for comparison purposes. Not adjusted for seasonal variation. City average is 70 kg/unit/year for MR and 220 kg/household/year for curbside.
3. Percent increase as a result of adding more capacity (carts or increased pickup)
4. Capacity was increased by doubling pickup frequency to twice weekly
5. Capacity was increased by adding carts

4.2 Strategy 2: Increase Convenience

Strategies to increase convenience included setting up mini-recycling stations in one building and adding an extra depot location in the parking lot at one building complex comprised of several smaller buildings.

It proved difficult to establish a positive relationship between improved convenience and increased performance at the test buildings, as shown in Table 3. At one building a decrease in recycling capture occurred. At this site a second drop-off point was set up to provide residents with two locations to drop off recycling. The decrease in recycling capture may have been a result of confusion on the part of residents. At the second location, additional carts were placed by the property management during the test period, likely causing the noted increase in recycling capture. It was difficult to find more than two buildings to test this strategy. Of the volunteer buildings there was limited ability to make adjustments for increasing convenience. This suggested that unlike capacity, which is often more easily addressed, the factor of convenience may be based on structural features of a building or property which are more costly to address. Addressing convenience should require making recycling as convenient as garbage disposal and could include installing recycling chutes, closing garbage chutes or setting up recycling containers on each building floor. This would require greater

commitment and resources than available for this project. Recommendations for testing factors of convenience in a pilot may include testing any of the scenarios noted above and measuring recycling rates before and after implementation. To control for other variables a test could be done in twin buildings which have the same features in all aspects except for the level of convenience.

Table 6: Strategy – Improve Convenience

Location	Number of Units	Number of Recycling Carts during test period	Capacity: Litres per Unit	Kg/unit recycled (annualized) ¹	Increase in amount Recycled
CNV #1 ²	194	15	28	100	-20%
CNV #2 ³	114	3 - 5	16	50	Na ⁴

Notes:

1. Average of approximate weights of recycling during six week period after test measures were implemented. Multiplied by 52 for approximate annual amounts. It has not been adjusted for seasonal variation. City wide the average is 70 kg/unit/year for MR and 220 kg/household/year for curbside.
2. Recycling carts were placed in a location determined to be more convenient to residents and a second mini-recycling station was set up in the mail room.
3. An additional recycling station was set up in the parking lot so that residents did not have to walk as far to recycle.
4. As extra carts were added part way through the test for added promotion, increased recycling that occurred cannot be attributed to increased convenience and is not considered in the results.

The amount captured by recycling stream was compared for the four buildings in this trial and it was found that the overall increase in kilograms of the paper stream was 95% and for the container stream it was 110%.

4.3 Strategy 3: Promotion & Education

A poster was developed to provide a friendly reminder to recycle and was strategically placed in garbage chute rooms. Results from the poster tests are shown in Table 4. While some increases in recycling were found at two locations, there was no increase and a decrease at two other locations. It should be noted that the significant increase in recycling capture at P&E4 cannot be solely attributed to the posters, as additional carts were added by the property manager during the test. (Note: this was not part of the planned implementation strategy).

Table 7: Strategy: Promotion & Education

Location	Building Units	Number of Recycling Carts during test period	Capacity: Litres per Unit	Kilograms per unit recycled during test period (annualized) ¹	Percent Increase in Recycling Compared to Baseline
P&E1 ²	148	11	27	100	0%
P&E2 ²	176	14	29	110	-5%
P&E3 ²	226	13	21	80	15%
P&E4 ³	145	6 – 8	20	80	na%

Notes:

1. Average of weekly recycling capture over six week period after capacity was increased. Multiplied by 52 for comparison purposes. Not adjusted for seasonal variation. City average is 70 kg/unit/year for MR and 220 kg/household/year for curbside.
2. Posters had simple worded message: “Remember Blue Cart Recycling”
3. Posters were language-free
4. As extra carts were added part way through the test for added promotion, increased recycling that occurred cannot be attributed to increased P&E and is not considered in the results.

4.4 Conclusions:

The strategy that was most effective in increasing recycling performance was increasing capacity, either by increasing the frequency of collection or by increasing the number of carts. The cost/benefit analysis of this strategy indicated that adding 1,500 carts would result in an estimated 1,400 – 1,600 additional tonnes. This is based on an observed rule-of-thumb that each additional 95 gallon cart will divert an extra one tonne of recyclables. The estimated costs of supplying this amount of extra capacity takes account of the capital cost of the carts amortized over five years, the annual processing and collection costs and the revenue. It is estimated that the annual cost per tonne would be in the range of \$30 to \$40 per year, dropping to \$10 - \$20 per year in the sixth year after the carts have been paid for.

The other two strategies of making recycling more convenient and promoting recycling in the buildings did not have any significant impact on recycling levels. These strategies are recommended as best practices in Stewardship Ontario’s Blue Box Best Practices Report. While this project did not provide evidence to support this assumption it is suggested that this is because there was not adequate capacity in the test buildings. To get a true read of the impact of P&E and improved convenience it is recommended that the lack of capacity must be resolved first before other strategies are implemented.

5. Phase 3: Cost-benefit Analysis

5.1 Cost-benefit analysis of increasing capacity in buildings

The results of this project demonstrate that there is a clear correlation between the amount of available space for recycling storage (number of carts) and the quantity recycled (kg/unit). This was clearly indicated from the trials at the four buildings where this was tested. Similar results are indicated in E&E Project 301: Analysis of Multi-family Waste Audit Results. E&E 301 analyzes the data from waste audit results from 70 buildings in seven Ontario municipalities. The results show that one of the strongest determinants for capture rate is how much storage space there is for recyclables.

5.2 Determining tonnes per cart

The cost-benefit analysis in Table 1 assumes that on average each additional cart added to the system will increase the amount recycled by one tonne per year. This average is based on the observations noted below and are used as a rule-of-thumb.

Observation #1 – E&E 197 test buildings

- E&E 197 – 14 data sets (10, plus 4 with added capacity)
- Estimated annual tonnes recycled = 260
- Number of carts in test buildings = 195
- Tonnes per cart = $260/195 = 1.3$

Observation #2 – London's program

- 2008 London MR program tonnes recycled = 3,300 tonnes
- Number of carts in program = 3,100
- Tonnes per cart = $3,090/3,100 = 1.0$

Observation #3 – Audit buildings from 7 municipal programs

- E&E #301 – 70 audit buildings, 7 municipalities
- Estimated annual tonnes recycled = 530
- Number of carts = 496
- Tonnes per cart = $530/496 = 1.1$

That observations 1 and 2 are similar is to be expected as the test buildings are a subset of London's program. Observation #3 provides stronger support to the rule-of-thumb because it represents results from a range of programs with many different

characteristics including capture rate, the level of outreach or P&E distributed, how much capacity is in the system, etc.

For programs that are under capacity, the data indicates that carts will result in greater than the 1 tonne/cart/year average (i.e., the carts are overloaded), just as programs or buildings with plenty of capacity will yield less than the 1 tonne/cart/year average (i.e., carts will not always be filled to capacity).

Adding more capacity to London’s program will have associated costs and benefits. This may include the following:

Costs	Benefits
<ul style="list-style-type: none"> • Purchase price of extra containers • Operational costs from increase tonnes, including: <ul style="list-style-type: none"> ○ Processing costs ○ Collection costs – initially extra tonnes will be absorbed without extra costs 	<ul style="list-style-type: none"> • Financial: <ul style="list-style-type: none"> ○ Increase revenues ○ Reduce landfill costs ○ Reduce garbage collection costs • Environmental: <ul style="list-style-type: none"> ○ Reduce landfilled tonnes and increase diversion rate ○ Reduces greenhouse gasses from increased recycling ○ Saves resources & energy • Social: <ul style="list-style-type: none"> ○ Increase participation from residents ○ Reduce unsightly overflow of recyclables

The estimated financial costs for three options, based on the number of carts, are presented below. The additional tonnes recycled as a result of adding more carts is estimated based on the one-tonne-per-cart rule-of-thumb. As an approximation, a range, rather than a set number, of estimated new tonnes is presented for each option.

Table 8: Costs of Adding Extra Capacity

(estimates rounded)	Existing Program Assumptions	Option #1 500 new carts	Option #2 1,000 new carts	Option #3 1,500 new carts
Units	45,000	45,000	45,000	45,000
New Carts		500	1,000	1,500
Total carts	3,100	3,600	4,100	4,600
Units/cart	15	13	11	10
Tonnes				
New Tonnes (±1 tonne per cart)		400 - 600	900 - 1,100	1,400 - 1,600
Total Tonnes (approx range)	3,300	3,700 - 3,900	4,200 - 4,400	4,700 - 4,900
Recycled (kg/unit/year)	73	82-87	93-98	104-109
Diversion (based on 210 kg generation)	33%	38-41%	43-47%	49-52%
Costs				
Cart purchase (amortized over 5 years)	\$75 each	\$7,500	\$15,000	\$22,500
Processing	\$50/tonne	\$20,000-\$30,000	\$45,000-\$55,000	\$70,000-\$80,000
Collection		\$ - included	\$ 50,000 overtime	\$ 100,000 ½ new truck
Gross costs		\$28,000-\$38,000	\$110,000-120,000	\$190,000-\$200,000
Revenue	\$100/tonne	\$40,000 - \$60,000	\$90,000-\$110,000	\$140,000-\$160,000
Annual Net Costs first 5 years		\$(13,000)-\$(22,000)	\$10,000-\$20,000	\$42,000-\$52,000
Cost per tonne		\$(30) - \$(40)	\$10 - \$20	\$30 - \$40
Cost per tonne – starting in year 6		\$(50)	\$(5) - \$5	\$10 - \$20

6. Multi-residential Service Fee Systems

In Ontario a number of municipalities have fee-based systems for multi-residential garbage collection that are designed to provide incentives to reduce garbage and increase waste diversion through recycling and other diversion programs. Below are examples of some approaches currently used by Ontario municipalities. Additional information on fee-based multi-residential programs is available in Discussion Paper #5: Sustainable Financing Approaches for Multi-Family Buildings (E&E Project 160).

Orillia

Orillia system uses a partial user fee system for garbage collection in multi-unit buildings similar to the program they introduced for curbside garbage in 1997. For the curbside program, residents are issued 40 tags and must place a tag on all bags set to the curb. Residents can buy extra tags if they have more waste. Buildings are permitted garbage collected equivalent to the volume of 40 bags per unit per year. Additional garbage collected is charged a fee based on the fee set for the curbside bag tag.

Ottawa

In 2006 Ottawa moved the cost of providing garbage services off the tax base to a flat fee annual per unit charge. Buildings must recycle and are entitled to weekly garbage collection. Containers are rented from the city and allocated based on building size. There is a schedule of fees for additional garbage containers and service. Buildings that produce more garbage are charged more.

Peel Region

In late 2008 Peel Region introduced a pilot program with on-board weigh scales on two recycling and two garbage trucks to track the weight of waste generated and the amount recycled at each building (E&E Project 123). Peel is studying the option of fees for buildings beyond their garbage limits based on number of units in a building and the pilot will inform that process.

Toronto

Toronto launched its Multi-unit Waste Reduction Levy in July 2008. Properties pay for garbage based on the volume they generate. Buildings that increase recycling and reduce garbage will pay less and if they manage their garbage within a designate volume no levy is charged. The designated volume is based on the estimated volume of garbage produced if the building was capturing 60% of recyclables.

London

Recycling collection for residential multi-unit buildings has been provided by the City of London since September 1999. Since that time property owners have been responsible for providing the recycling containers. Garbage collection is also provided by the City,

and similarly, property owners are responsible for providing their own garbage bins. The city also has a program for renting garbage bins for a monthly rental fee. Many buildings own their own bins and there is no limit to the amount of bins that will be collected, nor is there a service fee based on lifts per collection. Most buildings receive twice weekly garbage collection and once per week recycling collection. There is a service fee charged to buildings that receive two collections, but no service fee for buildings that receive only once weekly garbage collection. There is no recycling collection service fee. The current fee levels are as follows:

Collection Service	Collection Service Fee (above tax base costs)	Container Costs
Garbage – provided by city crews	<ul style="list-style-type: none"> • service fee for second weekly collection: \$3 per unit per year • to be increased to \$3.25 in 2009 	<ul style="list-style-type: none"> • owner to purchase garage bins, or • rent from city at \$25 per month
Recycling – provided by city contractor	<ul style="list-style-type: none"> • no additional service fees to property owners 	<ul style="list-style-type: none"> • owner to purchase (approx \$75-\$100 per 95 gallon cart)

At present London's system offers some incentive to reduce garbage collection. The per unit service fee on the second collection is an incentive to reduce the frequency of collection from twice to once weekly, but as this represents a reduction by half it may be a difficult reduction for a large building.

In the future London may consider options to tie the garbage service fee to recycling performance in order to provide increased incentives to recycle more. Because London does not provide recycling carts, insufficient cart capacity is often a barrier to increase recycling in buildings that are reluctant to purchase the necessary containers. London may consider the option of increasing the service fee based on how much a building recycles. This could be measured based on the number of recycling carts per building units. However, because this option assumes that the recycling carts are being used, it may not be effective, particularly in buildings where the recycling carts are inaccessible and not well used and another measurement of recycling performance may be required.

Another option, similar to other programs is to establish a volume based garbage limit for buildings based on the number of residential units. Similar to curbside bag limits this could be phased in beginning with a limit which would likely gain wide acceptance.

Details of the strategies and results for each of the test buildings is provided in *Appendix A: Results of Implementing the Strategies*.