



Submitted to
The City of Fredericton

Submitted by



466 Hodgson Road
Fredericton, New Brunswick E3C 2G5
T: 506.458.1248 | F: 506.462.7646
www.ghd.com

Report

Draft Garbage and Recycling Program Review

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Executive Summary

The City of Fredericton (City) issued a Request for Information (RFI P16-05) to retain a consultant to undertake a study of its current waste and recycling collection programs, which was subsequently awarded to GHD. The overall goal of the study was to review the City's collection programs to identify opportunities for improvements related to efficiency, cost, and diversion.

The City's main role as it pertains to waste management is to administer the collection of waste and recyclable materials. The collection programs that the City offers are for the most part dependent on solid waste programs (e.g., garbage and recyclable streams) established by Fredericton Region Solid Waste (FRSW), a division of Regional Service Commission 11. Therefore, FRSW is a critical stakeholder in the programs that the City offers.

Overall the City has been successful in administering curbside collection programs for the last 16 years, collecting garbage and recyclables from more than 19,000 households. In addition, the City has managed a seasonal leaf and yard waste collection program including the City's Parks and Trees Composting Centre on Beek Court for the last 25 years. **City residents noted that the current recycling program was well regarded (60% rated it "very good" or "somewhat good") based on a residential waste management survey completed as part of the study.** However, the City also recognizes the importance of continually adapting waste management programs to meet the changing needs of the residents they serve. The high survey response rate (844 responses) shows that residents are quite engaged, providing quality insight and feedback regarding the City's current waste management programs, and identifying areas where they would like to see change.

Key study topics for review requested by the City were related to diversion, automated collection, source separated organics (SSO), glass recycling, and curbside multi-unit residential recycling. In addition, two surveys were completed including an informal curbside garbage and recycling survey; and a residential waste management survey (noted above) that was made available to residents online and in-person at select venues. The following is a summary of the findings and recommendations.

Diversion

The City's current diversion rate is estimated to be approximately 19% based on the average quantities of residential garbage and recyclables collected (2011 to 2015), the quantity of leaf and yard waste collected (2015), and the average quantities of recyclables collected from the recycling depots (2011 to 2015). It was estimated that the City is capturing approximately 43% of materials that can be diverted based on existing programs (i.e., recyclables and leaf and yard waste). A modest increase in the diversion rate could be realized through greater participation in the existing programs and further promotion and education. A significant increase in the diversion rate could be achieved with the implementation of a SSO program for kitchen/food waste.

It should be noted that while the City's diversion rate is lower as compared to many other Canadian municipalities, there is no standard methodology for calculating diversion across Canada, which can result in a range of diversion statistics. Reasons for variances in the way diversion is reported can



be related to numerous factors such as the inclusion of programs administered and not administered by the municipality, the inclusion of industrial, commercial, and institutional (ICI) waste, and differences in what is considered diversion in individual programs. For example, the City's diversion rate could be as low as 13% if the materials collected privately from multi-unit residential buildings or other dwellings the City doesn't service are factored in. Conversely, **the City's diversion rate could also be as high as 25% if materials diverted through existing programs for Municipal Hazardous or Special Waste (MHSW), Waste Electrical and Electronic Equipment (WEEE), and backyard composting are included.**

Recommendations:

1. **The City should undertake a residential waste audit** to obtain data specific to the City that can be used to shape waste management and diversion programs.
2. **The City should develop a Promotion and Education (P&E) Plan.** This will serve as the basis to improve promotion, education, and enforcement of existing and future diversion programs in order to increase capture rates, especially for recyclables. This plan should include the development and use of:
 - a) Brochures and newsletters sent to residents
 - b) Posters displayed in key areas around the City
 - c) Interactive displays for community events and schools
 - d) Social media and website
 - e) Policies to support solid waste programs, including ensuring compliance through proper administration and enforcement
3. Expand the curbside recycling collection program to include multi-unit residential buildings as further described in the Multi-Unit Residential section (below).
4. Adopt a "pay as you throw" system for garbage carts that are rolled out as part of an automated curbside collection program as further described in the Automated Collection section (below).
5. Expand the leaf and yard waste program as outlined in the Source Separated Organics Program section (below).

Automated Collection

Manual and semi-automated collection systems, as currently used by the City's collection contractor, rely heavily on manual labour for collection activities. These systems have a lower capital cost but usually have much higher operational costs and increased health and safety risk due to heavy lifting and handling of waste. **Automated collection systems typically consist of a collection truck fitted with a hydraulically operated arm that can lift and empty standard carts without the need for handling by a worker. Automated systems are becoming increasingly popular as they alleviate the health and safety concerns associated with heavy lifting and handling of waste and require less manpower to implement.**



A model was developed to assess the costs associated with the City's current system, as well as the potential costs and savings as a result of implementing the following scenarios:

1. Automated Collection of Garbage
2. Automated Collection of Garbage and Recyclables
3. Automated Collection of Garbage, Recyclables, and SSO

The program costs incurred by the City under all of the automated scenarios considered would be significantly higher than under the current manual scenario as a result of the additional costs associated with the purchase and distribution of carts (capital cost ranged from \$890,000 to \$3.7 million). However, the program costs incurred by the collection contractor under all of the automated scenarios are expected to decrease incrementally (1.7-6.4%) with the inclusion of additional waste streams as a result of the time-in-motion efficiencies gained through automation. These savings are reflected in a cost estimate provided by the City's current collection contractor (Fero Waste & Recycling Inc.) for the implementation of automated collection for the garbage stream. The modelled savings are in line with those estimated by Fero.

In addition to considering automated collection, the City is also interested in policies that support and enforce diversion programs in order to foster participation and include waste limits (either through limiting the number of bags or cart size), "pay as you throw" (e.g., form of payment based on the quantity of garbage placed at the curb), and modifying the waste collection schedule (e.g., reducing garbage collection frequency). Overall, these measures are effective at diverting material away from landfill disposal and provide incentive for residents to participate in recycling programs.

Recommendations:

1. In order to determine the best course of action for modifying existing collection programs, **the City should develop an overall strategy with regards to solid waste management (e.g., objectives and priorities).** This will provide the framework for determining which automated collection options and policy changes are best aligned with the City's strategy.
2. **The City should implement automated curbside collection of garbage.** This will result in an initial capital investment to purchase new carts for residents (\$890,000). This cost could be offset by passing off some or all of the costs to residents, and by allowing existing conforming carts to be used. The estimated annual operating cost for the program for items such as maintenance and replacement of carts and promotion and education (\$56,000) is slightly more than the modelled savings from the annual collection contract (\$30,000). However, the City has also received a quotation from the current collection contractor that suggests annual savings could be even higher (\$90,000). Overall, implementing automated curbside collection offers the City many benefits including reduced health and safety liabilities, time in motion efficiencies, and ease of use benefits for residents.
3. **The City should adopt a "pay as you throw" system for new garbage carts that are rolled out as part of an automated curbside collection program.** Similar policies have been successfully implemented in other municipalities and have led to fair pricing that sees users pay for the level of service that they require, with the added benefit of increasing diversion. This system could include offering residents different cart sizes with an annual user



fee set based on the cart size, with larger ones being more expensive. The City would need to consider what size carts would be offered, how the pricing scale would be set, and how the fees would be implemented (e.g., direct fee to residents, subsidized by the collection contractor or new developers). Consideration will need to be given to allow residents to use existing conforming garbage carts.

4. The City should further evaluate other aspects of the collection program with respect to automated collection:
 - a) Automated Collection of Curbside Recyclables – The challenge with automated collection of recyclables is associated with the fact that there is a dual stream recycling system (fibres and containers; or grey box and blue box). The implementation of automated collection will require providing each resident with two carts or possibly one if a split cart is used. The City should further investigate implementing automated collection of curbside recyclables including advantage/disadvantage, economic, and public acceptance considerations.
 - b) Multi-Unit Residential – The City should further evaluate and consider the implementation of automated collection of curbside recyclables for multi-unit residential buildings with the potential of phasing out the recycling depots, as further described in Multi-Unit Residential section (below).

Source Separated Organics Program

Organic waste including leaf and yard waste and SSO makes up the largest portion of the City's waste stream. Currently the City is diverting some leaf and yard waste to its own composting facility. An order of magnitude cost estimate was prepared for the development and operation of a City-owned composting facility that would be capable of handling SSO material as well as biosolids. As a conservative assumption, an in-vessel type system (high level of process and odour control) was selected due to likely proximity to nearby residents. GHD examined three options ranging from processing 5,000 to 15,000 tonnes per year (TPY) of organics including kitchen waste, leaf and yard waste, and biosolids. **As shown in the table below, the estimated order of magnitude capital cost for a composting facility ranged from \$6 to \$15 million for 5,000 and 15,000 TPY facilities, respectively.** The equivalent annual cost per tonne¹ was estimated to range from \$176 to \$197.

¹ Equivalent Annual Cost (EAC) Per Tonne: Total capital and operating costs per tonne; capital costs amortized over 20 years at 5% discount rate



Order of Magnitude SSO Program Costs

Item	5,000 to 15,000 TPY Composting Facility
Processing Costs (Assume In-Vessel Technology)	
Capital Cost	\$6-15 million
Annual Processing Costs (Cost Per Tonne)	\$95-\$100
Equivalent Annual Cost Per Tonne (20 years at 5% Discount Rate)	\$176-\$197
Equivalent Annual Cost	\$985,000-\$2.64 million
Tip Fee Savings	-\$410,000 to -\$905,500
Net Equivalent Annual Cost	\$575,000-1.73 million
Program Costs	
Initial Purchase/Distribution of New Carts and Kitchen Catchers	\$1.03 million
Annual Operating Costs (i.e., replacement/maintenance of carts)	\$61,000

In addition, program cost estimates are shown in the table above based on the automated collection model² completed. An initial capital investment would be required to provide residents with carts and kitchen catchers (\$1.03 million), with annual operating costs related to maintaining/replacing carts (\$61,000). Annual collection contractor costs may not increase depending on how collection is implemented. The addition of SSO does not actually increase the total amount of waste collected and it is possible that garbage collection would be scaled back (e.g., from weekly to bi-weekly). Furthermore, promotion and education costs are likely negligible assuming the City has implemented a revamped program as part of implementing other solid waste management program changes in advance of implementing a SSO program.

The City requested that the carbon footprint of a potential newly developed composting facility be compared to that of the current practice of landfill disposal of organics at the FRSW landfill. **The FRSW landfill operates a Landfill Gas Utilization Plant (LGUP) which has been reported to be currently mitigating 45,000 to 60,000 tonnes of greenhouses gases per year and has the capacity to power approximately 2,000 homes³.** The calculated offset of the LGUP under current operating conditions is approximately 3,300 tonnes of carbon dioxide equivalent (tCO₂e) per year when considering only the City's waste stream (as compared to landfilling with no collection system), demonstrating that there is a significant benefit to the methane gas collection program. **Overall, the conclusion made by GHD is that that the carbon benefits realized by the City considering the development of a new composting facility will not materially increase the overall carbon offset as compared to the existing LGUP.**

Other options the City could consider to divert organics from landfill disposal include expanding the leaf and yard waste collection program and further promoting and supporting backyard composting.

² Scenario 4 (Implementation of automated collection for garbage, recycling, and organics) in Section 9 of the report provides further details of possible program costs associated with the implementation of a curbside collection program for SSO.

³ <http://frswc.ca/operations/landfill-gas-plant/>



The City currently provides leaf and yard waste pickup for its residents on the same day as garbage collection for a two week period in both May and November. The City could consider increasing the collection period (e.g., from two to four weeks for both May and November); this could be done at an incremental cost increase for collection. Furthermore, the City could consider expanding the operation of the City's Parks and Trees Composting Centre on Beek Court, by allowing the public to drop off leaf and yard waste during limited times (e.g., Saturday morning). Consideration would have to be given to the capacity of the City's composting facility to accept additional materials and additional receiving and processing costs.

The City works with Greener Village to promote backyard composting. They identified the need for the City to market the backyard composting program, to provide access to ideal facilities for the composting workshops (e.g., public library), and to continue making backyard composters available at cost for residents.

Recommendations:

1. If the City would like to further consider the implementation of a SSO program, it should engage FRSW as a stakeholder in the region's solid waste program. Implementing a SSO program in collaboration with FRSW would allow for the City to take advantage of economies of scale to reduce overall program costs, share risk, and implement efficient integrated collection programs. The next step would involve completing a Business Case Analysis that would include a comprehensive evaluation of implementing a SSO program including a review of feedstock quantities, potential facility sites, technologies, exploring alternate options (e.g., utilizing a private composting facility), and project delivery method.
2. If the City proceeds with automated collection of garbage as recommended above in the Automated Collection section, some consideration will need to be given to the collection of leaf and yard waste beyond the specific spring and fall collection periods. Additionally, these measures will allow for further diversion of leaf and yard waste from landfill disposal. The City should further review and evaluate:
 - a) Expanding the spring and fall leaf and yard waste collection period (e.g., from two to four weeks for both May and November).
 - b) Allowing for public drop off at the City's Parks and Trees Composting Centre on Beek Court during limited times (e.g., Saturday morning).
 - c) Banning the collection of grass clippings and encouraging "grasscycling".
 - d) Amending collection schedules to address when leaf and yard waste will and will not be collected.

It is noted that these changes may not be required if the City decided to pursue a SSO program, as excess leaf and yard waste could be managed with a SSO program.

3. Re-kick start working with Greener Village to promote backyard composting, including marketing, providing facilities to accommodate composting workshops, and continuing to provide backyard composters available at cost for residents.



Glass Recycling

Currently glass containers are not accepted in the curbside recycling program, noting that there is a bottle refund program in New Brunswick. The City likely generates approximately 288 tonnes of glass annually that is disposed of at the FRSW landfill. **Most regions in New Brunswick do not accept glass as part of residential recycling programs with common reasons being cited including limited impact on diversion, high cost to get the material to end market, and Material Recovery Facility (MRF) safety issues.** It appears that in Atlantic Canada that Rayan Investment Ltd. (Rayan), located in Moncton, is a major processor of glass collected from bottle refund and curbside recycling programs. GHD understands that Rayan charges a tip fee to accept these materials and processes glass by colour and crushes it into small pieces called cullet. Glass cullet is generally used for the production of new glass, glass abrasives, insulation, and fill materials (e.g., drainage media). By contrast, glass containers are collected in curbside residential programs in PEI and Halifax, and are ultimately crushed and used as drainage media and fill for local septic field or municipal projects.

Multi-Unit Residential Recycling

The City's curbside collection program does not include apartments and multi-family dwellings greater than four units; and as such the City operates three recycling depots for use by residents where curbside collection is not available. **There are several issues with depots noted by the City including lack of convenience for residents, low capture rates, contamination and improper sorting, and litter.**

The complexities of the multi-family sector means there is no "one size fits all" solution. There exist several potential policy tools which may be used by the City to increase source separation at multi-unit residential buildings. Key among these is requiring developers of new buildings to provide adequate access and to pay for the large carts and bins required to participate in the City's collection service. Similar to single-family residential collection, a major factor for consideration is the relative convenience provided to the resident. Depot based programs – whether they are for single-family or multi-family, generally aren't as successful as curbside collection programs.

Recommendations:

- 1. It is recommended that the City implement a by-law with the overarching goal of ensuring all residents (regardless of their housing type) have access to the City's recycling program. This includes the phasing out of the drop-off depots in favour of implementing a collection program at multi-unit residential buildings.**

Participation Survey

The City undertook an informal survey of participation in curbside recycling by residents over a six week period starting the week of July 18, 2016, extending through the week of August 29, 2016. Ten street areas or blocks were selected and each week a tally of residents who placed recycling boxes and/or waste containers for collection on garbage pick-up day was recorded. The total average garbage participation rate (61%) for the ten areas surveyed was 2.4 times higher than the total average recycling participation rate (25%). Approximately 47% of residential dwellings placed curbside a recycling box (blue or grey) at least once. Although the total average garbage



participation rate was significantly greater than the total average recycling participation rate, it was still much lower than anticipated.

Residential Waste Management Survey

A residential waste management survey was developed with the objective of determining how residents view and value waste reduction and diversion. The survey was deployed as an online survey through the City's website from October 3 to October 31, 2016 and was also administered in-person by GHD staff at various locations within the City from October 14 to 16, 2016. A total of 844 responses were received. Generally speaking, there is a high interest from members of the public to see some type of change with respect to the existing waste management system, in particular curbside recycling. **A large portion of respondents think curbside recycling should be mandatory (71%), are willing to pay a fee for wheeled carts (62%), and are willing to purchase a backyard composter or are already using one (57%).** However, the respondents that stated yes or no to the question of whether they are in favor of curbside garbage limits were almost equally divided between yes (44%) and no (42%). Thirty-four percent (34%) of respondents stated that they would be willing to pay more fees, while 27% said they are not willing to pay more, but would like to see additional waste diversion programs implemented by removing or reducing other services. Many respondents did, however, express a concern about having to pay higher fees and many noted that their willingness to support new initiatives would depend on how much the additional fees were.

A list of seven waste management programs were provided to survey respondents. Respondents were asked to rank them from 1 to 7, with 1 being their first choice. Curbside food waste collection was ranked the highest, with an average rating of 3.1, followed by eliminating depot systems and expanding curbside collection of recyclables to all multi-residential units with an average ranking of 3.2. Reducing garbage collection frequency did not receive as much widespread support, with an average rating of 5.12, making it the second lowest-rated option ("no change" was the lowest-rated option with an average rating of 5.68).

Over 96% of respondents stated that waste diversion and reduction was either "very important" or "somewhat important" and 85% of respondents stated that they either recycle everything or almost everything. The City's current recycling program was well regarded (60% rated it "very good" or "somewhat good"); however, 62% of respondents said that the City's current recycling program did not keep enough material out of the landfill, and 78% of respondents stated that they would like to see improvements made to the current diversion rate.