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Regional Municipality of York

Report on Current State and Opportunities for Improvement

May 18, 2007

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As with any planning assignment, the role of this document is to estimate future events based on information available and/or provided to us at the time of our report, primarily interview results, field observations, consultation with industry representatives and available published information. There are, however, a number of uncontrollable political, social and internal factors that may affect the findings outlined in this document. As a result, this document should be viewed in the context of being estimates based on information, which may or may not be influenced by unforeseen or uncontrollable events. We caution the reader that the ultimate success of any Blue Box Program Enhancement initiatives can vary significantly from the projections outlined in this report due to economic or regulatory changes, cost escalations, decisions of competing communities, the emergence of new competitors, changes in government funding programs and/or priorities or the inability of the program improvement process to achieve certain key milestones.

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Executive Summary

About this report

This report was prepared as part of the Recycling Program Enhancement & Best Practices Assessment project, the purpose of which was to identify activities that constitute best practices and determine the Ontario-wide Blue Box program cost if all programs in the province operated under best practices.

In appreciation of your willingness to allow the project team to visit and learn from your program, we have prepared this report, which identified best practices applicable to your program and lists potential opportunities for improvement.

Program observations, conclusions, and potential opportunities for improvement outlined in this report were developed as a result of brief site visits, high-level analysis of your program, assessment of other Blue Box programs, and primary and secondary industry research by the project team. It is important to note that prior to implementing any of these potential opportunities, your municipality needs to thoroughly assess their appropriateness and practicality in the context of your specific Blue Box program. For major initiatives requiring capital investment, this would entail a detailed cost/benefit analysis, payback period analysis, and/or feasibility review.

York Region covers 1,776 square kilometers and is comprised of nine lower tier municipalities: Markham, Richmond Hill, Vaughan, Aurora, East Gwillimbury, Georgina, King, Newmarket, and Whitchurch-Stouffville. Approximately 241,000 single-family and 32,000 multi-residential households are served by York Region's Blue Box program.

The nine lower tier municipalities are responsible for the collection of the Blue Box material and providing individual program promotion and education (P&E). The Region is responsible for processing and marketing the material, and promotion of diversion. The municipalities have all outsourced collection to private contractors. Currently, all of the municipalities work independently and have individual collection contracts with varying terms and agreements. Starting September 2007, the "Northern Six" municipalities of Aurora, East Gwillimbury, Georgina, King, Newmarket, and Whitchurch-Stouffville will be part of a joint ten-year collections contract. The joint collections contract is expected to show substantial cost savings in collection, harmonization of promotional material, enhanced service levels, improvements in monitoring and tracking, and dedicated staff to monitor the contract, resulting in greater efficiencies.

A new $39 million Waste Management Centre with a single stream Materials Recovery Facility (MRF), a garbage and source separated organics transfer station, and an education centre began operation in July 2005. It is municipally owned but privately operated by Miller Waste Systems on a five year contract that ends in July of 2010. The MRF portion of the facility is 62,000 square feet with a 90,000 tonnes per year capacity.

York Region was in transition in mid-2005 from a two stream collection and processing system to a single stream system. This hinders gaining a clear picture of York's system costs using 2005 WDO DataCall data. Based on 2005 data, York Region's Blue Box program had the highest E&E factor in its Large Urban municipal group at 3.14, which was 29 percent higher the group average. The high E&E factor was the result of the Region's high processing costs, which were 72 percent higher than the group's average. One likely factor causing this is the switch to single stream recycling to save on processing, without a concurrent change to their collection contracts. Also, York transfers much of its blue box tonnage at a cost of $35 per tonne. Other contributing factors included having the highest collection cost and administration and capital cost of the group, in addition to higher than average promotion and education (P&E) costs. The P&E costs were affected by the launch of a major campaign to inform residents of the new single-stream program. On the other hand, York Region had one of the highest recovery rates in the group at 65 percent.

York Region staff met with the project team on January 8, 2007 to discuss the Region's Blue Box program. The site visit, as well as follow-up communications with

lower tier municipalities, indicated some of the possible reasons for the high collection, processing, and promotion and education costs resulting in a higher than average E&E factor. Although the Region defines the contents and processing of the blue box program, municipalities have separate collection contracts and P&E programs. The apparent collection variances along with a lack of cooperative planning hinder achieving lower collection and P&E costs through economies of scale. There also appears to be room for improvement in pre-procurement consultation processes to ensure the request for proposals terms are clear and fair and thereby allow the Region to receive numerous proposals and competitive pricing of their collection and processing contracts. Although several firms were involved in pre-procurement consultation and several were pre-qualified, only one chose to bid. Furthermore, misalignment of collection and processing contract terms has not yet allowed municipalities to fully take advantage of collection cost saving opportunities that can result from single stream Blue Box systems. This is being improved by initiatives such as the collaborative collection contract entered into by York Region's "Northern 6" municipalities.

York Region's Blue Box program has undergone significant change and improvement in the past few years as shown by the high diversion rate achieved. The following further potential opportunities for improvement were identified for York Region to consider for its Blue Box program:

- Provision of free Blue Boxes and combined procurement. if they are not provided free to residents, at least, standardization of Blue Box prices across the Region;
- A coordinated P&E campaign amongst the lower tier municipalities;
- Extension of the Blue Box program to all multi-residential units;
- Continue harmonization efforts in Combined collections, processing and P&E programs;
- Continue MRF optimization improvements. The Region seems to have a well managed and informed program of looking for improvements involving making program adjustments and testing their effect on cost and diversion;
- Effective procurement, contracting, and contract management including pre-procurement consultation;
- Consider options for changes to the materials marketing agreement; and
- Consider adding additional materials to the program and solicit additional Blue Box materials from nearby jurisdictions.

Current State of Your Blue Box Program

This section of the document contains description, visual depiction, and analysis of the current state of your municipal Blue Box program

Program Description

Program Title: York Region

Program Type: Large Urban

Site Visit Date: January 8, 2007

Site Visit Team Members: Bonnie Ballam, Rob Rennie, Patrick Parent, Chris Reid

York Region covers 1,776 square kilometers and borders the City of Toronto to the south, Peel Region to the west, Durham Region to the east and Simcoe County to the north. The 2005 WDO Data Call indicates that approximately 241,000 single-family and 32,000 multi-residential households are served by York Region's Blue Box program. The population in York Region is expected to increase by approximately 150,000 people, or 16 percent, by the year 2011. Over 10,000 new homes were built in the Region in 2006 alone.

York Region is comprised of nine lower tier municipalities: Markham, Richmond Hill, Vaughan, Aurora, East Gwillimbury, Georgina, King, Newmarket, and Whitchurch-Stouffville. The nine lower tier municipalities are responsible for the collection of the Blue Box material and collection-specific promotion and education (P&E). The Region is responsible for processing and marketing the material, and promotion of diversion. Even though the Region has no direct role in collection responsibilities of the nine lower tier municipalities, or the related P&E, they are responsible for the submission and accuracy of the WDO data call information as it relates to the whole system. This is an issue as the Region is constrained by the data reported to it by the lower tier municipalities.

The collection function of all nine lower tier municipalities is outsourced to private contractors. In 2005, all of the municipalities worked independently and had individual collection contracts with varying terms and agreements. There remain variations in garbage and recycling collection frequency, garbage collection limits, user pay incentives, organic waste programs, and the charges applied for additional recycling boxes. Each municipality offers the first box and replacements at no charge; however, there is a wide range of prices for additional recycling boxes of varying sizes between municipalities with prices ranging from $5 to $10 per box.

Although there are similarities between each of the municipal programs, they are not all identical.

A current York Region population estimate shows that 33,379 (11.7 percent) of York Region's households are multi-residential units. Multi-residential includes apartments, condominiums, and some types of townhouses. As with single family homes, there are differences in the service level, contract terms, containers and garbage limits offered to multi-residential complexes by each municipality.

The most recent procurement of collection services was conducted in the summer of 2006 for the "Northern Six" municipalities of Aurora, East Gwillimbury, Georgina, King, Newmarket, and Whitchurch-Stouffville. The result of the procurement process was a new joint contract scheduled to begin in September 2007. This contract was awarded to Turtle Island Recycling. The new collection contract harmonizes the core collection services for discards across the six municipalities including collection frequency and materials accepted, as well as implementing the Green Bin program that is currently in place in the three other York Region municipalities.

Vaughan, Richmond Hill and Markham each still have separate collection contracts. The City of Vaughan entered into a collection contract with Miller Waste Systems (Miller) which began on January 1, 2006 for a five year term. The Town of Richmond Hill negotiated a 7 year deal with Miller that began in April 2007 to coincide with the launch of organics collection. The Town of Markham's current contract with Miller has been in place since November 2005 and is set to expire in November of 2011. The relationship between Markham and Miller has existed since 1972 and contracts have been extended and negotiated since that time without public tender.

A new $39 million Waste Management Centre was built for York Region and began operation in July 2005. It is municipally owned but privately operated by Miller Waste Systems on a five year contract scheduled to end in July of 2010. The facility consists of a 62,000 square foot single stream Materials Recovery Facility (MRF), garbage and organics transfer station, and an education centre. The single stream MRF was designed to process 90,000 tonnes of blue box materials per year. The municipally owned scales are also operated as part of the agreement with Miller. The new facility allowed the Region to expand the list of accepted materials to also include tubs and lids, all plastic bottles, polycoat containers, aluminum foil, and empty aerosol and paint cans. The MRF does not accept plastic film or polystyrene.

The Region entered into a five year marketing agreement with Miller Waste Systems in conjunction with the processing contract and Miller receives 5 percent of the revenues as compensation. Monthly meetings are held with vendors and the marketplace is regularly analyzed to obtain the best price per tonne for each commodity. The Region, through Miller, has established long-term relationships with the buyers without entering into long- term formal contracts. Composition audits of processed materials are performed on a regular basis by the Region.

DataCall Information and Quantitative Analysis

Listed below is a summary of the data provided to WDO for 2005 for York Region in comparison to data for all programs in its Large Urban municipal grouping, which includes Hamilton, London, Toronto, and the Region of Peel. It should be noted that York Region was in transition in mid-2005 from a two stream collection and processing system to a single stream system. As a result, 2005 data is not a good indicator of system costs in the Region either before or after the program change. Despite this fact, a comparison of York to the other programs in its grouping can still provide an indication of program areas that could benefit from additional attention.

York Region's Blue Box program had the highest E&E factor in its municipal group at 3.14, which was 29 percent higher the group average. The table below illustrates the variation in operational and financial statistics of York Region versus the average and the lowest E&E program:

Program Title	York Region	Average	Lowest E&E in Group
Year	2005		
Municipal group	Large Urban		
Reported and/or Calculated Marketed Tonnes	59,183	**73,475**	39,465
Residential Collection Costs Per Tonne	$156.38	**$149.93**	$144.49
Residential Processing Costs Per Tonne	$113.90	**$82.18** [1]	$75.50
Residential Depot/Transfer Costs Per Tonne	$4.41	**$6.43**	$1.78
Residential Promotion & Education Costs Per Household (Gross)	$2.94	**$1.62**	$3.30
Residential Promotion & Education Costs Per Tonne	$13.47	**$8.09**	$16.57
Administration and Capital Cost Per Tonne	$9.52	**$7.76**	$6.85
Gross Costs Per Tonne	$308.84	**$242.68**	$246.55
Net Cost/Tonne	$205.22	**$146.35**	$116.36
Households	273,358	**400,097**	198,262
Multi Family Percentage	12%	**36%**	30%
% Recovery	65.27%	**59.83%**	62.69%
EE Factor	3.14	**2.43**	1.86

[1] *Excludes London, which reported a processing cost of $1.86 per tonne.*

As the table above shows, the area where York Region diverges from the other programs in its grouping is its processing cost per tonne, which is approximately 39 percent higher than the municipal group average of $82.18 per tonne. There is a transfer cost within York's number of approximately $35 per tonne.

Although per tonne collection costs, administration and interest on capital costs, and promotion and education costs are higher than average, they do not impact the net cost per tonne to the extent that the processing cost does.

It is noteworthy that York Region reported one of the highest recovery rates in the group at 65 percent.

Observations and Qualitative Analysis

Members of the York Region Waste Management Branch met with the project team on January 8, 2007 to discuss the regional Blue Box program and tour the MRF. The site visit, as well as follow-up conversations with lower tier municipalities, provided

insight into potential contributors to the above average net cost per tonne of the program.

Although collection costs were not significantly above average in 2005, contributors to higher cost included:

- Separate collection contracts, which limits the ability to benefit from economies of scale and incurs additional administrative expense for managing multiple contracts rather than one. This is a responsibility of the lower tier municipalities
- Negotiated collection contracts in some municipalities, which may result in a higher cost compared to a competitive procurement process.
- The Region of York moved from a two stream to single stream collection program in mid-2005. Because of existing contractual arrangements, the expected substantial collection cost savings are likely not fully represented in the 2005 full year data and won't be until the end of current collection contracts.

These three observations are supported by the results of a recent collection procurement that was conducted by the "Northern Six" municipalities. Starting in September 2007, the "Northern Six" municipalities of Aurora, East Gwillimbury, Georgina, King, Newmarket, and Whitchurch-Stouffville will be part of a joint ten-year collections contract. The new contract includes all collection and haulage services for garbage, recycling, green bin, front loads, roll-offs, etc. Compared to existing contracts, the participating municipalities estimate that they will realize collection savings in excess of $11 million over the 10 year term of the contract (the savings are for all materials collected and only a portion will accrue to the Blue Box program). Most of these municipalities are currently paying by the household, but under the new joint contract will pay by the tonne. Since the announcement of the LCBO deposit return program and the expectation of a reduction in container weight in the blue box program, these municipalities may realize additional cost savings by having chosen this payment measure. The extent of any potential reduction is unknown at this time.

In addition to a substantial cost savings, this contract will harmonize the core collection services across the six municipalities. The new service level will implement weekly collection of green bin and blue box materials, and biweekly collection of garbage and yard waste. Although some of the municipalities currently have this service level, others do not. Therefore, some of the municipalities will receive an increased level of service as a result of the joint contract. In addition, the contractor will have a centralized call system to track and respond to customer complaints. Currently, some of the municipalities do not have an effective call-in system for investigation and tracking purposes. Under the new contract, the dispatch will forward the calls to the mobile Supervisor for investigation and resolution of the call by the end of the day. Reports can be generated to track the type of calls and how they were resolved.

The joint contract will also offer additional advantages to the participating municipalities. Currently, only two of the Northern Six municipalities have at least one full time staff person dedicated to solid waste. As part of the joint contract

planning, three positions are being developed to oversee the contract on a day to day basis, which will benefit those municipalities who have not had the staff resources to adequately monitor their collection contractors. Although this may increase personnel costs, hopefully it will lead to offsetting efficiencies,

Contributors to higher processing cost of the program include:

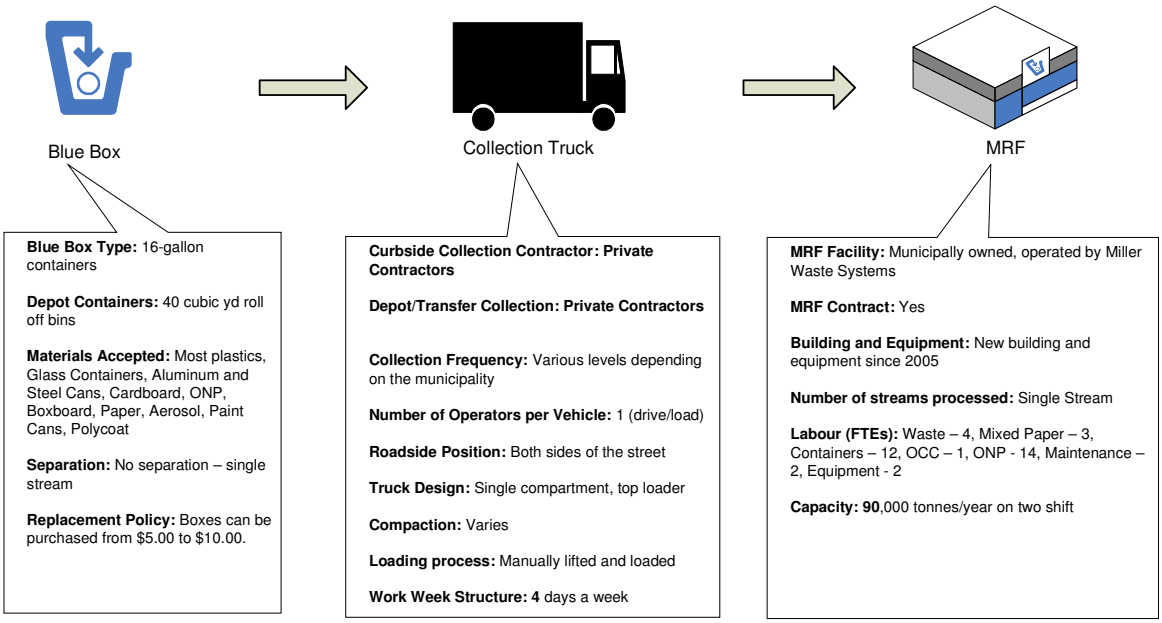
- The construction of a new single stream materials recovery facility (MRF) in 2005, which substantially increased the processing cost through high capital and depreciation costs. The construction of a single stream facility with more sophisticated equipment is also more costly as compared to a two stream facility.
- The appearance that there may have been inadequate pre-procurement consultation on the design/build/operate processing procurement to ensure the terms were clear and fair and would not inadvertently exclude competing proposals that could have offered a lower price. Although York region did conduct pre-procurement consultation with industry and pre-qualified several bidders, they still received only one bid for the Waste Management Centre.

Contributors to higher promotional and educational costs of the program include:

- Additional promotion and education in 2005 because of the change from two stream to single stream collection programs. New promotion and education material needed to be created and distributed to ensure that residents of the Region understood the changes. This was a one time additional cost and is unlikely to reoccur in the near future.
- Individual municipal programs that require specific communication material to explain their own programs. If municipal services were harmonized, more common messages could be promoted Region-wide with fewer resources, such as mass production of P&E materials and the use of mass media. With single stream recycling and common acceptable items currently in place Region-wide, and with most municipalities offering the same core service levels by the Fall of 2007, there may be an opportunity to consolidate P & E materials and communications staff at the Region level.

Although York Region has a higher than average E&E ratio, many of the program elements are working well. The Region is continually trying to improve their recycling program by performing audits to identify areas for improvement and testing alternative approaches in these areas. The Region has low residue rates as they strive for good quality end-product by implementing quality control at the baler to look for contaminants. In addition, the Region's award winning P&E material has resulted in high participation and diversion.

Process Map – Collection



Process Map – Processing

- Collected blue box recyclables are dumped onto a tip floor where workers inspect each delivery for contaminants, such as hazardous waste, before material is placed on the processing line. The recyclables are then pushed onto conveyor belts leading up to a pre-sort room. At this location, garbage and non-recyclable materials like plastic bags are manually removed from the conveyor belt. These items are deposited into chutes that lead to a waste conveyor that transfers them to the Waste Transfer Station.
- After the pre-sort room the recyclables are fed by a conveyor into a screen that separates large old corrugated containers (OCC) from the rest of the recyclables. The OCC is carried away by a conveyor for further processing.
- The remaining recyclables are then directed to a screen that separates old newspapers (ONP). The ONP is carried off by a conveyor to a final sorting room.
- Next, recyclable containers and small papers drop through the double deck screen and are transferred to a final set of screens. These screens separate smaller paper products from the recyclable containers and small pieces of glass. The small paper products travel up the screen then onto another conveyor belt which takes them

to the final sorting room. The containers fall into the middle of the screen and then onto another conveyor belt which takes them to the final sorting room. Broken glass drops onto separate conveyors and is sent to a separate storage building. In the final sorting room, manual quality control is done on the mixed paper and the separated newspaper to remove any remaining garbage and recyclable containers.

- The container stream passes under an overhead magnet, which removes steel cans and deposits them into a bunker.
- Various plastic containers, glass containers, and paper cartons are sorted by hand and dropped through chutes into a series of separate storage bunkers below the sorting room.
- Aluminum cans and foil are the last items removed from the sorting conveyor by an eddy current separator.
- The remaining materials drop off the sorting line onto another conveyor belt which takes them to the Waste Transfer Station for disposal.
- When a bunker is full, the material is emptied onto a conveyor which feeds it into a baler. Baled materials are stored until a sufficient quantity of each grade of material has accumulated, at which time that grade is loaded onto a truck for shipment to market.

Future State

This section of the document contains Best Practices applicable to your program, and opportunities for improvement

Applicable Best Practices

For the purposes of this project, Best Practices are defined as waste system practices that affect Blue Box recycling programs and that result in the attainment of provincial and municipal Blue Box material diversion goals in the most cost-effective way possible.

In the course of this project, we have determined that not all Best Practices are universal; many are conditional with their appropriateness dependant on program-specific circumstances. As a consequence, we developed a Decision Tree approach to identify Best Practices that apply to specific programs, based on a set of predefined program characteristics.

Your program characteristics that were used in the Decision Tree analysis are as follows:

- Geographical Region: Southern community
- Size of Program: Generating over 40,000 tonnes per year
- Residential Density: Between 10 and 70 homes per km of roads (mixed urban and rural, or suburban)

The range of applicable Best Practices varies depending on the three characteristics defined above. For a southern large suburban community, the following Best Practices apply:

Develop and implement an up-to-date plan for recycling, as part of an integrated waste management system

York Region is a major regional population center that is rapidly growing. Landfill space is either exceptionally costly or is already lost to development. For these reasons, it is important to maintain and implement an up-to-date plan for recycling, as part of an integrated waste management system. Such a plan will ensure a strategic management focus that, when combined with complimentary waste reduction, organics, reuse, energy from waste, and waste diversion incentives (bag limits, user pay), will result in a robust Blue Box program. The Region of York has a Waste Management Plan which is a joint effort between the Region and all of its municipalities. The plan is updated on an annual basis.

Multi-municipal planning approach to collection and processing recyclables

A regional planning approach offers participating jurisdictions the opportunity to establish a common list of target materials and similar collection programs. This will create consistency among neighbouring municipalities, which facilitates public understanding regarding what and how to recycle. This is particularly important, as residents often relocate between neighboring jurisdictions. A further benefit is the ability to develop contingency plans with neighboring jurisdictions.

The Region is working on a MOU to formalize contingency planning. A multi-municipal planning approach is underway for six of the Region's northern municipalities and is expected to produce substantial savings as a result. Also, the Region now has a consistent list of materials accepted across all municipalities.

Establish defined performance measures including diversion targets and monitoring

Having a plan is of limited benefit if there are no defined diversion targets and performance measures, supported by data collection and analysis that measure the effectiveness of the plan and its implementation. Performance measures and data to be obtained include monitoring of diversion amounts, conducting waste audits, and conducting participation studies. It is with such program monitoring that sound decisions can be made based on local program data, within a framework of a continuously improving the program. York Region has set a short term diversion goal of 65 percent. The Region has a long term overall diversion goal of 75% which helps drive an ongoing steady pace of continuous improvement. However, it is difficult to set and monitor performance measures over many different blue box collections contracts.

Optimization of operations

Optimization of operations is a general practice that encompasses overall program design, collection efficiency, and processing efficiency and effectiveness. The benefits of optimization include balanced routes and payloads, reduced collection time (and therefore reduced collection costs), and less costly processing. In 2005, the Region invested $39 million in the construction of a Waste Management Centre to optimize their program efficiency and effectiveness. A single stream system should yield savings in collection costs. Collection contracts should also be structured to provide co-collection of blue box recyclables along with another stream, such as organics or garbage, and to utilize controlled compaction to enable trucks to remain on-route longer and collect more tonnage per route. The municipalities across the Region have done so, except for Markham, which does not do compaction.

The Region of York also has a sizable multi-residential population. Collection of multi-residential recyclables needs to be a substantial part of this program, and should be integrated with curbside collection of recyclables wherever feasible to achieve better diversion.

Training of key program staff in core competencies required

Key program staff should be adequately trained in the core competencies required for each duty. While this is the case at the Region level, lower tier municipal staff members have not necessarily been trained in accounting for allowable costs as part of the WDO data call. As a result, it is possible that elevated submissions of costs may have occurred if non-eligible costs were included.

Following generally accepted principles for effective procurement, contracting, and contract management

A best practice that specifically applies to the Region of York and its municipalities is pre-procurement consultation with industry and inclusion of clauses that anticipate and allow for extraordinary circumstances such as fuel escalation clause. The fact that only one proposal was received for the Waste Management Centre suggests that although pre-procurement consultation was performed, it did not seem effective. Municipalities can influence and encourage competition and more robust supplier markets. Additional proposals could have resulted in cost savings. Clauses should also be included that clearly outline the requirements of each party while promoting cooperation leading to mutually beneficial improvement to the program. Although York Region changed from a two stream to single stream collection program at the request of the local municipalities, significant collection savings have not yet been realized by the municipalities, most likely due to collection contract language that did not address sharing of cost savings due to system changes.

Appropriately planned, designed, and funded Promotion and Education program

The promotion and education (P&E) of the recycling program is largely conducted by the individual municipalities for collections, and the Region is responsible for common messages. In general, York Region has an effective P&E program that is well funded. The Region has won several awards for their P&E material. However the Region can further benefit from a regional planning approach that enables participating communities to have a common list of target materials, not just the same list of materials collected. When combined with the availability of mass media for programs of this profile, a regional mass media campaign can be employed that allows for consistent promotion of messages, as residents relocate between neighboring jurisdictions. The Region is working well towards this goal.

Established and enforced policies that induce waste diversion

York Region has been able to achieve the 60 percent diversion target set by the Province with the use of incentives and policies that promote waste diversion such as garbage limits and user pay programs in some of the municipalities. In 2004, the Region also adopted by-laws prohibiting 12 types of waste (some of which are recyclable materials) from disposal at the Region's transfer station to meet new legislative requirements for waste imposed by the State of Michigan. There has been no reported violation to date as evidenced by Michigan DEQ audits. Going forward, each community needs to continue to evaluate its waste diversion plans

and initiatives to determine the right balance of economic and non-monitory incentives.

Expanded list of Blue Box materials accepted

York Region currently accepts an expanded list of Blue Box materials and is considering future inclusion of plastic film and polystyrene. Because of the light weight of these products, doing so may result in increased processing costs per tonne with a potential negative impact on their E&E Factor

Consider single stream collection of Blue Box materials

York Region recently converted its Blue Box program from two streams to single stream. Such a conversion does not necessarily provide significant enough collection cost savings to exceed the additional processing cost if collection is performed in generally the same manner. Collection costs can be significantly reduced in a single stream system if one or more of the following collection practices are utilized: controlled compaction of collected materials, co-collection of Blue Box materials with another discard stream, automated or semi-automated collection of Blue Box materials from containers of sufficient capacity with a frequency that matches household needs, and extended hours workday for collection. Extended hours may be impacted by city noise bylaws. Because collection systems in York Region are still in transition, it will be some time before a final accounting can show system savings from the conversion to single stream recycling.

Extended hours workday for collection

This practice does not apply to all programs but is conditional and depends on local factors such as use of compaction and density of homes on route. Implementation of this practice provides even more cost savings if collection is maintained on a five or six day per week basis, instead of reducing to four days per week, because less collection vehicles are required. However, the five or six day schedule is more difficult to manage when attempting to balance labor requirements.

Alignment of service contract lengths with equipment depreciation terms when new equipment is specified

Alignment of service contract lengths with equipment depreciation terms can ensure contractors make the best capital equipment decisions based on a lifecycle cost analysis, which in the long term will save money. Because of misalignment between lower tier municipalities' collection contracts and the opening of the Waste Management Centre, collection cost savings have not yet been fully realized as equipment used for two stream collection is still being utilized and depreciated. This will correct itself over time.

Consider the use of optical sorting equipment

This practice does not apply to all programs but is conditional and depends on local factors. Optical sorting equipment for plastics is designed to sort bottle streams. The expanded list of plastics accepted by York still requires hand sorting in the MRF

of those non-bottle items, which limits the savings that could be realized by optical sorting of plastics. York is reinvestigating the feasibility of optical sorting for both paper and plastics as the technology continues to evolve.

Opportunities for Improvement

Incremental – Short-Term

Incremental improvement opportunities include changes that be implemented immediately or over the next 6-12 months. Typically they result in noticeable improvement without significant strain on resources. Incremental improvement opportunities that were identified are:

- The provision of free recycling containers to households has been determined to be a Best Practice that leads to increased diversion of recyclables. If the Region's municipalities decide against providing free additional blue boxes to their residents, the public's purchase cost of recycling boxes should be standardized across the Region. Currently the prices range anywhere from $5 to $10 per box and sizes vary. Residents may be reluctant to pay the higher cost for an additional blue box, especially if they are aware that neighbouring municipalities charge as much as 50 percent less. Therefore, it is possible that more recyclables could be captured if additional boxes were less expensive. There is also an opportunity for all the municipalities to join in a combined tender for recycling boxes in order to obtain a better price on the large quantity. If personalized hot-stamping is desired by the nine municipalities, it is possible for the supplier to run quantities of each under the same blanket order. This will involve coordination of the municipalities. The Region should be utilized in the coordination efforts to ensure efficiency throughout the process.
- With the joint contract of the Northern Six municipalities recycling program, the participating municipalities should continue to harmonize the P&E efforts including planning, procuring of material, distribution and content. This will result not only in monetary savings but also in time savings, quality and effectiveness of the consistent P&E material.
- There is an opportunity to increase tonnage by targeting un-serviced multi-unit residential sites, and by utilizing 95-gallon carts instead of boxes. For large buildings in the urban areas, there is a potential to increase tonnage and efficiencies by implementing front-load bins instead of carts. There may be increased cost associated with this option due to potential contamination issues.
- When outside contractors are heavily involved in the recycling process, it is good practice to implement segregation of duties as a preventive control. Currently, Miller Waste Management operates the municipal scales to determine tonnage of inbound material which is the basis of their compensation. The Region monitors the scales electronically on a real time basis and has cameras at the scale site to monitor vehicle movement. There are practical issues to employing a Region employee to operate the scale at the contractor's transfer station, as there are

other commercial accounts using the scales. The Region should continue their monitoring and consider operating the scale at the municipal MRF.

- Consider adding additional equipment to optimize processing at the MRF. Current residue rate for glass is 15 percent, resulting in potential market rejections or downgrades of the glass as well as potential loss of higher value material lost to this stream (e.g. aluminum in glass). The Region needs to explore effective ways to minimize contamination of the glass material such as a glass cleanup system (e.g. air classifier, cyclone, blower). In addition, the recovery of container material that is misdirected to the fibre sorting lines can be optimized by installing a container re-circulation conveyance system instead of the current inefficient manual system.

Transformational Medium- and Long-Term

These are improvement opportunities that can be implemented over the next 1-3 years. They usually require sizeable effort and resources and will result in substantial improvements to the program. Transformational improvement opportunities that were identified are:

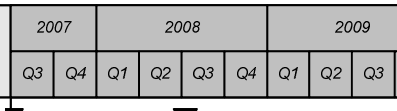
- The Region and its municipalities should perform pre-procurement consultations with prospective contractors to review the terms to ensure there are no aspects within the request for proposals that will prevent and hinder competition or cost-saving alternate proposals. With more proposals, the Region and municipalities may be able to realize cost savings through competition and encouraging contractor innovation.
- The Region is currently in a five year marketing agreement with Miller Waste Systems in which Miller receives five percent of the marketed revenues. The risk and rewards of this compensation arrangement does not seem to provide sufficient incentive for Miller to obtain the best available price for the marketed material. The Region should consider in the next contract renewal or negotiations to increase the contractor's share of marketed revenues with an offsetting decrease in processing costs. This will align both parties' interest in obtaining higher revenues and more efficient processing. Alternatively, the Region could fully assume the marketing of materials function from the contractor and performing it in-house as there appears to already be sufficient knowledge and experience of municipal staff in this area. The Region should explore these options.
- The joint collections contract for the Northern Six municipalities is expected to show substantial cost savings in collection, harmonization of promotional material, enhanced service levels, improved monitoring and tracking system, and dedicated staff to monitor the contract resulting in greater efficiencies. The three remaining municipalities should consider harmonization of their recycling program, in order to attain the same benefits.
- There is currently available space and capacity at the MRF to process more material. The Region should continue to carefully consider processing materials from other jurisdictions in the area as they have been doing. Alternatively, the Region should continue to evaluate the costs and benefits of adding more material

to the expanded list of Blue Box materials already accepted to more cost-effectively utilize the available capacity.

Implementation

In this section, we provide in
transition from the Current St

ID	Task Name	Duration
1	**Short Term Opportunities**	**53.4w**
2	Combined procurement of Blue Boxes	12w
3	Investigate collaborative efforts in P&E	52w
4	Pursue un-serviced multi-residential units	39w
5	Additions of municipal management staff	13w
6	Improve Data Call process	52w
7	Optimize MRF operations	26w
8	**Medium and Long Term Opportunities**	**105w**
9	Pre-tender consultation	104w
10	Change marketing contract agreement	104w
11	Harmonization of remaining municipalities	104w
12	Consider further expanded materials	104w



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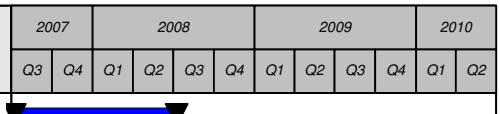


Implementation Requirements

Personnel Requirements

Most of the recommendations will require Region and/or lower tier municipality staff time and effort to execute. Specifically, staff time will be required to:

- Investigate bulk blue box pricing, with customizing for participating municipalities, and implement bulk purchase and distribution;
- Evaluate and implement service options to eligible multi-family residences currently not served;
- Improving municipal staff training with respect to Data Call reporting;
- Harmonization of collection contracts and program services for the remaining three municipalities; and
- Assess collection, marketing and processing logistics and costs for additional Blue Box materials and solicit Blue Box materials from other nearby jurisdictions. Upgrade glass processing to produce a better quality and more marketable commodity. Consider adding a container re-circulation conveyance system instead of the current inefficient manual system.

Financial Requirements

Specific implementation costs for suggested opportunities for improvement cannot be determined without detailed planning and design, and consideration of total system cost implications – that level of analysis was beyond the scope of the project team's visit to York Region. Implementation of identified opportunities for improvement will require investments in the following areas:

- Purchasing and distributing additional blue boxes and multi-residential receptacles;
- Equipment upgrades at the MRF for more efficient operation and improvement of glass quality; and

Other Requirements

Cooperation of the lower tier municipalities will be required to implement the opportunities for improvement identified in this report.

Implementation Benefits

Based on the team's observations, experience, and analysis done to date, implementation of the opportunities for improvement has the potential to yield the following benefits:

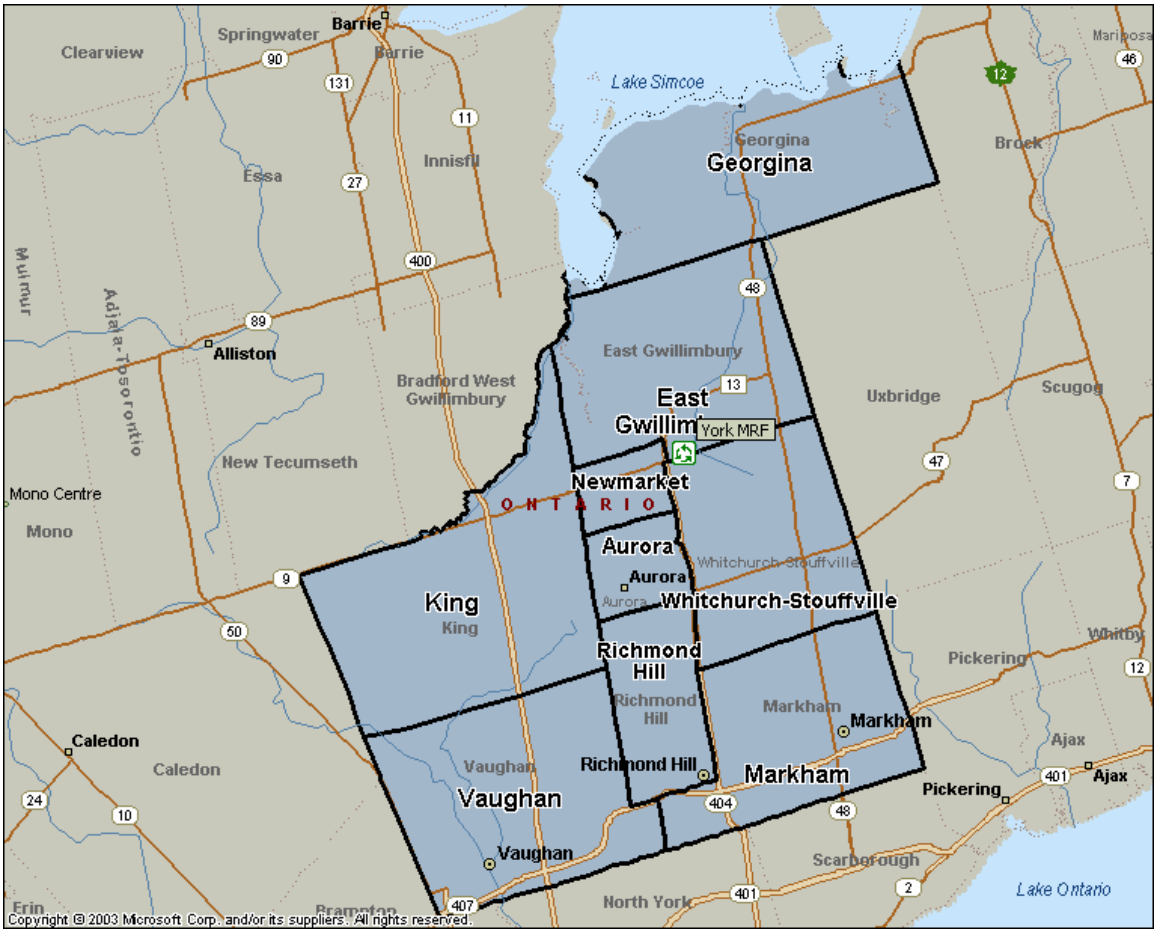
- Reduced collection cost of Blue Box materials;
- Increased program participation and recovery of Blue Box materials, especially from multi-residential buildings;
- Better accounting of true Blue Box program costs;
- Reduction of overall program administrative costs; and
- Cost-efficiency improvement of MRF operations.

Appendix

This section contains documentation to support information in this report

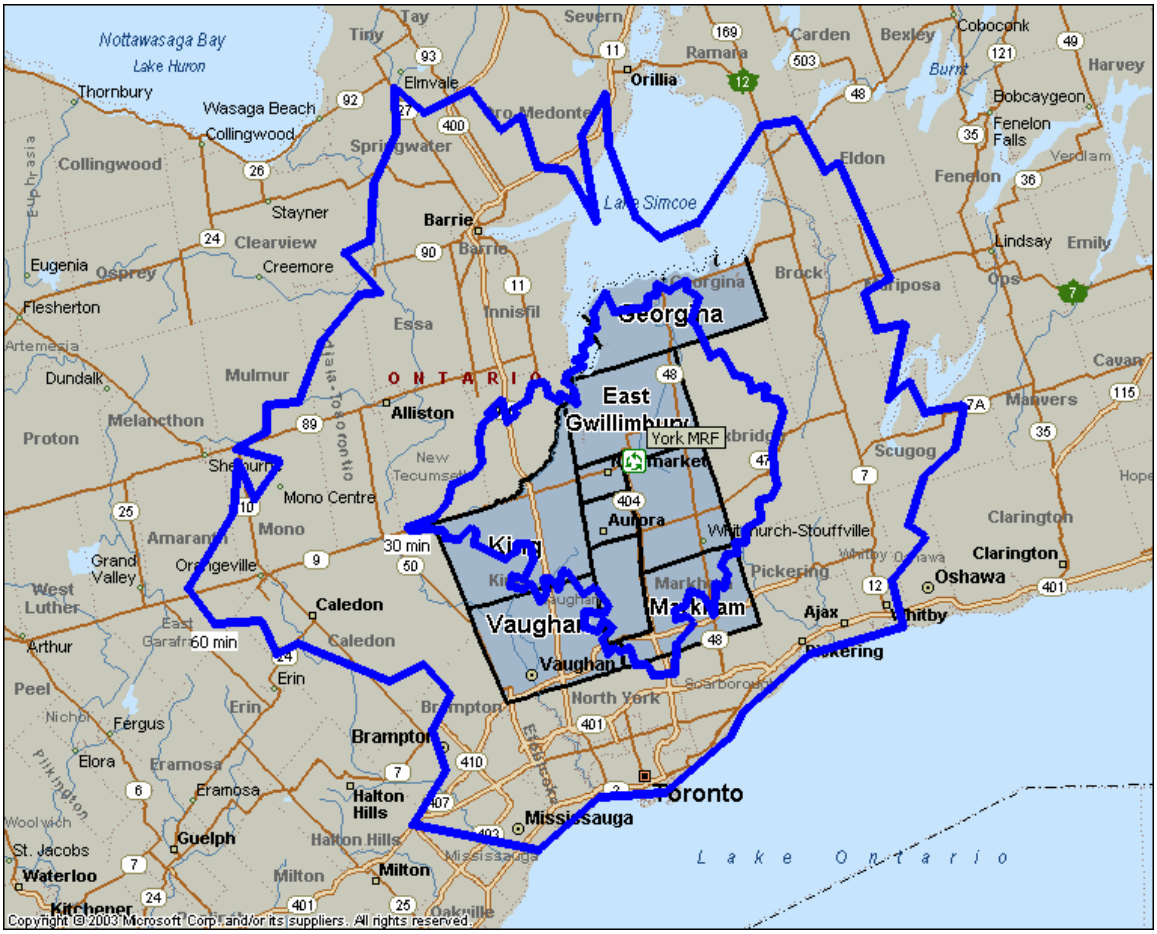
Collection Service Area

Blue areas indicate a weekly frequency, Green areas indicate a biweekly frequency, and depot areas are defined as Yellow.



Facility Centralization

The blue lines represent the theoretical 30 and 60 minutes drivetime zones from the Material Recovery Facility.



Best Practice Descriptions

The information in this appendix reflects our May 18, 2007 Draft Final Report titled "Blue Box Program Enhancement and Best Practices Assessment Project". For the future updates and the latest information on Best Practices please refer to the Waste Diversion Ontario website at www.wdo.ca.

Program Profile

Large Suburban Southern Blue Box Program

Overview

This Program Profile is designed to provide guidance to municipalities on how to design, manage, and operate their Blue Box programs under Best Practices. It is specifically tailored to programs of defined size, density, and geography in order to enhance applicability of Best Practices and increase the likelihood of their adoption.

Program Characteristics

The following characteristics were used to define this Program Profile:

Geographical Region: Southern community

Size of Program: Generating over 40,000 tonnes per year

Residential Density: Between 10 and 70 homes per km of roads (mixed urban and rural, or suburban)

Applicable Best Practices

Although a number of Best Practices have been identified, not all apply to each program. For a large suburban southern community, the following Best Practices apply:

FUNDAMENTAL BEST PRACTICES – applicable to all programs

- ❑ Development and implementation of an up-to-date plan for recycling, as part of an integrated waste management system
- ❑ Multi-municipal planning approach to collection and processing recyclables
- ❑ Establishing defined performance measures including diversion targets and monitoring and a continuous improvement program
- ❑ Optimization of operations in collections and processing
- ❑ Training of key program staff in core competencies required
- ❑ Following generally accepted principles for effective procurement and contract management
- ❑ Appropriately planned, designed, and funded promotion and education program
- ❑ Established and enforced policies that induce waste diversion

Use of Program Profile

It is important to note that this document is intended to provide guidance, not prescriptive recommendations, on how any given program should be structured.

The Project Team believes that by following Best Practices outlined in this document, recycling coordinators will improve performance of their Blue Box program.

The degree of improvement will vary across municipalities, as multiple factors contribute to overall program performance.

CONDITIONAL BEST PRACTICES – applicable to programs fitting this profile
❑ Expanded list of Blue Box materials accepted

Additionally, consideration of single stream collection of Blue Box materials (alternatively, two stream collection of fibres and containers), extended hours workday for collection, use of optical sorting equipment, and alignment of service contract lengths with equipment depreciation terms may also be applicable Best Practices, depending on the specific circumstances of the integrated waste management program.

A more detailed description of the application of Best Practices in the areas of collection, processing, administration and tendering, promotion and education, and policies and incentives is presented in sections that follow the Program Considerations sections below.

Program Considerations

Programs having this profile are large, complex, and urban/regional in nature. The challenge in this group is to achieve diversion goals and maximize efficient, cost-effective recycling services to all residents.

Programs in this group are either a major regional population center or a rapidly growing region at the edge of a major urban center that still has rural portions at its outskirts. Landfill space is either exceptionally costly or is already lost to development. It is important to **maintain and implement an up-to-date plan for recycling, as part of an integrated waste management system**. Such a plan will ensure a strategic management focus that, when combined with complimentary waste reduction, organics, reuse, energy from waste, and waste diversion incentives (bag limits, user pay), will result in a robust Blue Box program. Additional elements of a plan for recycling as part of an integrated waste management system can be found in the corresponding Fundamental Best Practices section.

Best Practice
Employed by Program?
YES ☐ NO ☐

Although a program within this grouping will be able to support its own MRF, all such programs will benefit from a **multi-municipal planning approach** to collection and processing of recyclables. This is especially the case for programs handling close to 40,000 tonnes per year, who could host a regional MRF, so that aggregation of blue box tonnage will result in larger MRFs of higher throughput, thereby lowering per-tonne processing costs for all participating communities. A multi-municipal planning approach also offers participating jurisdictions the opportunity to establish a common list of target materials and similar collection programs. This will create consistency among neighbouring municipalities, which facilitates public understanding regarding what and how to recycle. This is particularly important, as residents often relocate between neighbouring jurisdictions. A further benefit is the ability to develop contingency plans with neighbouring jurisdictions. Additional discussion of the details of a multi-municipal planning approach can be found in the corresponding Fundamental Best Practices section.

Best Practice
Employed by Program?
YES ☐ NO ☐

Best Practice
Employed by Program?
YES ☐ NO ☐

Having a plan is of only limited benefit if there are no defined **diversion targets and performance measures**, supported by data collection and analysis that measure the effectiveness of the plan and its implementation. Performance measures and data to be obtained include monitoring of diversion amounts, conducting waste audits, and conducting participation studies. It is with such program monitoring that sound decisions can be made based on local program data, within a framework of a continuously improving the program. Additional discussion of performance measures and program monitoring can be found in the corresponding Fundamental Best Practices section.

Best Practice

Employed by Program?
YES ☐ NO ☐

Performance data, once obtained and analyzed, will allow for the **optimization of operations**. The benefits of optimization include balanced routes and payloads, reduced collection time (and therefore reduced collection costs), and less costly processing. Due to the size of programs in this group, there are opportunities to invest in capital equipment to automate the recycling process and increase the rate at which Blue Box materials are collected and processed. Specific opportunities that apply to programs of this profile are further discussed in the Collection and Processing sections of this Program Profile.

Best Practice

Employed by Program?
YES ☐ NO ☐

For communities within this profile, programs designed to achieve 60% diversion of Blue Box materials would **need to collect the five mandatory Blue Box materials as well as several of the "supplementary" Blue Box materials** that: comprise a significant portion of the waste stream (as determined by waste audits), have reliable markets, and can be practically recovered for recycling. **Drop-off depots** should be utilized to collect overflow Blue Box materials and additional recyclable materials for which curbside collection is not practical or cost-effective. Depots may also be warranted in outlying villages in the remaining rural portions of the region. Supporting Best Practices related to drop-off depots are discussed in the corresponding Best Practice Spotlight.

Best Practice

Employed by Program?
YES ☐ NO ☐

The urban portions of programs of this profile will likely have a sizable multi-family population. Collection of multi-family recyclables needs to be a substantial part of this program, and should be integrated with curbside collection of recyclables wherever possible in order to ensure program success. Because of the unique challenges of multi-family recycling, associated best practices are further discussed in the corresponding Best Practice Spotlight.

For programs over 40,000 tonnes per year, single stream collection and processing is feasible. Single stream recycling offers the potential for increased collection savings and increased recovery of recyclables, but also results in increased processing costs and, depending on the container type used, increased contamination. Despite the recent growth in single stream systems, it would be a mistake to assume that the single stream recycling approach represents the most economical alternative for all communities. In some cases, other approaches, such as the dual-stream, two-bin recycling approach, may prove to be more economical. This conclusion underscores the importance of using local economic and market data in assessing the economic feasibility of single stream recycling for a local community. Refer to the

corresponding Best Practice Spotlights for more information on Collection and Processing considerations relating to single stream.

Collection

Curbside collection of recyclables should be used to service all available curbside-eligible households in the community. Similarly, on-site collection of recyclables should be used to service all available multi-family households in the community.

Best Practice	
Employed by Program?	
YES	NO
☐	☐

Providing sufficient rigid collection containers free of charge to residents will ensure that overflow materials are not disposed. Selection of the size and/or number of containers needs to take into consideration estimated set out volume of recyclables, **based on the frequency of collection**. Most programs will provide weekly or bi-weekly collection of recyclables. Collection of Blue Box materials should be at least as frequent as waste collection.

The size of programs within this profile allows for the construction of a MRF that is capable of processing recyclables that have been collected single stream. From a processing perspective, single stream collection of recyclables is not preferred over two stream collection, because the processing cost per tonne and process residue rates will be higher at a single stream MRF compared to an equivalent two stream MRF. Single stream collection costs, however, can be significantly reduced, compared to two stream collection (assuming use of carts and bi-weekly service), and the point at which the combined collection and processing cost favours single stream is approximately 40,000 tonnes per year.

Single stream collection can benefit the remote portions of the region due to reduced collection costs. Furthermore, because transfer of recyclables may be cost-effective for transporting materials from remote parts of the region, handling Blue Box materials in a single stream can minimize glass breakage due to the cushioning properties of paper and plastic products as materials are tipped, loaded into a transfer trailer, and tipped again.

Collecting materials single stream allows other collection practices to be implemented that can significantly reduce the collection cost. The first of these practices is controlled compaction that allows collection to be more productive because trucks can stay on route longer before filling. The compaction needs to be controlled so that the pressure is sufficient to achieve a reasonable amount of volume reduction, without over-compacting the materials. Over-compaction results in glass breakage and flattening of round containers, which can cause the automated systems in a single stream MRF to be less effective in separating flat paper products from round containers. Compaction can also be used in two stream collection; however, the per-household cost for collection in single stream systems is typically less than comparable two stream systems because materials can be loaded into a single stream truck in less time.

A second collection practice that is enabled by single stream is dual-collection of Blue Box materials with some other discard stream, such as refuse or organics. Dual collection (called co-collection by some) means that a two-compartment truck

collects Blue Box materials in one compartment and another stream of materials in the second compartment of the truck at the same time. This allows for a reduction in total system cost by not requiring two trucks to drive down the same road to collect materials separately. The essence of the cost savings lies in reducing non-productive time, such as time spent driving from stop to stop. In order to successfully implement this practice, the two materials that are dual-collected need to be delivered to one location, such as a transfer station or combined MRF and organics processing facility, or to two facilities that are near to each other.

A third collection practice that is enabled by single stream collection is providing program participants with carts for their Blue Box materials instead of bins. The significantly greater storage volume of carts compared to bins means that overflow Blue Box materials are typically not discarded, although some exceptions may occur. The carts also allow for every-other-week collection of Blue Box materials, with reduced collection cost, compared to weekly collection. The use of carts also allows for fully automated collection, in which a mechanical arm picks up and dumps the cart without the driver having to get out of the truck for the majority of stops. This can allow for collecting more stops per hour, yielding further cost savings. Because machinery is doing the heavy lifting, a more age and gender-balanced workforce can be used and WSIB claims are typically reduced. In areas where fully automated collection is impractical (e.g., due to obstacles impeding collection), semi-automated collection of recyclables in carts may be an option.

It should be noted that many of the practices that are enabled by single stream collection can be achieved by two stream systems that collect paper products and containers on an alternating week basis, including compaction and dual collection. Collecting on an alternating week basis does not mean that the MRF only processes paper products one week and containers the other week; rather it means that half the routes collect one material and the other half of routes collect the other material on any given day. This allows the MRF to be optimally sized. Because solid waste planners seek to optimize an entire integrated solid waste system, a two stream Blue Box system may be preferred over single stream if total system costs are reduced. Planners of programs similar to this profile should carefully develop their business case supporting two stream collection over single stream collection.

Regardless of whether single stream or two stream collection is the Best Practice for a program similar to this profile, other collection practices can be a Best Practice under certain conditions. An example is extended collection days, meaning that the normal working day for collection crews is lengthened, so that individuals get in their weekly hours in four days per week instead of five. The advantage of longer collection days is that fewer routes need to be operated to collect from the program because trucks stay on route longer and collect from more homes before ending the day. There is a certain amount of non-productive time with each route (i.e., daily preventative maintenance, fuelling, fluid checks, breaks, etc.). Fewer routes mean less non-productive time and cost savings. Drawbacks to extended collection days include declining productivity near the end of the day and increasing potential for injury or accidents. Considering extended collection days is conditional on trucks

having payload capacity for the additional homes to be collected (usually because of compaction). If trucks are usually full at the end of the normal work day, it will not likely be cost effective to go back out on route. When utilizing extended collection days, it is best to employ the equipment on the same number of weekly working days that otherwise would be worked (e.g., usually five or six) in order to make the most effective use of labour and equipment.

Opportunities for improving collection efficiencies and reducing costs that apply to programs matching this profile include the use of route optimization software, collecting recyclables as or more frequently than waste, and providing carts or dumpsters at multi-family complexes. These are more fully discussed in the corresponding Best Practice Spotlight.

Processing

Partnership and transfer opportunities should still be explored for all programs with this profile. Any community with a one to two-hour haul distance to a MRF should consider the use of transfer to potentially reduce system costs through economies of scale due to increased throughput resulting from multi-municipal cooperation.

Additionally, MRFs in this profile should investigate the suitability of processing paper and plastics with optical sorting equipment, as utilization of that equipment may be a Best Practice under certain conditions. Typically, the use of optical sorting equipment is feasible in only the highest throughput facilities. In the case of optical sorting of plastics, the equipment is designed for sorting plastic bottles only and therefore is generally not suitable to sorting a mixed plastics stream that includes tubs and lids and polystyrene. Optical sorting of paper is still somewhat developmental and automated sorting of paper may be limited to only certain facilities, based on how materials are sorted into sub-streams. Other optimization strategies for MRFs are more fully discussed in the corresponding Best Practice Spotlight.

Best Practice

Employed by Program?

YES ☐ NO ☐

Training

Best Practices include **ensuring key program staff are adequately trained** in the core competencies required for each duty. This is discussed in detail in the corresponding Fundamental Best Practices section.

Best Practice

Employed by Program?

YES ☐ NO ☐

Procurement and Contract Management

Best Practices include following **generally accepted principles for effective procurement and contract management**. This is discussed in detail in the corresponding Fundamental Best Practices section.

A best practice that applies to this profile is the alignment of service contract lengths with equipment depreciation terms. This practice is conditional on the program: (1) contracting with a service provider rather than using municipal staff; and (2) specifying that the service provider provide new collection equipment or design and build a new MRF. The reason for aligning the contract lengths with equipment

depreciation terms is to ensure that the program doesn't fully pay for equipment that may have additional life at the end of the contract. In the case of MRFs, the term should be aligned with the first scheduled major overhaul of the plant's equipment. A suitably long term also ensures that equipment is installed that has a life cycle cost advantage that may not be realized by the contractor over a shorter operating period.

Promotion and Education

Best Practice

Employed by Program?
YES ☐ NO ☐

An **effective promotion and education (P&E) program** leads to higher resident participation rates, improved material quality, lower residue rates, and increased customer satisfaction. A variety of P&E strategies can be employed by municipal programs to achieve desired program goals, as described in the corresponding Fundamental Best Practices section.

Furthermore, to increase program effectiveness, municipalities may need to coordinate P&E activities with their neighbours. Multi-municipal P&E enables participating communities to have a common list of target materials and similar collection programs in neighbouring jurisdictions. When combined with the availability of mass media for programs of this profile, a multi-municipal mass media campaign can be employed that allows for consistent promotion of messages, as residents continually relocate between neighbouring jurisdictions.

Policies and Incentives

Best Practice

Employed by Program?
YES ☐ NO ☐

In order to achieve the 60% diversion target set by the Province, programs in this category will **need to use incentives and policies that promote waste diversion**. Such tools may include solid waste bag limits, user pay program for waste, and/or enforced mandatory recycling bylaws. Each community needs to evaluate its waste diversion plans and initiatives to determine the right balance of economic and non-monetary incentives. A detailed discussion of policies and incentives that, when established and enforced, serve to induce waste diversion can be found in the corresponding Fundamental Best Practices section.

Fundamental Best Practices

The Project Team identified eight Fundamental Best Practices that apply to all municipal recycling programs in Ontario. These are as follows:

- Development and implementation of an up-to-date plan for recycling, as part of an integrated Waste Management system
- Multi-municipal planning approach to collection and processing recyclables
- Establishing defined performance measures, including diversion targets and monitoring and a continuous improvement program
- Optimization of operations in collections and processing
- Training of key program staff in core competencies
- Following generally accepted principles for effective procurement and contract management
- Appropriately planned, designed, and funded Promotion and Education program
- Established and enforced policies that induce waste diversion

Each of these Fundamental Best Practices is described in detail in this section.

Fundamental Best Practice

Development and Implementation of an Up-to-date Plan for Recycling, as Part of an Integrated Waste Management System

Overview

A recycling program plan that results from a thorough planning process is a strategic and practical guide for the design, management, operation, and optimization of a community's Blue Box program. To be effective, it should reflect careful examination of all program components, and direct goal setting, action steps, and resource allocation to achieve meaningful results over time. Implementation of a well-conceived plan is facilitated by an overarching vision, purpose, and direction, allowing synergies to be realized across operational, geographical, and political boundaries. The recycling plan may be a stand alone document or may be incorporated into a larger integrated waste management plan.

Key Benefits and Outcomes

Program planning is a long-term investment that will result in the following benefits:

- A clear vision to guide program development
- Defined program goals and objectives against which progress can be measured
- Focused use of staff and monetary resources aimed at achieving cost-effective results
- Clarification of what is needed to proactively bring about change rather than just react to change
- Provision of a "roadmap" on how to meet program needs and objectives
- Enhanced operational and political decision-making process
- Integration of solid waste services, leading to lower system costs
- Overall improved program effectiveness and efficiency

Description of Best Practice

Integrated waste management is defined as a combination of techniques and programs to manage all municipal waste streams. Critical to the success of any Blue Box recycling program is up-front planning of how the program will be developed and implemented, with the recognition that Blue Box recycling is an integral part of the overall waste management system.

The value of recycling program planning comes not just with the development of a document, but is realized during the process of planning itself. While the nature and extent of the planning process will vary, depending on the level of resources available for planning and the complexity of programs being planned for, planning is fundamental to all programs.

Regardless of the size or complexity of the planning document, a recycling plan should ask and provide answers to four basic questions:

1 Where do we want to be?

2 Where are we now?

3 How do we get from Current State to Future State?

4 How do we measure/track our progress?

The kind of information that can be presented to answer each of these questions is provided below. The amount of information and the degree of its detail will vary with program size and resources available for planning.

1. Where do we want to be (Future State)?

This component of the plan establishes a long-range vision for how the recycling program would look, if fully and successfully implemented, and sets the goals and objectives of the program to be achieved during the planning timeframe. Typical planning horizon is around three to five years; however, program planning can have a longer time frame – five to ten years – depending on the extent to which infrastructure is needed. An important part of this planning step is to engage community stakeholders in the visioning process, so that the resultant vision is shared by all.

Equally important is recognizing that recycling as just one component of an overall waste management system. The entire system should be aimed at minimizing waste generation and capturing valuable energy and material resources from waste prior to disposing of materials that cannot be technically and/or economically recovered for further use. Establishing an integrated waste management system and determining the appropriate role for recycling within that vision serves as a guide to further recycling planning and decision-making.

2. Where are we now (Current State)?

Developing an answer to this question will entail a review and assessment of the current recycling and related waste management programs, operations, and activities including:

- Population and recyclable materials tonnage projections for the planning period, estimates of current diversion levels
- A description of the strengths and weaknesses of all aspects of the recycling program and related policies, procedures, facilities, and operations. This review should include an assessment of the current and projected capacity of the recyclable materials handling infrastructure, an assessment of recyclable materials market conditions, and market trends, and any circumstances or conditions that may affect the program over the course of the planning period
- Documenting current costs for programs
- Identifying how the current recycling program works in conjunction with other waste management programs
- Identifying remaining needs and gaps to be addressed

3. How do we get from Current State to Future State?

With respect to answering this question, plans should describe the strategies and action steps to be used in order to address the identified needs and gaps and meet the Blue Box program's goals and objectives. Topics to be addressed in the development of these plan strategies could include:

- Potential program and policy options
- Opportunities for cooperation (both internal and external, with respect to neighbouring jurisdictions)
- Opportunities for coordination and integration of recycling programs and operations with other components of the resource/waste management system
- Opportunities for public/private partnerships
- Clarification of the roles and responsibilities of various stakeholders
- Costing/budget estimates and financing approach
- Continuous improvements measures
- An implementation timetable reflecting short, mid and long term planning milestones

4. How do we measure/track progress?

To address this planning question, plans should outline the methods to be used to measure the Blue Box program's progress and performance results. Having performance measures and tracking performance against these measures will ensure that continuous improvement will be an integral part of the system. This will include:

- Adoption of the plan by the appropriate decision-making bodies
- Identifying the means by which data and information can be captured to measure progress toward defined program targets
- Timelines for review of the program and the recycling plan itself

Program plans should include specific diversion targets against which program effectiveness can be measured (see Best Practice on Performance Measurement).

Implementation

Any municipality should be able to develop a basic recycling plan and will benefit from doing so. The key aspect in developing a plan is to match the plan to the program needs, size and complexity. There is no "one size fits all" solution for a plan, but a good planning process will have the following common characteristics:

- Is flexible, applicable to the program and user friendly
- Is participatory – has the involvement of all the key "stakeholders" in the planning process and, ultimately, their support
- Is practical and realistic with respect to goals, objectives, resources and outcomes

- Accounts for budget and resource allocations and limitations
- Provides for realistic and achievable recommendations for the program
- Establishes and ensures accountability for results
- Leads to resource decisions and acknowledges the reality of the limitations of financial and other resources
- Is not static – the process and plan have to be reviewed and revised on a regular basis
- Is not done in isolation of other planning processes, such as for other waste management system components, as well as for broader municipal planning, such as community master planning

Lastly, a recycling plan should address and incorporate elements from other defined Best Practices.

Source and Links

"Preparing a Waste Management Plan – A methodological guidance note"
http://www.eukn.org/eukn/themes/Urban_Policy/Transport_and_infrastructure/Technical_infrastructure/Waste_collection/Waste-management-plan_1002.html

"Guidelines for Strategic Planning" , US Department of Energy
http://www.orau.gov/pbm/links/sp-guide.pdf

"Guide to the Preparation of Regional Solid Waste Management Plans by Regional Districts," Ministry of the Environment Environmental Protection Division, British Columbia: http://www.env.gov.bc.ca/epd/epdpa/mpp/gprswmp1.html#s17

European Topic Centre on Resource and Waste Management
http://waste.eionet.europa.eu

Ontario Centre for Municipal Best Practices
http://www.amo.on.ca/Content/ocmbp/PolicyIssues/WasteManagement/default.htm

Fundamental Best Practice

Multi-Municipal Planning Approach to Collection and Processing Recyclables

Overview

A widely-recognized principle of business is that significant efficiencies and economies can be obtained from larger scale activities. The same principle applies to recycling programs. Therefore, it is considered a fundamental Best Practice for municipalities to explore a multi-municipal approach to planning recycling activities. Considerable amount of industry research and data analysis indicates that nearly all municipalities can benefit from a co-operative approach to planning and/or providing recycling services.

Key Benefits and Outcomes

Many communities have found it advantageous to work co-operatively in providing solid waste management services. Working jointly, municipalities can increase bargaining power with private service providers for collection and processing of recyclables. Pooling resources, such as processing equipment, collection equipment, or facilities, can result in increasing equipment, labour, and/or facility utilization, thereby realizing financial and operational efficiencies.

Co-operation between two or more municipalities is becoming more common as municipalities face increasing budgetary constraints. Co-operative planning can lead to improved performance across virtually all recycling program components, enhancing effectiveness and efficiency in the following areas:

- Economies of scale
- Increased resident participation/satisfaction
- Optimized program funding
- Shared staff/time/costs/skills/equipment
- Improved supplier/contractor relations
- Reduced need for management supervision
- Reduced need for council time and attention
- Increased capacity to adopt new technologies and methods
- Material markets and pricing advantages, yielding higher revenues
- Increased innovation in strategies, services and products
- Shared risk management
- Shared capital requirements

Description of Best Practice

While multi-municipal cooperation can yield positive results in all circumstances, its applicability is highest when:

- Municipalities within the region are in need of the same set of services
- Jurisdictions have worked together successfully in the past
- Responsibilities and roles are clearly defined
- There are clear advantages to working cooperatively
- Entry and exit protocols for contractual relationships are clearly defined

A successful multi-municipal planning approach will focus on supporting municipal objectives, including;

Cost Containment

Economies of scale can result in dramatic savings for municipalities due to volume discounts; standardized equipment size, features, and specifications; standardized service levels; and promotion and education synergies. For example, a 2006, cooperative collection contract among six municipalities in York Region reportedly resulted in annual Blue Box and waste cost savings of over $900,000.

Improved Quality and Productivity

Municipalities that share some of the workload across a multitude of components of a recycling program can lower their unit cost and develop staff expertise through common resources. This often results in improved quality and consistency of the services delivered and increased staff productivity. A desirable bonus obtained from interaction with knowledgeable staff is an increase in resident satisfaction with the program, which, in turn, results in increased participation and diversion.

Transferability

Multi-municipal cooperation can result in greater resident participation and smoother operation of the recycling program. As residents commute and relocate from one community to another, common messages through co-operative promotion and education and common service levels/procedures make it easy for residents to maintain their participation and diversion levels.

Over time, cost reductions will be realized through staff time and promotional savings obtained from less re-education and reduced collection rejections. Contamination levels often decrease and diversion is maintained or increased as a result of the diminished need to educate residents.

Competitiveness

Many municipalities struggle to attract bidders for recycling RFP's or tenders. One obvious benefit of multi-municipal planning is to take advantage of the larger tonnage offered under co-operative contracts to attract more bidders, as well as non-local bidders. WDO Datacall statistics confirm that recycling costs are steeply reduced

when greater quantities of materials are collected and processed above a 10,000 tonnes per year threshold level. Clearly, the more tonnage that can be combined under a single contract, the more contractors are willing to participate and to pass on savings to municipalities.

The inverse also holds true. A contract that requires half a truck per week to collect is much less likely to attract multiple bidders than a contract that requires five trucks per week.

Market Revenue

Revenues for larger amounts of recyclables often increase because of shipping, storage and handling economies.

Recyclable markets are usually willing to pay better prices for a larger, continuous supply of good quality material. A multi-municipal approach to planning/marketing material may provide some of these benefits.

Implementation

In order to implement this Best Practice, municipalities are advised to follow a seven-step approach outlined below:

1 Identify service needs of each potential co-operating jurisdiction

2 Identify and communicate advantages to working co-operatively

3 Identify and implement communication and working protocols among potential cooperating municipalities (a steering committee or a task group may be required)

4 Determine and document clearly how the multi-municipal program will be funded, using financial projections and a business plan

5 Identify the governance strategies for providing for accountability, monitoring, and decision-making authority to participating jurisdictions. These may include a utility-type board, a sub-committee of municipal representatives, a municipal corporation, or a combination of the above.

6 Identify costs (and cost savings) associated with the co-operative program, using financial projections and business plan from Step 4.

7 Test multi-municipal strategies in low-risk circumstances, such as a joint advertising, container purchasing, promotion & education, etc., and build on successes of such efforts

Co-operative recycling activities, more often than not, simply entail establishing good contracts that align with activities and services municipal neighbours are already providing. Communication is the key to engaging in the co-operative planning process.

For example, it is possible to begin a co-operative planning process by synchronizing the expiry date of neighbouring municipal contracts, so that when the next tender is issued, contractors may bid on multiple contracts simultaneously. Municipalities may

or may not have different service levels and features under each contract. Such minimal multi-municipal planning may result in considerable economies of scale for a supplier who is often willing to share a portion of savings with the municipalities in order to win the bid.

Another example is the co-operative purchasing of blue boxes. Since suppliers will almost always offer volume discounts, savings can be obtained simply by coordinating annual blue box (or any other program consumable) purchase requirements.

No cross governance structures, utility boards or joint ventures are required to participate in these or many other types of recycling activities.

Potential Challenges and Suggested Solutions

Municipalities often have reservations about planning activities and services with communities outside their own boundaries. Concerns frequently center on loss of autonomy. Staff and council may be concerned that they do not want to lose control of their program. Suggested solutions to overcome these issues are:

- Explore opportunities for shared decision-making and management authority; and
- Clearly document roles and responsibilities, such that control is not lost, but economies are gained.

Another frequent concern is that services provided are often different in surrounding jurisdictions. Suggested solutions to overcome these issues are:

- Consider some programs that you could work together on. Share educational items, for example, or share model contracts or communication literature that can be adjusted to suit individual programs;
- Consider why programs are different, and if it might be mutually beneficial to join forces, even if it means altering a program; and
- Design contracts and RFP's to provide for different services in different locations.

Sources and Links

There are numerous sources of online information that will offer help with multi-municipal planning activities. Below are some identified source documentation/links for additional information:

Blue Box Assistance Team (A-Team)
http://www.vubiz.com/V5/Stewardship/bluebox.htm

Association of Municipal Recycling Coordinators http://www.amrc.ca

Waste Diversion Ontario http://www.wdo.ca

Stewardship Ontario http://www.stewardshipontario.ca

Recyclers' Knowledge Network http://www.vubiz.com/stewardship/Welcome.asp

Fundamental Best Practice

Establishing Defined Performance Measures, Including Diversion Targets, Monitoring, and a Continuous Improvement Program

Overview

Proper management of a recycling program includes the monitoring and measurement of the program goals through the establishment of diversion targets and performance objectives. Targets and objectives must be realistic, measurable and relevant. Furthermore, targets and objectives are needed for the individual program components to be evaluated (e.g., curbside collection, depots, processing, promotion and education, etc.) Evaluation facilitates continuous improvement within the recycling program.

Key Benefits and Outcomes

Effective monitoring and evaluation allows program managers to continuously improve their municipal recycling programs and track progress through the use of targets and performance measures. Specifically, program staff are able to:

- Set objectives and targets for recycling programs that are implemented and evaluated within a defined time period
- Collect specific program data to evaluate the effectiveness of recycling programs before and after implementation
- Make decisions on recycling programs based on a detailed analysis of diversion rates and associated costs
- Evaluate program objectives against the pre-defined targets
- Tailor data collected to match the specific goal, avoiding the collection of data that are not pertinent

Description and Implementation of Best Practice

The monitoring and evaluation program should be developed with appropriate resources to gather and evaluate the required information. The collected data must be relevant to the recycling program and the target set must be measurable. The effectiveness of the recycling program should be evaluated and goals should be set for continuous improvement. Specific steps for implementation are detailed below.

Step 1: Establishing Program Objectives

Objectives and targets must be reasonably established by the municipality to meet the requirements of the specific program to which they will apply. The desired outcomes and the associated benefits to the program should be defined. The targets must be measurable and achievable, but challenging, and lead to increased benefits. An example of setting program objectives and targets would be the setting of a diversion target, establishing steps to meet the target, and then monitoring the diversion rate to evaluate if the target is being met. Ongoing assessments of the

targets and objectives must be made to ensure that the recycling program goals are being met.

Step 2: Baseline Measurements and Waste Audits

In evaluating program performance, it is often desirable to first establish a baseline. This baseline will be specific to the program under consideration and can be used to compare the future performance of the program. Data collected as part of the baseline must be appropriately suited to accomplish the objectives. Understanding the specific waste stream that the program is targeting is a critical first step. This is generally accomplished through the completion of waste audits. Waste audits determine the composition of waste being generated, can measure the effectiveness of existing programs and can identify opportunities for improvements in the waste management program. Please refer to the Step by Step: Waste Audits link in the source documentation reference section for this fundamental leading practice.

Step 3: Defining Data Requirements

Best practices associated with program evaluation are aimed at tracking program effectiveness (how successful has the program been in achieving its target goals and objectives) as well as efficiency (the extent to which the program accomplished its objectives with minimal use of resources).

In defining data requirements, the following questions should be answered:

- Will the measure track program outcomes as opposed to just outputs and inputs?
- Is the measure for absolute impacts or relative impacts?
- Can information pertaining to the measure be gathered systematically, consistently, and objectively?
- Is there sufficient time and resources to gather, organize and interpret that information in order to tell a meaningful story to the evaluation audience?
- Will the intended audiences perceive the measure as credible?
- Will the knowledge gained through use of the measure be useful (e.g., for program improvement, adjustment in funding)?

Types of data collected can consist of set-out rate, capture rate, participation rate, residue rate, material tonnages, cost allocation, recyclable market statistics, MRF residue audits, MRF productivity statistics, staff requirements, facility requirements, supplies (i.e., blue boxes), and equipment. Selected definitions are provided in the last section of this Best Practice narrative.

Step 4: Data Collection and Management

Next determine how the data will be gathered and stored. Different data collection methods include mechanical (scales), surveys, focus groups, visually, etc. If appropriate develop a database to store the data in a secure location. Throughout the monitoring phase evaluate the data being collected to ensure that they are

relevant to measuring the desired outcome, and accurate. Monitor the steps as part of the target and if required, adjust the steps and target as data is evaluated.

Step 5: Assessment and Reporting

Compile the data and analyze it by comparing to the baseline information. Assess the monitoring and evaluation program against the desired and measurable outcome. Report on the outcome of the objectives and targets. Identify and analyze the factors that influence your program's ability to meet established goals. Overall, use the findings to identify barriers to recycling, assess program performance relative to the objectives, assess MRF performance, and improve the effectiveness of the recycling program. Once a goal is met, continuously build and improve on future goals for the program.

Step 6: Reviewing Goals and Objectives

Evaluation for continuous improvement is an ongoing activity. Program performance must be monitored at appropriate intervals, often determined by the needs of individual program components. The effectiveness of prior evaluation methods should also be evaluated, so that this program component, too, can be improved upon.

Select Definitions

Capture Rate – The capture rate is the amount of recyclables set out for recycling divided by the total amount of recyclables set out for recycling plus recyclables left in the garbage. Capture rates can also be compared for each material type.

Participation Rate – The participation rate is typically defined as the percentage of households on a curbside collection route who set out recyclables at least once in a consecutive four week period. It is different from Set-Out Rate (see below), as it measures the percentage of residents participating in the program in general, not necessarily on every given collection day (some households may not generate enough recyclables to set-out the Blue Box on every collection day).

Residue Rate – The percent of material in a recycling stream that is rejected during processing.

Set-Out Rate – Percentage of households on a curbside collection route setting out recyclables on the day of collection. As a percent the set-out rate is the # of households setting out recycling on collection day divided by the total number of households available to set out material.

Waste Audit – A formal, structured process used to quantify the amount and type of waste including recyclables being generated.

Source and Links

Stewardship Ontario's Plan Your Own Waste Audit webpage:
http://www.stewardshipontario.ca/eefund/projects/audits/waste_audit_own.htm

E&E Project #105 – Protocol for MRF Residual Sampling April, 2006:
http://www.stewardshipontario.ca/pdf/eefund/reports/105/105_tech_memo_2.pdf

E&E Project #164 – Markets Help Desk (see Appendix C: Protocols and Procedures for Conducting Audits at the PIWMF)
http://www.stewardshipontario.ca/pdf/eefund/reports/164/164_final_report.pdf

California Division of Recycling Project Evaluation Tips:
http://www.consrv.ca.gov/DOR/grants/grant_seekers/ProEval.htm

Evaluation of Recycling Programs, East Central Iowa Council of Governments:
http://www.iowadnr.com/waste/pubs/files/ecicogfinal.pdf

EPA Measuring Recycling A Guide for State and Local Governments:
http://www.epa.gov/recyclable.measure/download.htm

Step by Step: Waste Audits
http://www.wme.com.au/magazine/downloads/WasteAudit_dec2002.pdf

Fundamental Best Practice

Optimization of Operations in Collections and Processing

Overview

Optimization of operations is a process of critically assessing collection and processing functions and making changes that have a net positive effect on recovery rates and/or cost. A combination of data-driven, expertise-driven, and heuristic approaches can be used to optimize operations. Where collection and/or processing are outsourced, close collaboration with the contractor, sufficient flexibility in the use of contractor labour and assets, and thorough understanding of cost drivers contribute to optimization of the system.

Key Benefits and Outcomes

- Collection efficiency means getting more for less—picking up more recyclables using fewer trucks, fewer staff and/or less time. Optimized curbside collection operations maximize the quantity of target materials set out at each stop on collection day and minimize the amount of time required to collect that material, thereby minimizing the unit costs involved.
- Optimized processing operations make full use of the available processing capacity, minimize the amount of manual and mechanical sorting required to produce recyclable products that meet target market specifications, and maximize the quantities of these materials from the incoming feed, while minimizing the amount of out throws, residue and prohibitives associated with the captured material.

Description and Implementation of Best Practice

Optimization entails evaluation and implementation steps aimed at improving the performance and efficiency of those operations being evaluated. There are basic principles associated with optimization that apply to both collection and processing. Key principles are as follows:

- Have an integrated approach to design and management of operations so as to take advantage of opportunities to share facilities and other resources, such as those associated with P&E program design and implementation, and reduce the costs of the system as a whole
- Pursue the "low hanging fruit" first: options that provide the greatest return on investment with respect to meeting operational performance and efficiency targets set by the jurisdiction (see Best Practice on Monitoring and Evaluation)
- Use existing infrastructure as appropriate prior to establishing additional infrastructure that may duplicate or compete with that already in existence
- Provide for a reasonable degree of redundancy to minimize down time, while avoiding unnecessary duplication of infrastructure. An example of this is to have spare collection vehicles or arrange for a neighbouring processing facility to accept material in the event of processing facility down time

- Match the scale and nature of operational infrastructure to the task at hand and use appropriate technology – the right tool for the job
- Balance the use of mechanization with use of labour
- Avoid double handling of materials (e.g., moving materials from place to place within a MRF when conveyors could do the job more cost-effectively)
- Provide incentives to workers and contractors for spawning innovation and continuous improvement. One means of doing this is to offer spot bonuses for ideas that generate significant cost savings
- Use ergonomic, worker friendly equipment and systems, such as sorting conveyors of proper height and width, comfortable safety equipment, and good lighting and air conditioning
- Maintain a flexible design and operational approach to respond to changing needs and circumstances
- Make an appropriate level of capital investment to maximize benefits over the long term at a reasonable payback level
- Utilize a preventative maintenance program by servicing equipment prior to breakdowns instead of fixing it upon breakage, thus reducing downtime
- Address operational issues when they arise by understanding the underlying causes, developing potential solutions, and minimizing adverse impact. An example is to introduce compaction-enabled collection trucks when low material density has been identified as an issue
- Provide appropriate levels of management and supervisory personnel who are trained on optimization techniques and use of Best Practices
- Plan and provide for emergencies, contingencies, and growth

In working to optimize operations, it is important to recognize that other objectives beyond optimization merit focus and attention, such as providing for worker safety and acceptable working conditions, and protecting public health and welfare. Consequently, optimization must be performed in a manner consistent with meeting other such important community objectives.

Additional optimization best practices and considerations specific to curbside collection and processing are provided in separate sections on these topics. Best practices for depot and multi-family recycling programs are also discussed in separate sections so titled.

Sources and Links

E&E Fund Project Number 207. York Collection and Processing Optimization Study, 2006
http://www.stewardshipontario.ca/eefund/projects/benchmark.htm#207

Efficient Recycling Collection Routing in Pictou County, 2001
http://www.cogs.ns.ca/planning/projects/plt20014/images/research.pdf

US Environmental Protection Agency. Getting More for Less: Improving Collection Efficiency, 1999
www.epa.gov/garbage/coll-eff/r99038.pdf

Single Stream Best Practices Manual and Implementation Guide, Susan Kinsella, Conservatree, 2007
http://conservatree.com/learn/SolidWaste/bestpractices.shtml

Fundamental Best Practice

Training of Key Program Staff in Core Competencies

Overview

Municipalities need to ensure that management program personnel are adequately trained on position-related competencies and responsibilities. Training provides the skills needed to develop, manage, monitor, document and promote the numerous and complex components of a successful recycling program. Regardless of the size or type of municipal program, training acts as an enabler of performance, facilitating the achievement of objectives in a cost-effective manner.

Key Benefits and Outcomes

Proper staffing and training leads to improved performance in all key program components, including both effectiveness and efficiency in the following areas:

- Resident participation and satisfaction
- Optimized program funding
- Staff time/costs
- Supplier/contractor relations
- Reduced need for management supervision
- Reduced need for council time and attention
- Job satisfaction, motivation and morale among employees
- Process efficiencies
- Capacity to adopt new technologies and methods
- Knowledge of material markets and pricing, yielding higher revenues
- Innovation in business strategies and products
- Reduced employee turnover
- Enhanced municipal image
- Risk management
- Increased ability to attract/promote staff

Description of Best Practice

Municipalities that take on the responsibility of providing recycling services also assume the duty to provide adequate amounts of time from knowledgeable management and operations staff to deliver those services. It is assumed that all municipalities and private contractors train operations staff to levels that ensure the safety and efficiency of the program.

Additionally, municipalities need to recognize the importance of having appropriately trained management staff to effectively perform the assigned responsibilities. Providing adequate staff time may be a challenge to smaller municipalities, however, all effective and efficient recycling programs depend on the availability of enough

time from knowledgeable people. Therefore, all municipalities are encouraged to strive for the appropriate staffing and management training levels.

Knowledgeable staff routinely achieve higher levels of success within their local recycling program, as measured by greater resident participation and satisfaction, along with increased diversion and optimized program funding. Business research shows that productivity increases while training takes place (see end of this section for references). Staff who receive formal training can be significantly more productive than untrained colleagues who are working in the same role. As a result, most businesses provide on-the-job training, which generally yields a positive return on investment.

While rationale and objectives for training vary across organizations, municipalities seeking to improve program performance should consider focusing on the following goals:

Improved quality and productivity

Training that meets both staff and employer needs can increase the quality and flexibility of municipal recycling services by encouraging:

- accuracy and efficiency
- strong work safety practices
- better customer service

Enhanced Transferability

The benefits of training in one area can flow through to all levels of an organization. Over time, training will reduce costs by decreasing:

- wasted time and materials
- redundant work
- workplace accidents
- recruitment costs through the internal promotion of skilled staff
- absenteeism

Increased Competitiveness

Municipalities must continually change their work practices and infrastructure to improve diversion and contain recycling costs. Training staff to manage the implementation of new technology, work practices and business strategies can also act as a benchmark for future recruitment and quality assurance practices.

In addition to impacting municipal costs, training can improve:

- staff morale and satisfaction
- inter-staff/department communication and leadership
- time management

- customer satisfaction

Effective Recruiting

Training aids the recruiting process. If a municipality is committed to training, it may be more willing to hire a desirable candidate who lacks a specific skill. Training also makes a municipality more attractive in the eyes of potential employees because it shows them that they have room to grow and accept new challenges. Additionally, training existing employees often reduces the need to hire new staff.

Training rewards long-time employees. Municipalities are more willing to promote existing employees who have learned new skills and are ready to take on new challenges.

Training reduces the need for supervision. Not only does skill-based training teach employees how to do their jobs better, but it also helps them work more independently and develop a can-do attitude.

Perhaps the most important benefit of a healthy training culture is that the skills of your staff are formally recognized and their contribution to the municipality and the recycling program is openly valued.

Staff retention

Training increases staff retention, resulting in significant cost savings. The loss of one competent person can equal the equivalent of one year's pay and benefits. In some companies, training programs have reduced staff turnover by 70 per cent and led to substantial returns on investment.

Implementation

Ontario recycling program coordinators and senior staff need the skills and expertise to effectively employ all of the fundamental best practices described in this report. Such skills include:

- recycling program planning, development, evaluation, and continuous improvement
- recycling services procurement and contract administration
- use of policy mechanisms to promote waste diversion and recycling, and promotion and education
- operations planning and management (where the municipality provides that function)

Numerous organizations offer opportunities to acquire training, information and networking.

The Association of Municipal Recycling Coordinators (AMRC) offers several recycling conferences and workshops each year.

Waste Diversion Ontario (WDO) offers many guides and informational packages to assist with municipal Datacall completion, funding and CAN/OCNA in kind advertising.

Association of Municipalities of Ontario (AMO) is a non-profit organization representing the municipal order of government and provides a variety of services and products to members and non-members.

Stewardship Ontario, WDO, and AMO regularly host "Ontario Recycler Workshops" (ORWs) for Ontario municipal waste management staff and private sector service providers, as well as for municipal councillors and interested stewards of Blue Box recyclables. These workshops and web casts provide information about how to optimize WDO funding to support municipal residential Blue Box recycling programs. Project studies and reports commissioned under the Effectiveness and Efficiency Fund are available, along with tendering tools and information from the Recyclers' Knowledge Network.

The Solid Waste Association of North America (SWANA) has been a leading source of information and training programs for solid waste professionals for over 40 years. SWANA offers training and certification as a Recycling Systems Professional.

Although all of the above organizations offer some training and information services, there is no coordinated recycling management training system currently available in Ontario.

Broader and more comprehensive training resources and tools may be implemented in the near future to equip municipal recycling staff with adequate skills to effectively manage and operate Blue Box programs.

For example, in the United Kingdom, WRAP (the Waste & Resources Action Programme) has announced phase four of its free training courses for recycling managers. The training program, developed to support recycling managers in improving existing recycling schemes and introducing new collection initiatives, has proved very popular. In the first year of operation, 25 courses have been run and 400 delegates from across the UK have received training.

The three-day residential courses are aimed at people from local authorities, the community and private sectors who manage or develop and promote collections of recyclable or compostable materials. The content focuses on equipping delegates with the knowledge, skills and tools to develop cost-effective systems with high participation and recovery rates for the collection and sorting of materials that meet end market requirements.

Based on this and other examples, the Team estimated that annual costs for recycling program management training would amount to approximately $412,000. This assumes that two staff members from the largest 40 programs and one staff member from the remaining 150 programs need to be trained. Training-related expenses range from $1,600 to $2,150 per delegate.

Source and Links

There are numerous sources of online information about training and development. Below are some identified source documentation/links for additional information:

Association of Municipalities of Ontario http://www.amo.on.ca

Association of Municipal Recycling Coordinators http://www.amrc.ca

Waste Diversion Ontario http://www.wdo.ca

Stewardship Ontario http://www.stewardshipontario.ca

Recyclers' Knowledge Network http://www.vubiz.com/stewardship/Welcome.asp

Ontario Recycler Workshops
http://www.stewardshipontario.ca/eefund/orw/orw_main.htm

Solid Waste Association of North America http://www.swana.org

Research on training in the workplace: Smith A., 2001, Return on Investment in Training: Research Readings, http://www.ncver.edu.au/research/proj/nr1002.pdf 2001, Australian National Training Authority.

WRAP launches phase 4 of its recycling manager training programs.
http://www.wrap.org.uk/wrap_corporate/news/wrap_launches_6.html

Fundamental Best Practice

Following Generally Accepted Principles for Effective Procurement and Contract Management

Overview

A vast majority of Ontario Blue Box municipal programs involve the use of contractors for collection and/or processing of recyclables. Since contractor selection and performance in these municipalities has a substantial impact on program design, service delivery, cost, and sustainability, effective practices in procurement and contract management need to be employed.

Key Benefits and Outcomes

Well designed and executed procurement and contract management processes can yield a number of effectiveness benefits. Specifically, it

- Ensures high quality service to specified requirements
- Offers flexibility to address changing needs
- Provides incentives to maximize participation, tonnage and material revenues
- Provides a proper system (or system component) design that increases diversion at a lower cost
- Opens the door to innovation

Efficiencies that can be gained include:

- Cost savings due to increased competition
- Cost savings due to economies of scale
- Cost savings due to properly structured contract terms

Description and Implementation of Best Practice

The majority of Ontario Blue Box programs involve some element of contracting of services. It is, therefore, essential to employ effective procurement and contract management processes within these programs to yield positive province-wide diversion and fiscal results.

The goals of good procurement and contract management are to:

- Secure the desired level of services from competent contractors at the lowest possible cost, and
- Create an effective working partnership between contracting parties that continues through the duration of the contract.

Accepted leading practices for effective procurement and contract management to extract the best value for municipal Blue Box contract needs include:

- Planning procurements well in advance of service requirements. Useful life of existing equipment, lead times for replacing this equipment, and lead times for

the execution of the procurement process itself all require careful consideration. Failure to plan properly may mean costly maintenance and breakdowns and sub-optimal contracting.

- Investigating and understanding suppliers' markets to understand the players, dynamics, cost drivers, and innovators in order to maximize value when setting procurement strategy. This results in municipal staff becoming informed buyers.
- Involving suppliers (in pre-procurement consultations) to help refine requirements, where own experience is limited, and to leverage innovation and capabilities of experienced suppliers. This results in municipal staff becoming smart buyers.
- Developing a clear definition of services and performance requirements
- Using the appropriate procurement instrument, such as a Tender or an RFP
- Using a competitive procurement process and working to encourage multiple proponents/bidders
- Using a two-envelope bid process (when a Request for Proposal process is appropriate)
- Using a pre-defined (transparent & fair) bid evaluation process
- Using knowledgeable evaluators. This may include a cross-functional team, supplemented with independent experts, as required.
- A partnership-oriented approach to monitoring and managing the contract and contractor to achieve objectives and take mutual advantage of opportunities for improvement

Implementation of an effective procurement and contract management involves a series of sequential steps. These steps are presented below:

Step 1: Precisely define services to be contracted

This involves developing answers to questions such as:

- Who is the service recipient? Is it one or more municipalities?
- What services are to be provided? What is the nature and type of service (e.g., collection, processing, transportation, marketing of materials, communication and education, program administration and operation)?
- What is the length of contract? For contracts involving the supply of equipment, the best contracts match the lifecycle of the equipment being supplied. If the contract is too short, the contractor must capitalize the equipment over the period of the contract, resulting in less than optimal unit pricing and overall cost. If the contract exceeds the equipment life by a year or more, the contractor will incur new equipment or expensive maintenance costs that must be built in to the price. Current lifecycle expectations for new collection trucks are about 7 years; new materials recovery facility (MRF) equipment 10 -15 years.

Municipalities should also evaluate options prior to proposal/bid process through informal dialogue with potential service providers and other stakeholders. Municipalities should clearly and specifically:

- examine weaknesses in past agreements and any issues with service
- review agreements from other communities
- identify both short- and long-term needs
- identify where flexibility can be incorporated without leaving too much open to interpretation

Program managers and procurement personnel should provide adequate data and technical specifications for accurate pricing of services. A typical collection contract may include: services to be provided, collection frequency, stream separation and number of streams, volume tonnage and types of material (from recent audited mix), future materials contemplated, number of households/stops per kilometre for collection; areas to be collected/route maps. A processing contract may include: tonnes per hour, product mix, quality measures (e.g., bailed material composition thresholds), uptime as a percentage of operating hours, and acceptable residue rate, among other factors.

Staff should also prepare a cost estimate of services requested to inform the procurement process – benchmark to other recent municipal procurement processes for similar services, whenever possible.

Step 2: Determine contractor pool and your market position

Good results are more likely to come from a minimum of 3 bidders. In rural areas, bargaining power may be improved by bundling services or partnering with other communities to increase attractiveness of potential business. On the other hand, if the service area is too large, as may be the case in urban areas, this can also limit contractors. In this event, it may be desirable to de-bundle services or break-up the contract to allow more, smaller bidders the opportunity to bid on selection or entire system.

The level of financial investment expected may determine the market of suppliers. A high capital investment typically requires a longer contract and implies more risk. Fewer contractors may be capable of bidding.

With respect to recycling collection and processing, the leading practice is to structure the procurement process to allow for separate contracting for collection and processing when feasible. This stimulates competition by encouraging collection contractors, who may not be able to bid on a MRF, to provide good service at competitive prices on the collection process. With this approach, it is most desirable to handle the procurement process for processing in advance of collection, or to specify a MRF location, so that collection service providers will know where the MRF will be located and can structure their proposals/bids accordingly. Quality control concerns when two contractors are involved can be managed contractually with appropriate monitoring, penalties and incentives.

Municipalities need to develop contract payment terms that align with incentives and desired performance levels. It should be clear and unambiguous how adherence to

contact terms and achievement of performance thresholds will be tied to payments for services.

Additionally, it is desirable to obtain separate prices for collection and processing even if under one contract, and to request pricing for the handling of any materials that might be added at some point during the term of the contract.

Finally, a self-assessment process is needed to determine whether your municipal organization is fair and equitable when dealing with contractors. Investing in and protecting your reputation for open, transparent and fair procurement practices will positively influence the pool of available bidders on future contracts.

Example: Components of a good RFP and Contract

- Clearly defined terms
- Detailed description of service(s) to be provided
- Adequate background information and data
- Expectations regarding qualifications and experience
- Detailed performance specifications that address the following:
  - Location of service
  - Regulatory compliance
  - Recyclables (initial & provisions for future)
  - Markets for processed materials
  - Capacity/throughput
  - Vehicle access, operating hours, weighing
  - Residue management and limits
  - Start up schedule
  - Handling of complaints
  - Record keeping and reporting
  - Equipment requirements
  - Public education requirements
- Payment terms
- Incentives/penalties to support increasing performance
- Opportunities for amending scope to address changing circumstances
- Avenues for resolving disagreements - mandatory 3rd party mediation clause
- Clear financial/cost proposal instructions
- Proposal submission instructions
- Description of selection process and evaluation criteria

Step 3: Prepare a detailed, unambiguous RFP or Tender

Programs staff should select the appropriate procurement mechanism. A tender works best when:

- services can be definitively specified
- all bidders are qualified
- price is sole deciding factor

A Request for Proposals (RFP) – Works best when:

- Local government is receptive to different approaches to delivering service. This may often yield additional value opportunity
- Price is not sole determining factor in contractor selection

Step 4: Employ a fair and transparent contractor selection process

A healthy competitive market is critical to availability of service choice and better value in procurement. Local service markets become diminished if fair and transparent processes are not used. Service choice, therefore, becomes more limited in the future. Municipalities can influence and encourage competition and more robust supplier markets by employing the following activities:

- Use supplier mailing lists and widespread advertising to solicit interest in your service needs
- Co-operate with nearby municipalities to create joint opportunities that could increase the number of suppliers
- Learn about capabilities/interests of potential contractors in advance by meeting with them
- Consider pre-qualifying bidders
- Hold pre-proposal/bid meeting
- Provide adequate opportunities for questions/answers during proposal/bid development
- Determine detailed evaluation criteria and scoring system to be used

- Clearly describe evaluation criteria in bid documents
- Require and verify references

Potential contractor selection and evaluation criteria include:

- Responsiveness to RFP or Tender
- Qualifications & experience (organization, management), including facility/operational capacity, financial stability, and references
- Technical soundness of response
- Cost
- Innovation

Each criterion must be clearly defined and explained in the documentation. Mandatory and preferred requirements should also be specified.

Evaluate proposals with a qualified team, which may include business unit & technical personnel (or qualified and independent consultants, if necessary), purchasing, and legal representatives. First, evaluate compliance with mandatory requirements on a pass/fail basis. Then, evaluate compliant technical responses on a point scale or on a pass/fail basis. Finally, open the price envelope to evaluate price and value according to the pre-specified evaluation criteria. Document evaluations and final rationale for selection.

Through a well-executed procurement process, the contract will be awarded to the best overall scored proposal (according to the predetermined bid criteria and scoring process). However, if actions or circumstances did not result in proper procurement (such as improper sequence of response component evaluations, failure to come to terms with the winning bidder, failed due diligence processes), the process may need to be redone.

Communicate results to all bidders, including strengths and weaknesses of their proposals. For the winners, this sets the stage for any final negotiations on services. For the losers, it helps them to improve their bids for the next competition, which benefits all parties.

Step 5: Negotiate a partnership-oriented contract

The final contract negotiation process with the winner (and if not successful, the runner-up) should go smoothly if the procurement was well-managed. Well-prepared RFPs include a comprehensive draft contract and require the supplier to comment on the draft contract in their proposal. The focus should now turn to setting the stage for building a successful business relationship, positioning both parties for success. Specifically, the municipality should:

- Build upon RFP terms and conditions
- Finalize the structure of incentives for improving performance
- Allow flexibility for amending scope to address changing circumstances, including technical or process innovation, means of addressing extraordinary

circumstances, such as changes in law, index-based monthly fuel adjustments, index-based annual payment adjustment for inflation (e.g., CPI or PPI with fuel component removed), adjustments for growth, etc.

- Provide avenues for resolving disagreements
- Build in ongoing communication and feedback

Step 6: Maintain partnership approach in contract administration and monitoring through entire contract term

Successful relationships require attention and effort in regular maintenance and communication by trained/skilled contract management personnel. To maintain and build on the partnership, municipal staff should:

- Become knowledgeable about factors affecting recovered materials movement and value
- Monitor recycling market prices and trends
- Monitor markets used and revenues received
- Continuously monitor contractor compliance with performance specifications and contract terms. Apply pre-agreed incentives and penalties for performance
- Live up to your side of the relationship, including the flexibility arrangements, to help your contractor be successful in providing your service
- Communicate regularly on pre-agreed schedule and frequency
- Address problems as soon as they arise
- Have a back up plan if the relationship deteriorates or services are jeopardized.

Common pitfalls to avoid

By avoiding pitfalls, municipalities increase the likelihood of selecting a qualified supplier at a low price and building a lasting relationship with them. The following list includes some of the most common pitfalls in recycling related procurement:

- Not using a competitive process
- Over- or under-specification
- Prescribing the "How of operations" versus focusing on the business, legal & performance requirements
- Micromanaging the contractors operations beyond ensuring business, legal and performance requirements are being met
- Not managing the contractor due to infrequent communication and performance discussions
- Not providing for operational flexibility or for innovation
- Poorly matching equipment life-cycle and maintenance provision to contract length

- Poor procurement planning, including insufficient lead time for procurements and insufficient knowledge of the marketplace
- Poorly defined service requirements and performance standards
- Prohibitive bonds and letters of credit, which unnecessarily reduce competition and add directly to cost
- No service exit strategy or contract language
- Lack of transparency and fair competition
- Allowing a poor procurement to proceed

Sources and Links

Recycling Contracting Tips and Tools training materials developed for State of Pennsylvania, R.W. Beck, February 2006

Best Practices Review – Contracting and Procurement in the Public Sector, Minnesota Deputy State Auditor, November 2005

Model collection contracts available under "Tools for Recycling Coordinators." http://www.mass.gov/dep/recycle/reduce/assistan1.htm

Blue Box Residential Recycling Best practices – A Private Sector Perspective, A Joint Project of Stewardship Ontario and the Waste Management Association, Guilford and Associates, February 2007

Stewardship Ontario Model Tender Tool

Fundamental Best Practice

Appropriately Planned, Designed, and Funded Promotion and Education Program

Overview

To be effective, a municipal Blue Box program needs to be supported by a Promotion and Education (P&E) component that is appropriately designed and funded, and incorporates specific audiences, defined messages & media, planned frequency of communication, and monitoring of results. A well-designed and implemented P&E program can have effects on virtually all other elements of the Blue Box system, including planning, collection, processing, marketing, and policy development.

Key Benefits and Outcomes

The impacts of effective P&E propagate throughout the recycling program. Most significant benefits include

- Potentially higher revenues for marketed materials due to the lower degree of contamination
- Higher waste diversion and recyclables recovery rates overall
- Establishment of new recycling behaviours and reinforcement of emerging or existing positive patterns among residents
- Increased community involvement in the program
- Set out of only those materials that are accepted by the program
- Proper set out of recyclables at the curb, leading to increased collection efficiencies and decreased operator safety issues
- Lower residue rates at processing facilities, resulting in higher recovery and lower costs

Description and Implementation of Best Practice

Planning and implementing targeted P&E programs that support recycling and waste diversion are vital to municipal Blue Box programs. Experts in the field agree that P&E is one of the cornerstones of an effective program. Most recently, an OWMA report stated that a "unanimous conclusion (of a group of private sector companies) is that effective promotion and education programs are significant contributors to the success of the blue box program ." Another recent E&E Fund study, aimed at enhancing Blue Box recovery in the Golden Horseshoe area, determined that effective communication and education is required to "increase cost-effectively the number of recyclables recovered…". Furthermore, a study titled "Best Practice P&E Review" defines and articulates a number attributes that lead to a successful P&E program. Some content from the above studies is used throughout this document.

The key to effective P&E lies in the concept of "appropriateness" – considering what level of planning, research, deployment, and measurement is appropriate for

different communities across the province. Each community's ability to design and deploy P&E is affected by community size, geography, resources (financial, skills-based and time) and many other factors.

The description that follows attempts to provide useful direction to communities, as they consider what may determine the appropriate P&E for their programs, taking into account four key factors that include:

- Design
- Funding
- Deployment
- Monitoring and Evaluation

Design

P&E programs that contribute to best practices in recycling are based on a current (and regularly updated) communications plan, with identified goals and measurable objectives.

Ideally, recycling P&E programs and targeted campaigns will be rooted in a communications plan, based on targeted community research, or if resources are unavailable, on reliable existing research that highlights common factors that are broadly applicable.

Communications plans include a statement of goals and objectives, target audiences, key messages, tactics (including planned media and distribution), timing, and plans for monitoring and evaluation. While the majority of Ontario recycling programs do not have in place detailed or current communications, in the course of this study, project team members were told by various communities that they intend to develop these plans in the near future.

The Best Practice P&E Review report, previously mentioned, indicates that most of Ontario communities conduct some form of research to identify their audiences, themes, targeted messages, images and branding before rolling out new communications efforts. For communities that lack the resources to carry out targeted research, several research documents are currently available that may provide insights from which they may extrapolate. See Sources and Links section for more information on these and other resources.

Funding

As a rule of thumb, communities will determine the level of financial resources they have available, whether they are adequate to cover full program costs, and, if necessary, identify other sources of funding or modify tactics to achieve P&E program goals. The best plan cannot be implemented if adequate financing is not in place.

A recent study of eight programs that are considered to be among the P&E leaders, as well as of other well-performing communities, revealed that their P&E costs, as

reported in the 2005 WDO Datacall, range from approximately $0.83 to $1.18 per household, with recovery rate at or exceeding 60%.

Statistical analysis showed a positive, albeit weak, correlation between increased P&E spending and increased recovery in Ontario recycling programs.

In applying the above conclusions, one needs to take into consideration that P&E funding may vary significantly from one year to the next, based on the introduction of new services, new materials, additional programming and several other factors.

More details on the cost analysis are provided in the Key Observations section of this report. Promotion and education funding considerations, as they relate to the Net System Cost under Best Practices, are outlined in Volume II of this report.

Deployment

P&E initiatives that contribute the success of a recycling program employ a mix of media (e.g., calendars, brochures, radio spots and others) over a sustained period of time. These vary according to the audience, available budget, and resources.

Mix of Media

The use of media reported by P&E leaders may be grouped in five broad categories:

- Print (paid ads, brochures, calendars, newsletters)
- Broadcast (TV, radio ads, Public Service Announcements)
- Electronic (websites, emails)
- Outreach (special events, in-school education, community education centres, door to door campaigns, landfill/depot contact, etc.)
- Icons & incentives (Blue Boxes or other collection containers, magnets and other 'gifts', community mascots etc).

The strongest and most effective P&E campaigns strategically combine media and tactics. The Blue Box Program P&E Review report suggests that wherever possible, communities should try to implement a multi-tiered approach, with appropriate tactics selected from each of three tiers:

- Tier 1 - Radio components or, if possible, TV (vs. print ads)
- Tier 2 - householder drop of calendars or user-friendly tools showcasing website offerings; complemented by
- Tier 3 - public relations or word-of-mouth strategies to animate communities – highly visible events and activities, community and corporate partnerships, role model identification, personal testimonials

Communities that use this approach benefit from the mass media impact that helps build awareness and shift attitudes, combined with outreach that helps engage residents and contributes to skill-building. Where limited budgets and media outlets constrain P&E program choices, the Best Practice P&E Review suggests focusing on

a limited range of Tier 2 activities, deployed with greater frequency to achieve greater impact.

Sustained & sustainable deployment: Campaigns that include a program for ongoing and sustained contact with targeted audiences generally have greater impact than a one-time "blitz." Year-round exposure is the target.

Communities that look for and implement innovative and cost effective strategies to deploy their messaging expand the reach of their messaging and get a better 'bang for their buck.' There are many ways to maximize deployment or delivery mechanisms including:

- Partnering with other communities with similar messaging to design/deliver tactics
- Sharing with community partners to deliver messaging (e.g., sending print materials with utility bills, inserting messaging into politicians' newsletters, working with community groups)
- Enlisting a known community spokesperson to 'carry the message'
- Combining public relations (earned media coverage) with other 'cost-based' tactics (calendars, newsletters etc.)
- Working with appropriate community partners to design and or deliver P&E messaging

Messaging: Recycling P&E campaigns that target those who are receptive to recycling and skew toward the female head of the household show greater success.

Most community residents are aware of recycling and what to recycle, particularly with materials that have been recycled for several years now. They continue to need information to support the addition of new materials to recycling collection programs. They also need to be motivated to take action.

Recent focus group findings in several Greater Toronto Area municipalities indicate that despite efforts to provide information about recycling, many multi-family residents remain unaware. Efforts to reach out to multi-family residents require continued persistence and creativity, with rewards (e.g., with indications that their efforts pay off, and by providing clean, safe recycling sites for their use) and attention to ethnic/cultural issues that are often pervasive in multi-family buildings.

In many communities, the need for traditional informational messaging is becoming secondary to inspirational approaches. Most residents are aware of at least the 'first generation' materials that may be recycled.

The most compelling messages also speak to the emotions (again, rather than simply providing information).

Linguistic issues are a vital component: to be successful and engaging, P&E must be produced in the languages spoken in the community.

The foundation for the messaging lies in targeted community research or, where resources are unavailable, consideration of the wealth of information that exists in available reference documents.

Allocation of financial resources: For most, if not all Ontario communities, P&E for recycling programs is constrained by limited financial (and staff) resources. The majority of respondents in the P&E Review survey reported that they thought they would need to double their budgets to be able to accomplish the full range of tasks to ensure "successful P&E."

Despite that, communities across the province are developing and sustaining P&E programs that are contributing to program effectiveness with, in some cases, very limited resources. To achieve Best Practices, communities should consider planning their P&E strategies to include some of the low cost/high impact components (and others) identified above.

Opportunity to increase efficiency: For some elements of their programs, communities are already sharing resources either with other communities or with other programs within their communities or existing P&E vehicles.

Other shared resources for P&E that exist or are in development include:

- the WDO Ad bank
- a new web-based resource about all Ontario recycling programs (www.blueboxmore.ca)
- P&E module coming to "Recyclers' Knowledge Network" (expected in May 2007)
- Project reports from all E&E Fund Communication and Education studies

Communities that seek out new opportunities to share resources (information, graphics, activities and others) will increase the cost-effective impact of their P&E programs and in some cases, be able to employ tactics that would otherwise be cost-prohibitive.

Monitoring and Evaluation

P&E programs that contribute to best practices contain a monitoring and evaluation component that is budgeted and mapped out in the planning phase.

For many communities, the ability to implement formal qualitative and quantitative research will be constrained by budgetary limitations.

In a more informal way, evaluation may also be monitored by changes in amounts/quality of materials marketed over a year. Because there are so many factors that influence program performance, this is a less precise means of evaluating a P&E campaign or program, but it does provide an indicator. In the Blue Box Program P&E Program Survey, London, Durham and Toronto indicated that they look to 'spikes' in recovery or overall annual tonnages in their consideration of P&E effectiveness.

Communities that use these measures as indicators of P&E effectiveness may link their findings with existing (and growing) research about the impact of specific tools and campaigns in Ontario and beyond.

Source and Links

Reports

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City of Hamilton: *"Blue Box Recycling Public Opinion Survey (March 2006)"*

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Skumatz: *"Policy and Program Options that Increase Recycling"*, 2004

Presentations

AMRC: *"2005 Promotion & Education Awards"*, 2006AMRC Policy & Programs Committee: *"2006 Municipal P&E Awards"*, February 2007

"Industry Experts Speak about Advertising: Research Perspectives": A presentation at AMRC's Spring Workshop by Informa Research, Praxis PR and McConnell Weaver Communications Research; February, 2007

Upcoming Resources

Stewardship Ontario's Efficiency and Effectiveness Fund Communication & Education projects

Fundamental Best Practice

Established and Enforced Policies that Induce Waste Diversion

Overview

Municipalities need to utilize a combination of policy mechanisms and incentives to stimulate recycling and discourage excessive generation of garbage. Most of these policies are aimed toward causing a permanent shift in residents' behaviour through the use of economic and non-monetary levers. Economic incentives work by assigning a tangible value to the recyclable portion of the refuse stream. Non-monetary incentives, on the other hand, force residents to limit undesired behaviours and stimulate desired ones, using punitive and rewarding policy tools, respectively. Each type of incentive is described in further detail in this section, with pragmatic application guidance.

Key Benefits and Outcomes

By using a mix of economic and non-monetary incentives, municipalities can change residents' behaviours and generate program revenues. Specific effectiveness benefits include:

- Higher participation rates
- Increase in materials diverted to recycling
- Reduction in recyclable materials loss
- Improved quality of materials
- Realized synergies between policies and Promotion and Education

Efficiency benefits include:

- Decrease in garbage collection costs
- Increase in program revenues
- High return on investment
- Low capital requirements

Description of Best Practice

Economic incentives

Economic incentives are as diverse and varied as the municipalities and waste authorities that employ them. The basic objective of incentives, as relates to recycling programs, is to place a cost on disposing of waste at the curbside, which will cause system users to divert appropriate material to diversion programs. The intended result is a decrease in waste disposed and an increase in recycling volumes.

There are a number of approaches employed, the names for which are often used interchangeably: Pay-as-you-throw (PAYT), unit pricing, and variable rate structures are often cited. Generically, these are often referred to as "user pay" systems. Incentive programs can employ variable fee structures, and simple but effective

forms use bags or stickers. Other approaches require subscription by container volume, or may be weight-based. Bag tags and sticker programs are consistent with approaches used in many Ontario communities, in which system users pay for bags or tags that qualify for curb side garbage collection. In some cases, partial systems are used in conjunction with bag limits (see discussion on non-monetary policies), allowing users a maximum number of bags at the curb (often 2 or 3), after which user paid bags or tags are required to qualify for garbage collection.

In general, the "user pay" concept has the potential to recover part or all of waste management costs from system users. Utility-based or self-financing systems recover all of their costs, while the user pay systems recover part or all costs. Potential increases in net recycling costs may result in lower unit costs, while other aspects of the waste management system will benefit from reduced garbage collection costs, reduced disposal costs and increased landfill life expectancy. Well-conceived incentive programs may also improve material quality, resulting in increased program revenues and reduced sorting costs.

Non-monetary Incentives

Bag limits are a common practice of limiting how much waste, and specifically the number of garbage bags full of waste, will be accepted for collection. They are often employed with "user pay" systems, which will assign a cost per bag for collection for bags over the limit. Bag limits are a relatively simple means of encouraging residents to become more conscious of the amount and type of waste they generate to initiate a change in attitude and behaviour about their waste generation habits.

Typical bag limit designs include:

- Strict bag limit is imposed with no other options provided for placing additional waste at the curb. Once the bag limit set out is reached, any additional units of garbage are left at the curb by the collection crew
- Partial Bag Limit allows residents to purchase special tags or bags for excess garbage (also referred as a partial user pay system). Because residents are given an alternative approach to deal with excess garbage, it is not as critical to provide convenient waste diversion alternatives. However, residents will expect some level of waste diversion services to enable them to divert their waste and reduce the financial burden of paying for excess garbage. This approach is much more common among communities imposing bag limits of three bags or less
- Hybrid System combines features of the strict bag limit and with features of the partial bag limit. Typically, in a hybrid system, a community will impose a strict bag limit but will distribute a set of "free" tags for use by residents to augment the bag limit

Bag limit programs send a clear message to residents that it is no longer acceptable to produce unlimited amounts of garbage. However, they are usually coupled with significant convenient opportunities to divert waste.

Communities that impose bag limits of less than three per week, in general, experience a noticeable reduction in the amount of waste sent for disposal and an increase in recycling rates. There tends to be an inverse relationship between the number of bags permitted at the curb and the diversion and recycling rates achieved. The lower the bag limit the higher the diversion rate of waste from landfill and the recycling rate, as long as residents have access to convenient and comprehensive waste diversion opportunities. Curb side recycling is generally considered essential if a bag limit of three or less is to be contemplated. Introduction of additional diversion opportunities, such as curb side collection of kitchen organics, further enhances bag limit impacts.

Bag limits can generally be administered without capital expense to the waste authority, and thus are generally regarded as a low-cost initiative.

Provision of blue boxes entails the provision to households of free blue boxes in order to ensure ample household recycling capacity. This is usually done when programs are initiated and when materials are added and/or the program is re-promoted. Additional blue boxes require an initial capital outlay, however, the added capacity may not only increase capture and potentially lower unit operating costs, but the minimization of home-made curb side containers may yield longer-term ergonomic benefits to collection crews.

Disposal bans can be implemented by the disposal authority, which determines what materials it will accept for disposal. This forces the collection authority to redirect banned materials from the waste stream to appropriate receivers. This policy is often applied to broader material types and industrial wastes, and not specifically a blue box strategy.

Curb side material bans entails banning of material from garbage collection, forcing the household to dispose of the material through the proper program channels, such as recycling, source separated organics, household special waste depot, or any other appropriate collection or depot system. This is enforced at the curb, and disposal service can be withdrawn if users refuse to divert banned materials to the proper streams.

Mandatory recycling is institution of a by-law that directs households to use the recycling program for recyclable material. This can be enforced at the curb, and disposal service can be withdrawn when users continually place recyclables in the garbage. This approach is also commonly used to direct managers and property owners of multi-family residences to promote recycling, and is enforced by making public garbage collection programs available on condition that the complex provides a recycling program.

Reduction in garbage collection frequency is a strategy made possible when diversion programs are able to divert large amounts of material, such as recycling and source separated organics programs. With significant diversion, a minor portion of material left for the garbage stream makes weekly collection obsolete, and the conversion to less frequent garbage collection, in turn, makes diversion programs

more attractive even to program hold-outs. Reduction in garbage collection frequency has the added benefit of reducing garbage collection costs.

Drop-off Depots for overflow materials make recycling available at locations and facilities where public traffic is present. Recycling receptacles are an opportunity to collect material without curb side collection costs, adding material to the revenue stream without the same level of cost for collection.

Careful program planning is essential to the success of economic and non-monetary policies. A number of critical considerations are cited within the body of literature, studies and experience associated with these practices.

Implementation of Best Practice

Economic Incentives

Implementation of economic incentives requires thorough analysis and planning. User pay incentives work best

- in conjunction with clear, well-considered goals
- when there is a strong sense of what barriers to recycling are being targeted through the incentives
- where there is adequate infrastructure to obtain the desired results, including strong program elements, such as accessible recycling programs, a commitment to educational/promotional support, active enforcement (it should be noted that in some literature, fines are considered to be a form of economic incentive), and provision of adequate recycling capacity
- where there is careful determination as to what type of program is suitable for the community (bag tag, variable pricing, weight or volume based)
- as part of a waste management strategy

Through proper planning, minor concerns can be anticipated and mitigated. With respect to litter and illegal dumping, experience shows that implementation issues may arise. Diminished quality of recyclables, for example, may result from placement of over-the-limit garbage in recycling bins by residents in order to avoid garbage cost. Roadside garbage dumping may take place in isolated cases. However, these issues can be addressed by stepping up enforcement in the early post-implementation stages and developing targeted educational campaigns.

Administration and capital requirements will depend on the type of program selected. Weight-based systems require a capital outlay with increased operational expenditures, and, therefore, may be more expensive to operate. Bag-tag systems are considered to be less expensive to operate, with some programs looking to retail outlets to manage distribution of bags, tags or stickers.

Some programs offer variable rate plans based on either weight or volume, allowing subscribers to select containers or bins that match their waste production needs and encourage a "downsizing" of household waste generation. This provides additional

incentive to reduce waste and increase recycling by placing a value on the behaviour through additional savings. Consideration of such approaches are systemic in nature, accompanied by assessment of weight or volume-based subscription plans, automated collection systems for carts or bins, and impacts on system cost.

Non-monetary Incentives

As previously noted, benefits attributed to any of these strategies are dependent on the amount of associated public education, promotion, and enforcement support.

In the case of those strategies that "direct" waste to the recycling stream, care must be taken to avoid negative impacts to the quality of the collected material. When instituting bans, bag limits, or garbage collection frequency reduction, recycling collectors need to be diligent with respect to quality control. It is possible that non-recyclables will be placed in the blue box as a reaction to reduced garbage service or capacity.

Reduction in garbage collection frequency is one of the final implementation steps in a successful integrated waste management diversion program, and is a companion strategy to the effective diversion of household organics and blue box recycling. The need for weekly garbage collection is effectively eliminated. This particular strategy requires a revision of collection logistics that may result in co-collection scenarios for waste, recycling and organics, in a manner that can lead to efficient use of collection vehicles.

The implementation of a bag limit program (featuring three bags or less) requires a planned phase-in to address communication with residents (citizens need to know why the municipality is doing this) and the infrastructure required to support it. The following is suggested as effective bag limit levels for various Blue Box recycling programs:

Recycling system	Collection Frequency	Garbage	Suggested Bag Limit	Add Kitchen Organics	Suggested Bag Limit
Multi sort	weekly	weekly	3	weekly	2
	bi-weekly	weekly	4	weekly	3
Two stream	weekly	weekly	3	weekly	2
	bi-weekly	weekly	4	weekly	2
	alternating weeks	weekly	3	weekly	2
Single stream	weekly	weekly	3	weekly	2
	bi-weekly	weekly	4	weekly	2

In most communities, where a recycling curbside program is in place, the average householder sets out three bags or less of garbage per week and only has excess garbage a few times a year, typically after the holiday season and spring clean up. These special times can be effectively accommodated with amnesty days.

Sources and Links

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AMRC "Analysis of User Pay System Costs**"** *E&E Fund Project 191 (2006),* http://www.stewardshipontario.ca/eefund/projects/innovative.htm#191

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Best Practice Spotlights

In addition to formulating Fundamental and Conditional Best Practices, the Project Team focused on identifying Best Practices in specific program areas. These areas include:

- Curbside Collection of Materials
- Processing of Materials
- Marketing of Materials
- Multi-Family Recycling
- Depot Collection of Materials
- Recycling of Challenging Plastic Materials

Best Practices in each of these program areas are described in detail below in a Best Practice Spotlight

Best Practice Spotlight

Best Practices in Curbside Collection

Overview

In a typical Blue Box recycling program, the curbside collection function is the most expensive program component. It is, therefore, essential to understand and properly manage cost drivers and operational intricacies associated with collecting recyclables at the curb. This section provides guidance for municipal program operators on the availability of choices and resulting cost and recovery implications of adopting or changing curbside collection methods and parameters.

Key Benefits and Outcomes

By effectively structuring and optimizing their collection functions, Blue Box programs can obtain the following effectiveness benefits:

- Increased recovery of materials and diversion from landfill
- Improved separation of materials in vehicles and MRFs
- Increased participation in recycling
- Enhanced aesthetic appeal of containers at the curb
- Improved operator safety and ergonomics
- Improved customer satisfaction levels

Programs can become more efficient due to the following factors:

- Lower collection and processing costs
- Increased revenues from sale of recyclables captured
- Improved utilization of capital (trucks and processing equipment)

Description and Implementation of Best Practice

Relationship to Processing

The appropriateness of any specific curbside collection practice is directly related to the processing capabilities of the MRF that will be receiving the collected material. Some collection methods listed may not be appropriate for all municipalities for this reason, as well as others. All collection methods should be reviewed with consideration of processing capabilities and further feasibility analysis may be required.

Set Out Containers

It is good practice for municipal programs to complete set out studies, waste audits, and capacity studies to evaluate the current program's recovery effectiveness, remaining recovery potential, and set out container capacity needs. If sufficient

container capacity is not provided to match the set out volume and frequency of collection, then there is the potential that additional recyclables might be placed into the garbage. Often, additional collection can help solve the bin capacity issue.

As a program continues to grow, additional or larger containers may become increasingly advantageous. Some programs allow residents to add blue boxes or allow residents to include the additional materials in clear plastic or clear blue bags. Single stream collection programs using carts do not usually have container capacity problems, provided that residents follow instructions on how to prepare material (e.g., flattening cardboard so that it will fit into the cart, etc.). The size and number of recycling bins or carts should be selected to match the collection frequency and the projected volume of recyclables. Container options typically include:

- **Recycling box:** may be suitable for most small programs collecting only the "mandatory" recyclables weekly (18-68 litre)
- **Multiple boxes:** as programs grow in the number of designated recyclables collected and in the recovery of those materials, they usually move to providing multiple boxes to residents, often one for fibres and one for loose containers
- **Roll-out cart:** used by programs with a wide range of materials with reduced collection frequency (bi-weekly or monthly) to enable the use of semi- and/or fully- automated collection vehicles (120 – 360 litre).
- **Translucent bags:** provide flexible capacity, similar to carts, but increase sorting problems at the MRF. Allow identification of gross contamination, but not the opportunity to provide curbside contamination sort

Degree of Sorting

Programs generating less than 10,000 tonnes per year can benefit from curbside sort collections when no two-stream or single-stream MRF is located within a reasonable driving distance. Smaller programs typically do not recover sufficient tonnage to justify establishing their own MRF: however, such programs may find it cost effective to implement a low-tech bulking facility where densification of curbside sorted materials takes place. Often materials recovered through curbside sort systems have very low contamination, thus resulting in a very high quality product.

As programs grow in size and tonnage, there is more pressure to consider additional commingling of recyclables. Typically, programs previously providing a multi-sort curbside scheme evolve into providing a dual sort collection system, i.e., separation of fibre and containers in two vehicle compartments. Another variation of the dual sort system is separation of glass into a third compartment.

Two-stream collection (fibres and containers) is generally the preferred collection method for programs that process between about 10K to 40k tonnes of material per year, again, depending on the processing capabilities at the MRF. This tonnage throughput can support two-stream processing; but if a single-stream MRF is located within an hour's driving distance, single stream collection should be considered as a potential collection option. Two-stream collections capitalize on the initial labour provided from the residents at the curb. Often, programs with high participation can

benefit from this type of collection as materials are collected fairly easily by collection staff. In addition, if boxes are used to set out recyclables (as opposed to bags or carts), collection staff have an opportunity to perform a degree of contamination screening at the curb to improve the quality of the product delivered to the MRF.

As program tonnages approach and exceed 40,000 tonnes per year, single stream collection and processing may become more feasible. Single stream recycling offers the potential for increased collection savings and increased recovery of recyclables, but also results in increased processing costs and, depending on the container type used, increased contamination. In simple terms, the larger the program tonnage, the greater the potential for collection cost savings and, hence, the greater the potential to offset the additional cost of single stream processing. In addition, the use of fully or semi-automated collection vehicles to tip carts into a vehicle results in fewer injury-related strains, thereby increasing worker safety and lowering operating costs associated with injuries.

It should be noted that if a two box set out is maintained in a single stream program, most of the potential savings in urban areas will be lost, since there will be little reduction in stop times. A more-detailed discussion of single stream recycling is provided in the "Processing" section.

Collection Frequency

Municipalities need to assess their program performance to identify the type of collection that is best suited to their own circumstances. Selection of collection frequency needs to be made with consideration to the variety and volume of recyclables recovered, the type, number, and volume of household containers supplied to the resident, the type of collection equipment available for use, and how recyclables collection is integrated with other solid waste collection services (e.g., household organics, garbage, etc.). Team's analysis indicates that programs that collect recyclables at least as frequently as garbage exhibit higher recovery rates. This practice sends an important message to residents that recycling is equally as important and as convenient as setting out garbage, thereby boosting the tonnage of materials diverted.

The most effective programs in the province with respect to tonnage diversion provide weekly collection of recyclables and household organics, with bi-weekly collection of garbage (and an effective refuse bag limit). However, bi-weekly collection of recyclables on its own can be more cost-effective than weekly collection, provided there is no appreciable loss of tonnage, and provided that householders are given sufficient container capacity to meet or exceed their two-week material storage requirements. Another option, used primarily by programs that do not have specialized collection vehicles or are co-collecting recyclables with other waste materials (with recyclables taken to a two-stream MRF), is the collection of fibres and containers on alternating weeks. While not a best practice, in certain situations, where efficiency must be weighed against diversion benefits, such programs may be justifiable.

Collection frequency for recyclables should be reassessed when planning for collection of kitchen organics. Co-collection opportunities should be evaluated and utilized, when feasible. This entails using the same vehicle for two or more different waste streams or fitting a vehicle with appropriate equipment (in low-density, rural areas), so that a single pass can be made to collect multiple types of materials. Co-collection is typically only appropriate when materials can be unloaded at the same or adjacent facilities.

Regardless of the collection frequency, but particularly in programs with waste bag limits or lower frequency of collection, it is beneficial to provide convenient and consistent options for capturing overflow materials. Some communities have depots for this purpose, while others provide clear plastic bags for the collection of overflow materials.

Routing

Regardless of the type of collection procedure used, it is a Best Practice that collection methods are designed to ensure that the routes are shortest in distance and reach all the residential locations. Route design should also maximize collection vehicle time spent on route and minimize collection vehicle time spent off route. One means of doing this is to use large-capacity collection vehicles. Another best practice is to use compaction equipment, particularly for plastic containers, with an optimal compaction ratio matched to the processing capability in the MRF. Set out instructions can also be prepared to increase collection efficiency. For example, when street layouts permit and safety is not an issue (and particularly in low-density areas), households can be directed to set out material on one side of the street only. Another option is to encourage "twinning" of recycling containers at the curbside (residents place their bins beside their neighbour's bins) to maximize set outs per stop. This can be particularly beneficial when street side parking can interfere in servicing set outs, or when houses are on large lots. This technique is more commonly used for solid waste collection programs using roll-out carts, but the same technique works for recyclables collection as well.

For larger programs in particular, and for private collection service providers, the use of route optimization tools and methods to balance routes and payloads, can be very effective in reducing time per stop, time between stops, off-route time, and miles driven. Optimized routes provide efficient service to residents, reducing collection time, which can translate into lower collection costs. Some municipal staff have produced in-house route optimization methods and there are a number of route optimization software applications available for municipal staff to purchase. Whether a purchased program or an in house methodology is used, optimizing routes on a regular basis will result in some beneficial change.

Transfer

Transfer is an option that should be considered for programs with tonnages of recyclables considered too small to support their own MRF, or for larger programs without their own MRF with direct haul time to a MRF of greater than about one

hour. How recyclables will be transferred will depend on the destination MRF. The degree of commingling, receiving hours, and possibly the type of transfer vehicle that can be used are typically items that the MRF will dictate. Transfer of single stream recyclables using light compaction will likely be simpler and more economical than transfer of two stream recyclables.

The design of a transfer station can vary from a very simple split-elevation, direct unload operation into an open top transfer trailer (for small tonnages) to more sophisticated enclosed structures with several loading bays. A recent WDO report provides more detailed information about transfer systems. The cost of providing a transfer option must be weighed against that of direct haul. To assist in this, an Excel model has been developed to assess different transfer options on a site specific basis (check with WDO on how to access model).

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Waste Diversion Ontario
www.wdo.ca

Best Practice Spotlight

Best Practices in Processing of Recyclable Materials

Overview

Processing of Blue Box recyclables at a MRF is an intermediate step between the collection of the recyclables and the marketing of those materials to selected material markets. The role of a MRF is to receive, sort and prepare the recyclables to meet material specifications dictated by the selected markets. Discussed herein are selected design and operational Best Practices and associated considerations. Please refer to the Fundamental Best Practice on Operation Optimization, as well as the description of Curbside Recycling Best Practices for additional relevant information.

Key Benefits and Outcomes

By improving and optimizing processing functions, municipalities can obtain the following effectiveness benefits:

- Increased recovery of materials and diversion from landfill
- Improved separation of materials
- Lower residue levels
- Consistent material quality
- Improved relationships with end-markets

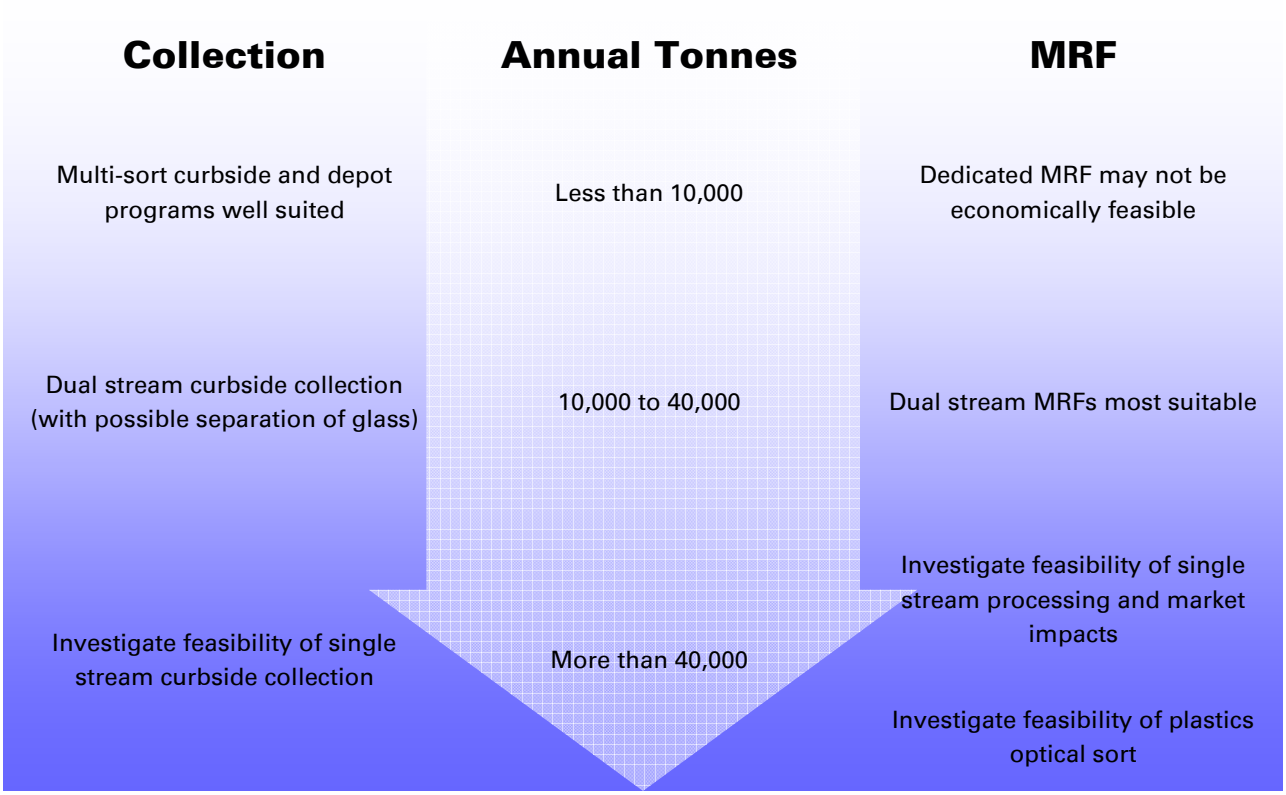
Programs can become more efficient due to the following factors:

- Reduced need for staff, reduced downtime, reduced maintenance
- Increased revenues from sale of recyclables captured
- Improved employee safety and ergonomics
- Improved utilization of capital

Description and Implementation of Best Practice

The design of a MRF is dependent on the materials delivered, the composition of those materials, the degree of commingling, the annual tonnages delivered, and the proposed grades and specifications of materials to be produced and marketed. Smaller MRFs that rely heavily on manual sorting to separate recyclables and remove contaminants primarily serve smaller collection programs that rely heavily on curbside sorting of Blue Box recyclables. Larger programs with higher tonnages and an expanded degree of commingling of recyclables are able to support more sophisticated mechanical sorting at the MRF.

The schematic below illustrates how collection and processing systems change with increased tonnage recovered.



Regardless of the type of MRF, there are a number of conditional Best Practices that should be considered by any program looking to improve processing effectiveness, efficiency and costs. These include:

- Provide at least 2 day's storage capacity for incoming recyclables. This permits a second shift operation and provides a storage buffer during unscheduled equipment down time. Consider planning for a second shift, to maximize the use of processing equipment and to allow for processing of additional materials
- Build in as much flexibility as possible into the design and operational approach; this allows responding to changing needs and circumstances (e.g., changes in material mix, additional materials, improved technology, optical sorting, changes in market specifications, seasonal surges in tonnage, etc.)
- Balance the use of mechanization and labour. Evaluate the benefits and cost of labour and capital in each processing step to identify the optimum balance
- Use appropriate technology – the right tool for the job. These may include use of balers sized and designed to match the nature of material to be processed, ergonomically designed sorting lines, appropriately-sized and designed loaders to handle incoming materials, etc
- Provide adequate pre-sort capability. This practice provides the ability to remove oversize and problem materials such as large cardboard, wire, plastic film, etc. before reaching mechanical sorting equipment, where they may interfere or cause damage or interfere with subsequent processing. Removal of these materials improves the efficiency of subsequent sorting operations. Pre-sort

capacity also offers an opportunity for sorting future add-on materials, such as bagged film plastic, textiles or oversized plastic bottles. Length of pre-sort conveyor required is dependent on the quantity and type of contamination present and the width of storage bunkers or cages required below the sorting conveyor

- Use fluffers (at the baler in-feed) or perforators with single ram balers, as plastic containers are particularly difficult to bale (especially with the lids still on). While single ram balers are suitable for smaller MRFs, they typically do not have the ability of larger 2-ram balers to produce dense plastic bales. The use of fluffers or perforators results in improved bale density of up to 20%.
- Investigate the feasibility of optical sorting of plastics if MRF throughput tonnage is >40,000 tonnes, or alternatively, if 3 or more sorters are required for sorting plastic containers. (These automated systems are primarily designed for bottles sorting and the addition of tubs/lids, clamshells, and polystyrene generally limits the applicability of this technology in Canada, given the nature of the containers in the waste stream in this country, compared to other regions, such as the United States.) If possible, leave space for optical sorting in a new MRF design, in the event that this will be added later
- Make an appropriate level of capital investment to maximize benefits over the long term at a reasonable payback level (a detailed feasibility analysis is required).
- Pursue the "low hanging fruit" first – meaning those options that provide the greatest return on investment with respect to meeting specified operational performance and efficiency targets
- Build into contracts a clear understanding of preventive maintenance and equipment replacement requirements to maximize equipment life and ensure good equipment performance

In addition to the above, the following is a list of "toolbox" items that might be considered in MRF design and operation. Many of these were observed during MRF site visits in this project:

- Municipal ownership of MRFs – increasingly more municipalities are electing to own their own MRF and contract the operation. This gives them more control of their processing operations (e.g., ability to test and add materials, ability to retrofit as necessary to accommodate new technologies and processing systems, etc.). While private sector-owned MRFs ease the capital financing requirements of municipalities, they may offer less flexibility to the municipality (e.g., in what materials they can process, operating hours, number of streams processed, willingness to invest in additional equipment or equipment maintenance to further reduce operating costs, etc.). Contracts for operation of publicly-owned MRFs by private contractors should not exceed ten years in length.
- Provide frequent training of sorters to identify recyclables, improve sorting efficiency, reduce turnover

- Use variable speed conveyors wherever possible to adjust for material changes and staff sorting variability
- Incorporate ergonomic considerations in design with adherence to the ANSI Z245.41-2004 Facilities for the Processing of Commingled Recyclable Materials – Safety Requirements
- Incorporate methods to encourage a uniform flow of material through the process (even flow at reduced burden depth) (e.g., levelling drums, variable speed conveyors, provide 2 to 3-foot drop at fibre conveyor transitions, etc.)
- To the extent possible, remove large and bulky material (such as OCC and items that can be mechanically sorted) first on sort lines to get these materials out of the sorters' way
- Use negative sorting wherever possible to sort commodities to minimize handling, especially when markets for such a commodity are more forgiving. Due to its diverse nature and particle size, residue should be removed from the commodity by negative sort to minimize labour requirements
- Use technology (screens, air classifier, magnets, etc.) early in the process to reduce the volume to be sorted and leave an opportunity for supplementary recovery (i.e., quality control) after the technology has been applied to maximize the recovery of valuable commodities
- To the extent possible, use gravity and free fall to move materials from processing to storage and further processing to simplify the operation, reduce maintenance, reduce floor space, requirements, and reduce operating costs. One example of this is to use vertical storage hoppers that release sorted materials when they are scheduled to be fed into the baler
- Optimize traffic flow control to reduce unloading time and congestion; and minimize double handling where possible for example by using conveyors to move materials as opposed to repeated loading and unloading
- Provide workers with environmentally comfortable and safe working conditions in accordance to ANSI Z245.41-2004 Standard (heat/cool, ventilation, lighting, safety and protective equipment, etc.) Ensure knowledge of health and safety requirements, including Pre-Start Health and Safety Review, the provision of safety training in accordance to ANSI Z245.41-2004, minimization of noise and air contamination, and the safe use of equipment, personal protection equipment (PPE).
- Provide a quality control station at the baler pre-feed, in place of several quality control stations for individual materials
- Consider compacting, or possibly baling residue, to minimize shipping costs to landfill
- Monitor residue rates and work to improve both incoming and outgoing product quality
- Conduct periodic efficiency/optimization studies and provide structured opportunities for employee input to provide for continuous improvement

Single Stream Recycling

While the discussion above relates to all MRFs, there exists particular interest in the development of single stream recycling. The term "Single Stream Recycling" refers to a process in which Blue Box recyclables, container and fibre materials, are collected from residences and/or businesses in a single, fully commingled form and subsequently separated and processed into marketable secondary materials at a materials recovery facility. The following discussion reviews a number of key issues related to single stream recycling, with particular emphasis on single stream MRFs. The reader is also directed to the Best Practice Spotlight on Curbside Collection discussion for more detail on related single stream collection issues.

As the definition implies, there are two parts of a single stream recycling system that are generally implemented in tandem:

- **Single stream** Collection of Recyclables – To facilitate efficient collection residents are told that there is no need to segregate recyclables into separate streams (e.g., fibre, containers). The recyclables can then be collected using standard single compartment collection vehicles, in some instances, with semi-automated or automated loading capabilities. The use of larger capacity containers (carts, bags) encourages consideration of a reduction in collection frequency (from weekly to every other week) with resulting cost savings. The use of a large container allows for the collection of additional recyclable materials (such as a full range of fibres and rigid plastic containers), as well as the reduction in collection frequency due to the additional storage capacity provided by the container. It also provides convenience and ease of use to the resident and/or business. In some programs, residents use plastic bags, rather than rigid containers, to set out the commingled recyclables
- **Single stream Processing of Recyclables –** The implementation of a single stream recycling system also requires the availability of a materials recovery facility (MRF) that is able to accept and process recyclables that are collected in a single stream form.

There has been a tremendous growth in the implementation of the single stream recycling approach in the last decade. In 1995, there were five single stream MRFs in the United States. In 2000, there were 64 single stream MRFs. These facilities represented more than 20% of the MRF processing capacity in the U.S. in the year 2000. According to Governmental Advisory Associates, a Westport, Conn., consulting firm that maintains a database on MRFs, there are presently about 100 municipal and regional single stream programs located in 22 states serving about 27 million residents.

While single stream recycling may not be appropriate for every community, there is a definite trend regarding the implementation of this approach for residential recycling systems. It is noteworthy that a number of the most aggressive and dedicated U.S. recycling communities have converted to single stream recyclables collection programs. Among the converts are:

- Seattle, Washington
- Portland, Oregon
- San Jose, California
- Los Angeles, California
- Denver, Colorado
- Plano, Texas.

The Canadian experience is similar, especially in Ontario. In 2004, approximately 20% of Blue Box tonnage was processed through single stream MRFs. In 2006, this had increased to approximately 40%. Programs such as the City of Toronto, York Region, Peel Region, and Sudbury have introduced single stream recycling over the past two years.

The following factors have contributed to the rapid growth of single stream systems in the last ten years:

- **Desire to Increase Number and Quantity of Recyclables –** The adoption of higher recycling goals has caused communities to target more materials for collection, exacerbating the problems associated with curb-sort collection systems (e.g., limited number and size of compartments, limited bin capacity, etc.)
- **Householder Desire for Convenience and Ease of Use –** The increase in the number of materials targeted for recycling increased the difficulty of the resident's participation in source-separated recyclables collection systems, leading first to the development of the dual-stream concept and later to the single stream approach. Single stream recycling has shown to be successful in increasing both participation and capture rates even in communities that previously had good two-stream recovery rates
- **Improvements in MRF Processing Technologies –** The heavy reliance of early MRFs on manual labour led to the development and/or refinement of materials handling technologies to the point where screening systems can now reliably and effectively sort out containers and fibrous materials. In the last ten years or so, improvements have been made in MRF processing equipment - specifically, disc screens and optical sorting equipment (for larger facilities) - that have enabled MRFs to cost effectively process single stream recyclables
- **Improvements in Automated Collection Technologies –** In the last 20 years, there has been significant growth in the utilization of automated refuse collection vehicles for both refuse and recyclables collection, particularly in the U.S. This trend has not occurred in Ontario, although it may become more prevalent in future years where weather permits. The growth of this market has resulted in design improvements that have increased the reliability and reduced the maintenance costs of automated collection equipment, as well as lowered equipment prices
- **Pressure to Reduce Overall System Costs and Minimize Cost Increases Resulting from Addition of New Materials –** In many parts of Canada and

the U.S., different governments are responsible for the collection and processing elements of curbside recycling systems (i.e., cities and towns assumed or were given responsibility for recyclables collection, while counties or states implemented MRFs). For this reason, there was little opportunity or incentive to look at system-wide efficiencies. It took large municipal and private sector organizations with major responsibilities for both recyclables collection and processing service, such as the Peel Region, the City of Toronto, City of Phoenix, Waste Management, Inc., etc., to recognize the potential system efficiencies associated with the single stream approach. These efficiencies are primarily associated with the curbside collection of recyclables in a single stream form. Very often, single stream recycling has been implemented to accommodate other waste management practices (e.g., co-collection, addition of household organics collection, etc.)

- **Consolidation in the Waste and Recycling Industries –** With fewer companies handling greater quantities of materials from larger geographic areas, larger, more automated regional MRFs have become increasingly feasible. Capital investment in processing systems has increased, and with it the use of single stream systems

According to its promoters, single stream recycling is reported to have the following benefits:

- Easier and more convenient for residents
- Increased recyclable capture rates due to the ability to collect more types and volumes of materials
- Reduction in scavenging (materials are usually set out in one larger container)
- Less wind scatter and litter
- Protection of paper from rain if carts or bags are used
- Ability to use high capacity collection vehicles, including automated collection vehicles in some areas
- Improved collection efficiencies (reduced seconds per stop, more materials per stop)
- Reduced fatigue and risks to workers, especially when the system is fully or semi-automated

Reported disadvantages include the following:

- Less quality control at curb
- Low recovery of glass by colour due to more glass breakage
- Recovered materials contamination, especially paper with glass shards and plastic film
- Loss of collected materials due to cross over contamination (e.g., plastic bottles ending up in paper bales)
- Potentially lower value of recovered materials

- Contamination of fibre caused by food and liquids originating from the containers;
- Increase in MRF residuals
- Higher MRF capital and processing costs
- Higher vehicle maintenance costs (for automated vehicles)
- Increased marketing of minimally sorted paper as mixed paper – much of it shipped overseas – rather than sorting paper into grades used by domestic mills, thereby creating supply concerns. (Also results in low grading, as opposed to highest and best use, and ultimate deterioration of material quality)

Single stream recycling is a complex issue that impacts virtually all of the major components of a solid waste management system. Specifically, single stream recycling program components are listed below.

Collection – Although collection efficiencies can be achieved with single stream recycling, this is not a certainty. Municipalities considering single stream recycling need to take a system-wide approach because collection savings will only be achieved under certain circumstances. If fully automated waste collection is franchised or contracted for the entire municipality, there is a strong incentive to investigate single stream recycling because existing trucks can be used to collect both waste and recyclables on separate routes. However, if most waste collection is performed via rear-load manual trucks, single stream recycling will require an entirely new collection fleet, and will impose a cart-based system on residents who may be accustomed to setting out bags, bins, or bundles or recyclables. Similarly, if a municipality decides to maintain a two box collection system, potential savings in stop times at the curb will not be fully realized.

Single-stream collection systems typically use collection equipment with on board compaction that is also used for waste collection for simplicity of operations and maintenance. Although waste benefits from maximum compaction, single stream recycling collection can only accept some compaction before its impact will seriously affect the performance of the processing system. The processing system is based on the separation of "flats and rounds" or two-dimensional objects from three-dimensional objects. Excessive compaction during collection can compromise this property differential.

Reduction of the collection frequency from weekly to every-other-week collection can lead to significant cost savings in single stream systems. While this option has been identified by as a promising strategy to ensure the long-term economic viability of residential curbside recycling systems, there appears to be no documentation in the literature of its combined economic impacts.

Public Education – For the past two decades, most residential customers who live in areas with curbside recycling have been asked to carefully prepare and often separate fibre from containers. Single stream recycling is a significant change in behaviour for residents – they are now told that there is no need to segregate recyclables into separate containers and a distinctive recycling truck is replaced by a

"garbage truck". This can create significant scepticism among them about whether the materials are actually recycled.

Processing – There is no question that processing single stream material is more costly, requires more capital investment, and requires a significant throughput to assure financial success. Additionally, residuals are known to be significantly higher for single stream MRFs. These high residue rates partially offset the higher capture rates of the single stream program, so any evaluation of single stream should take into account both impacts.

Some materials are not compatible with single stream systems because of their physical properties. For instance, plastic film and telephone directories affect the disc screen performance. Polystyrene pieces and shredded paper tend to flow through the screens and contaminate mixed broken glass. Larger plastic containers (over 8 litres) have the potential to be mechanically separated into the cardboard stream, if the pre sort is inadequate and a post screen quality control on cardboard is not implemented.

Marketing – Prior to converting to a single stream program, it will be extremely important to understand the availability of markets for single stream material, and to evaluate the potential to achieve target specifications for sorted materials. The acceptability of materials collected through single stream systems depends on the specific products to be made. The fact that some paper mills are able to accept single stream materials does not mean that all will be able to do so. Many mills requiring high quality recovered paper feedstock have growing concerns about the ongoing availability of suitable supply.

Although single stream equipment manufacturers insist that their configurations can produce #8 ONP if needed, there has been mixed feedback from paper mills. Some indicate that single stream material is highly contaminated and increases potential to damage mill equipment, while others point to examples of single stream feedstock that is far better quality than that of dual stream customers. Clearly, blanket statements regarding the quality of fibre coming from single stream MRFs should be avoided. The MRF operator plays a key role in product quality. There have been exceptionally clean loads produced from single stream MRFs and very dirty loads from dual stream MRFs.

While the issue of fibre contamination is a market concern for single stream systems, other market concerns also exist. The issue of glass breakage in the collection and processing steps and the resulting reduction in glass recovery is an issue faced in both dual-stream, as well as single stream systems, but is a greater issue in certain single stream systems – particularly in communities without access to glass beneficiation facilities with optical sorting technology.

Cost – Despite the recent growth in single stream systems, it would be a mistake to assume that the single stream recycling approach represents the most economical alternative for all communities. In some cases, other approaches, such as the dual-stream, two-bin recycling approach, may prove to be more economical. This

conclusion underscores the importance of using local economic and market data in assessing the economic feasibility of single stream recycling for a local community.

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Best Practice Spotlight

Successful Marketing Strategy for Processed Recyclables

Overview

Marketing of processed recyclable materials is the last step in the value chain of municipal Blue Box recycling. As a result, the effective execution of this process is largely influenced not only by the end-market demands and relationships, but also by virtually all other value chain elements that precede it. This section describes a range of factors that lead to improved material quality and higher revenues and provides guidance on how to structure a successful marketing strategy.

Key Benefits and Outcomes

A successful marketing strategy, when properly designed and executed, has the ability to improve program effectiveness by:

- Ensuring high quality service to specified requirements
- Improving end-market relationships
- Improving contractor relationships
- Allowing for flexibility and innovation to address changing conditions
- Positively affecting system-wide program strategies
- Allowing processor to properly manage inventory
- Aiding market development
- Raising municipal profile
- Engaging staff
- Maintaining focus on continuous improvement

It can improve program efficiency by:

- Positively affecting the net cost of the overall recycling program
- Resulting in higher, more predictable revenue
- Potentially optimizing funding
- Potential mitigating municipal risk, if desired
- Improving risk management by way of due diligence
- Identifying potential revenue enhancements through modified processing

Description of Marketing Practices

The marketing of recovered materials is one of the most critical factors in the success of any municipal recycling program, as the revenue realized from the sale of materials directly affects the net cost of the overall recycling program. Municipal marketing strategies are widely diverse and varied (as a consequence, analysis of

WDO data did not conclusively identify a leading practice in this realm). The range of strategies includes:

- Marketing done by municipality who retains revenue
- Marketing done by contractor who retains revenue
- Marketing done by contractor who rebates most of the revenue to municipality
- Marketing done by contractor who shares revenue with municipality (e.g., 50/50)
- Marketing done by municipality who shares revenue with contractor
- Municipality sells commodities to contractor based on a formula (contractor then markets and attempts to receive a premium)
- The use of service agreements or spot markets (or a combination)
- The use of tenders or other bidding system of varying terms
- Pricing based on established indexes such as the Official Board Markets (OBM), Yellow Sheet Price
- The exclusive use of brokers or end markets (or combination)
- Collection contract that does not include control of material once collected (collection contractor responsible for processing and marketing)
- Cooperative marketing (marketing recyclables from different, usually smaller, programs)
- Other combinations of the above strategies

Many of the contractor-controlled marketing strategies listed above are designed to mitigate municipal risk. A recent report, titled "*Blue Box Residential Recycling Best Practices – A Private Sector Perspective"*, jointly prepared by Stewardship Ontario and the Ontario Waste Management Association (OWMA), suggests that market risks should not be assigned to the contractor without fully considering the options and potential implications. If contractors accept risks they cannot control, they will make appropriate provisions in pricing, forcing municipalities to pay a premium. By doing this, contractors protect the bottom line when market revenues decline, and make excessive profits if revenues meet or exceed expectations. Because contractor-controlled marketing strategies are often tied to varied contractual terms and pricing (e.g., processing or collection fees), it is considered best practice, in cases where a potential decision may be to assign all revenues to the contractor, to structure a tender that permits the municipality to assess what exactly is being charged by the contractor to assume market risks. This can be done, for instance, by requesting pricing options that include revenue sharing scenarios.

The OWMA report suggests that the private sector preferred practice is for the contractor to retain responsibility for marketing the materials in exchange for a small percentage of revenue (5-10%). These revenue sharing arrangements usually serve to benefit both parties, as the objectives of revenue maximization and appropriate risk management are aligned. It should be noted that in these contractor marketing scenarios, municipalities need to employ knowledgeable staff to manage the contract, as there is little incentive to the contactor to realize the best revenues.

Marketing by municipal staff, whose municipalities retain the revenue, can also be a successful strategy. This strategy can be employed in municipally-operated Material Recovery Facilities (MRFs), as well as those that are operated on behalf of municipalities by contractors.

Successful marketing is inherently tied to all aspects of a recycling program. For example, materials are often targeted for recycling by municipalities for a variety of reasons not related to their marketability (e.g., waste audit information, regulations, political mandate). If materials included in the program do not have established markets with consistent revenue, or cannot be used to displace another material (e.g., glass as an aggregate substitute), net revenue per tonne is negatively affected. If Promotion and Education (P&E) is not effective and collection crews do not deliver quality feedstock to the MRF, then there is pressure on the MRF to meet recyclable material recovery and quality targets. Because of this, the marketer needs to communicate with those responsible for Program Planning, P&E and Collections.

The marketer's relationship to other program elements is particularly relevant when it comes to processing. In order to successfully market processed commodities at the highest possible revenue, a marketer requires a consistent supply of quality material (i.e., meets market specifications and payload minimums). As markets for recyclable commodities are generally well established, fluctuation in revenue is primarily the result of individual product quality and current market conditions. Even if staff responsible for marketing is not the same as for processing (or managing the processing contract), it is important that the marketer has a keen understanding of MRF operations, contracts, and opportunities (e.g., alternative plastic sorts, densification options, etc.) that determine the quality and composition of the material that is being sold. Conducting routine audits helps to ensure that opportunities that improve revenue through tonnage increase or mitigation of quality concerns are fully acted upon. Equally, the marketer needs to understand and establish relationships with markets (all end-users), and mutual understanding of the composition of the marketed material is important to this relationship. The markets, to which recyclable materials are sold for revenue, are critically important to understand, as they specify types, quantities, and quality of materials that will be purchased. These requirements fundamentally influence processing, collection and other aspects of a recycling program's operation.

Implementation of a Good Marketing Strategy

There are a number of leading practices, based on the marketing experience of developed programs, that can be employed by municipal program operators. These include:

- an understanding of basic market requirements
- the performance of marketing-related audits
- the provision of quality feedstock to end markets
- a systematic approach to finding and selecting end market options

These practices and their benefits are described below in greater detail.

Planning and Operating According to General Principles that Promote Service, Integrity and Sound Decision-making

Whereas a waste manager is a service provider, with a responsibility to collect waste and keep citizens satisfied with service, a recycling manager must also provide quality feedstock to an industrial process, ensuring clean, consistent volumes of useable material.

Some industry experts indicate that there is currently a gap in quality, consistency, and reliability between materials produced by the municipal recycling process and the expectations of buyers of these materials. Higher degree of communications and interactions between producers (recyclers) and buyers (end-markets) may be needed to close this gap. Progress in this area may shift the relationship from a punitive one that causes loss of revenues (reduction in prices paid, downgrades, etc.) to a collaborative one that results in higher revenues from buyer expectations being met (customized material compositions, special bailing methods, convenient delivery schedule, etc.).

General principles to apply to recyclable materials markets:

- Markets should be as secure as possible, either by having multiple outlets or by establishing purchase agreements
- Market requirements and location influence program collection and processing. Material with low market value generally benefit with nearby outlets, whereas products with high value may be economically transported in truckload or railcar quantities to more distant markets
- Markets may need varying quality, consistency and quantity. Materials need to be processed to meet the specific market specifications of the buying entity.,
- Market fluctuations must be considered in program planning. This can be gauged by reviewing historical pricing trends available through trade associations and publications, monitoring of the trade press, personal communication with end markets, brokers and municipal marketers, and by tracking key market indicators (refer to the Sources and Links section below)
- There must be one or more markets for materials made from recycled products

Traditional revenue generating markets require the following:

- High and predictable quality feedstock (i.e., uncontaminated recyclables)
- Sufficient volumes to be cost effective
- A consistent supply

These market requirements dictate the appropriate recovery technique, equipment and recyclable material revenues.

Program managers need to recognize that a variety of micro and macroeconomic factors influence the revenues received from marketing processed recyclable materials. Some of these include:

- Business cycle - the periodic up and down movements in economic activity (i.e., expansion, contraction, recession etc.)
- Energy prices
- Transportation costs
- Export and imports
- Currency exchange
- Size and proximity to market
- Supply and demand of a particular material
- Competition
- Labour issues
- A development/change in end use
- Supply and demand of virgin materials
- Innovations in raw material supply
- Regulations, institutional, and government issues (domestic and international)
- Quality/quantity and consistency of supply of material
- Landfill costs (indirectly)

Conducting Marketing-Related Audits

Material audits are instrumental in identifying issues, deducing causes of problems, and making program changes. They allow program managers to reinforce and leverage positive elements of the program and reduce or eliminate problem areas.

Inbound audits serve to:

- Identify quality of feedstock to the MRF
- Identify changes in composition
- Draw attention to new packaging
- Aid in planning process changes
- Assist in targeting P&E
- Monitor collection crew diligence
- Aid in effectively managing collections and processing contracts

Residue audits serve to:

- Determine the amount of recyclable material that is lost to residue
- Further analyze effectiveness of P&E
- Further determine collection consistency as it relates to accepted material

- Identify potential sorting opportunities (e.g., Tubs and Lids vs. 3-7)
- Identify potential mechanical (or manual) deficiencies in the system
- Determine marketing options for residue (alternate processing)
- Aids in effectively managing collection and processing contracts

Commodity audits (bale audit) serve to:

- Determine if processing is meeting market specifications
- Communicate data to end markets
- Defend against downgrades
- Determine if revenue is being lost (e.g., aluminium in Fibre)
- Identify sorting opportunities (e.g., natural vs. pigmented HDPE)
- Identify potential mechanical (or manual) deficiencies in the system
- Train sorters
- Aid in effectively managing processing contracts

Finding and Selecting Markets

Municipal marketers need to continuously evaluate end-market options for transportation and material handling. Delivery options of processed materials to end markets are as follows:

- Haul recyclable material directly to material consumer (the mill) where it is processed and used in an industrial process
- Haul to an intermediary (a broker or dealer) who processes it to specification and hauls it to the mill
- Have an intermediary pick up recyclable material
- Adopt a regional approach with smaller feeder programs decontaminating and storing materials to feed into larger regional processing centres that process materials and haul to market. More information on cooperative marketing experience is available from AMRC and Cooperative Marketing project report (E&E Fund Project #86)

Factors to consider in choosing a recyclable materials market:

- **Distance to market:** the greater the distance, the higher the haulage costs and the greater the need to maximize payload
- **Required specifications for material preparation:** in general, select the market with the minimum specifications and the highest price. For a stable situation, it is important to balance the two elements, and look at patterns and history (such as downgrades)
- **Tonnages:** programs with larger tonnages can often sell directly to a market, ensuring a higher price. Smaller programs may require a broker/merchant or cooperative agreement to obtain favourable pricing

- **Revenue/cost ratio:** maximum revenue implies a higher processing cost, therefore there is a need to select the optimum revenue/cost ratio. It is important to find a balance between the two

Determining the best market for a material requires four steps: identifying, contacting, selecting and negotiating and/or contracting with buyers. To be executed properly, this process usually requires dedicated time and resources. Even small programs should dedicate resources to this task, even if it is temporary/periodic for the purpose of setting up and monitoring a longer-term strategy. It should be noted that it may be advisable to use more than one buyer, if possible, and to sell material using a combination of agreements and spot markets.

- **Step 1 - Identify potential buyers:** Contact information can often be found from talking to other recycling program operators, or by contacting national and provincial recycling and/or industry organizations. Numerous trade publications and websites also exist. Marketers also often receive unsolicited calls from potential buyers.
- **Step 2 – Contact potential buyers:** This step involves requesting information regarding the market. Some questions might include:
  - Price paid for material
  - Material specifications (degree of contamination acceptable, densification required)
  - Transportation options and costs
  - Minimum/maximum loads
  - References
  - Payment terms
- **Step 3 – Select a buyer:** This step may involve interviewing potential buyers and assessing them based on a set of criteria.
- **Step 4 – Contract with a buyer:** A written agreement protects a relationship with a buyer as competition for markets escalates. Contracts can be useful when markets take a downturn because buyers may only service customers with written agreements. Written agreements may include letters of intent to purchase material as well as formal contracts. Provisions in a written agreement may include tonnage and volume requirements, material quality specifications, and provisions for delivery or pickup, termination provisions, length of commitment, and the pricing basis that may include a relevant index.

Knowledgeable marketers continually research pricing trends to ensure they receive fair value for material. Marketers should monitor performance by analyzing relevant industry publications (e.g., CSR Price Sheet) and communicating with other municipal marketers, markets, brokers and organizations (e.g., Association of Municipal Recycling Coordinators, Markets and Operations Committee).

Sources and Links

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Official Board Markets Yellow Sheet Pricing (OBM):
http://www.packaging-online.com/paperboardpackaging/

CSR Price Sheet:
http://csr.org/pricesheet/pricesheet.htm

Association of Municipal Recycling Coordinators (AMRC):
http://www.amrc.ca/

Stewardship Ontario E&E Fund Approved Projects:

" #86, Pre-Feasibility Study of Co-operative Marketing Programs for Blue Box Materials in Ontario" (April 2006)

"#164, Markets Help Desk Report" (January 2007)

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Best Practice Spotlight

Best Practices in Multi-Family Recycling

Overview

Statistics Canada 2001 Census reported that approximately 26% of Ontario's residents currently live in multi-family buildings and the number is continuing to grow. Since the collection of recyclable materials from multi-family households has historically been a challenging process, a new approach that incorporates Best Practices is needed. This section is designed to provide guidance to municipalities that seek to enhance participation levels, recovery levels, and material quality levels, while yielding operational efficiencies in multi-family collection.

Key Benefits and Outcomes

By employing Best Practices in multi-family recycling, municipalities can obtain the following effectiveness benefits:

- Increased diversion from landfill
- Decreased contamination of materials
- Increased capture rates
- Increased participation in recycling

Programs can become more efficient due to the following factors:

- Collection of front-load bins or side-load carts at a single collection point are more cost-effective methods when compared to individual stops at each household for the equivalent number of units
- Front-load bins are more cost efficient than carts, carts more efficient than boxes
- Increased revenues from sale of recyclables captured
- Optimization of collection and processing systems due to increased tonnage

Description and Implementation of Best Practice

Ontario Regulation 103/94 requires the owner of a building that contains six or more dwelling units and is located within a municipality that has a population of at least 5,000 to implement a source separation program for the waste generated at the building.

Municipalities are required to collect recyclable materials from multi-family buildings only if the properties are receiving garbage collection services from the municipality. However, if garbage service is not provided by the municipality, all qualifying multi-family buildings are still required to recycle aluminium food or beverage cans, glass bottles and jars for food or beverages, newsprint, polyethylene terephthalate (PET) bottles for food or beverages, steel food or beverage cans, and any other categories of waste that are collected or accepted in the blue box program of the municipality

where the building is located. Despite this law being in place for over a decade, a recent E&E-funded Focus Group (see Sources and Links section) study revealed that most property managers were not aware of this Ontario government regulation.

Municipalities often regard multi-family buildings as being part of the commercial sector. Therefore, financial and operation information may not be reported under the WDO Datacall for the municipal Blue Box program. Municipalities who do not service the commercial sector may be unaware of the potential to include the multi-family sector in their residential Blue Box program as a possible cost-effective method of capturing large amounts of recyclables. Assuming the challenges associated with multi-family recycling are understood and addressed, the benefits of adding this sector to the municipal Blue Box program include increased diversion of materials from landfill, increased recycling tonnage, optimization of collection and processing systems, and increased revenues from the sale of the additional recycling materials captured.

It is recommended that municipalities identify all existing serviced and un-serviced multi-family buildings within their boundaries. For those currently not serviced, investigate the possibility of incorporating this sector with those residents served through the municipal Blue Box program. Factors to consider include whether some or all of the multi-family buildings could be absorbed into the existing curbside program or if a defined multi-family program would be warranted. The rationale will be affected by such things as the number, size, and location of the buildings, as well as the impact on the overall system to collect, process, and market the expected increased tonnage. For complexes that are currently being serviced under the municipal Blue Box program, it is important that the performance be measured and monitored.

Waste Composition Audits

It is recommended that periodic waste composition audits be conducted to assist with program planning, to determine generation rates and capture rates, and to obtain benchmark data used to compare performance over time. Stewardship Ontario has developed multi family waste audit worksheets, tips and, guidelines for waste sorting.

Generation and Capture Rates

Each multi-family household in a large urban area generates approximately 264 kg of recyclables per year (approximately 92 kg less than single family households), but less than 32% of this is captured. In comparison, approximately 60% of the available recyclables generated by single-family households are captured.

A contributing factor to the lower generation rate for both garbage and recyclable materials is that there are usually fewer occupants in each household. On average, there are 2 people per apartment unit, as opposed to 2.9 in a single family home.

Factors that adversely affect recycling at multi-family buildings include:

- Recycling is almost always less convenient than garbage disposal
- Insufficient recycling bin capacity
- Residents' sense of disconnect from recycling program, leading to sense of direct responsibility
- Anonymity limits repercussions for not recycling properly or at all
- Transience issues - apartments may be considered temporary accommodation
- Multi-cultural and socio-economic factors may affect recycling behaviour
- Multi-lingual issues may hinder understanding of the recycling program
- Opinion that maintenance fees cover waste management services
- Insufficient promotion and education of the program

Multi-family buildings exist in a variety of sizes, heights, and designs. Since the majority of multi-family recycling programs have been added to existing apartment developments that were not designed for recycling programs, there are often challenges with insufficient space, location, or collection system for recycling bins. In addition, multi-family buildings generally share common bins and have their garbage and recycling collected at a central collection point. Unless closely monitored, sharing common bins can contribute to the potential for misuse, causing contamination and premature topping out. However, given the high concentration of residents using common bins, there is a potential to cost-effectively capture large amounts of recyclables.

Design Requirements for New Developments and Re-Developments

Although some existing buildings may have less than optimal layouts for recycling programs, there is an opportunity to ensure that any new developments are designed to meet the individual municipality's recycling system requirements prior to approval. It is recommended that municipalities develop mandatory requirements for new or re-developed multi-family buildings to be designed to allow for integrated waste management practices.

The standards for these developments should work in harmony with each municipality's Waste Management Master Plan, and suit the collection system and processing operations accordingly. The design plans submitted by the developer should be reviewed by competent staff with the Solid Waste knowledge to assess the drawings to determine if the design requirements for garbage and recycling collection have been met.

If developers propose a change in collection points, method of collection, change of use, or an existing building being expanded by more than 1/3 its original size, the plans should also be reviewed by Solid Waste staff. Each site and building should be inspected prior to approval to ensure that the development has complied with all requirements for solid waste and recycling programs.

In order for multi-family buildings to qualify for the municipal garbage and recyclables collection services, it is recommended that municipalities only approve those new

developments or redevelopments that adhere to the appropriate design requirements. Requirements may stipulate an appropriate type, quantity, and location of the garbage and recycling bins to accommodate the volume of material expected to be generated by the number of residential units at the complex, assuming full participation in the municipal recycling program.

The application submitted to the municipality should include details regarding the number of dwelling units in the development, the total ground floor area, the number of stories, access routes, loading facilities, garbage rooms, recycling rooms, size and quantity of garbage and recycling containers to be used, and, if designed for a chute disposal system, the type and quantity of chutes for garbage and recycling.

The new or re-development should be designed to ensure that the recycling system is as convenient a system for the residents to use as the garbage system. For example, a chute system on each floor would have to receive both garbage and recyclables, either as one chute with mechanical baffles for residents to control the direction of the appropriate stream, or with individual chutes for garbage and each steam of recyclables. If no chute is provided, then there should be a central garbage and recycling facility on the ground floor.

Set a maximum allowable limit on un-compacted and compacted garbage. In the majority of municipalities, residents of multi-family buildings have no limits on the amount of garbage they are allowed to generate. In most cases, the recycling system was an "add on" to existing infrastructure, and therefore the disposal of garbage is almost always much more convenient than recycling. In addition, unlike at curbside set-out, there is anonymity with multi-family waste disposal. This limits the opportunity for peer pressure regarding the amount of garbage disposed or for not participating in the recycling program.

It is important to inform the management and residents of the maximum garbage limit. It is also important that collectors, whether municipal forces or contracted, understand and follow the garbage limit allowed for each location.

Set a minimum recovery threshold for recycling. It is recommended that sites fully participate in the municipal recycling program in order to be eligible to receive municipal garbage collection. It will be necessary to determine what quantity of recyclables should be used as a benchmark in order to be considered fully participating in the recycling program. This will depend largely on the frequency of collection, the amount of materials accepted in the program, and the collection system in which to base the measurement. For example, the City of Toronto has used the following benchmark: for every 100 units at a complex, a volume of 6 cubic yards (or 1212 US gallons) of recyclables should be captured per week as a minimum. The management and residents are informed of this minimum requirement. In many cases, once appropriate promotion and education activities are executed, the capture rate exceeds the minimum requirements.

Many programs require multi-family buildings to purchase the recycling bins at full or subsidized cost. A recent focus group study revealed that although superintendents

identified the need and repeatedly requested that their property management supply more recycling bins, this minimal investment request was refused. Unless the building was going to incur additional garbage charges for excess quantities, they did not see the financial benefit to their business. If there were maximum garbage limits and minimum recycling limits, they would be more likely to comply with obtaining the appropriate number of bins.

The feedback from the collector is crucial regarding compliance at the multi-family buildings. Buildings that are not meeting their minimum should be notified regarding their performance and offered guidance toward achieving a better capture rate in order to be eligible to receive municipal garbage collection.

There should not be a maximum limit placed on recycling. In some programs, a limit has been placed on the quantity of cardboard set out in the recycling carts. The operational problems created by big quantities of cardboard can be resolved by changing collection method, bin type, or increasing frequency rather than limiting the quantity accepted as recycling. On the first of the month, buildings are likely to have an increase in the amount of cardboard due to new residents unpacking. This should be taken into consideration when assessing the collection system and bin types. Setting a limit on recyclables will only resulting in the disposal of the material as garbage. If the quantity of recyclables is unmanageable within the current system, it may be necessary to reassess the bin size and type used at the site, and/or consider increasing the collection frequency to meet the need.

Type of Collection Bin

The type of collection bins is dependent on current operational practices for each municipal program, as well as the location and design of the multi-family building. The method of garbage collection may determine the method of recycling collection. For example, multi-family buildings receiving front-end bulk garbage would be an appropriate candidate to consider bulk recycling, as the layout is already conducive to this type of bins and collection vehicles.

Very small complexes that have less than 6 units, may distribute individual blue boxes for their residents to set at the curb for collection with the single family homes. However, depending on each program's recycling sort streams, and the extent of recycling materials accepted by the program, combined with the collection frequency offered through the municipal programs, each unit may require more than one box to sufficiently contain the recyclables between collections. This can create storage issues within the units, potential problems at the set out point, and an inefficient collection method at the complex.

Multi-family buildings or infill townhouse complexes that have a common collection point for up to 30 units should consider using 90 or 95 gallon (340-360 litre) roll-out carts that are compatible with the collection vehicles. Each recycling cart offers the equivalent volume of 6 to 8 curbside recycling boxes. The residents will not have the negative aspects associated with storing the material in their own units between collections, and the cart can be mechanically lifted and emptied more efficiently. The

carts should be stored in a location that is convenient for the residents to use (inside or sheltered from rain and snow), and, if different than the collection point, moved out for the day of collection only.

For complexes between 30 and 100 units either carts or front-end bulk bins can be effective, depending on the number of recycling streams in the program and the design of the complex. Programs offering single stream recycling may see a benefit by using front load recycling bins in this mid-size multi-family building category, as several carts can be replaced by one bulk bin, thereby reducing the number of carts and lifts required. For example, one 4-cubic yard (3-cubic m) bin could replace 9 carts containing the same materials. However, if the existing design is a sprawling infill townhouse complex, it may be more appropriate to have several recycling stations to enhance convenience, and have the carts brought to one or more central location points on collection day.

For complexes with 100 units or greater, front-load bulk bins should be considered the preferred choice to maximize both efficiency and effectiveness. If the bins are to be accessed directly by residents, it is recommended that the bins be modified to limit the opening to contain only the desired materials and thereby minimize opportunity for contamination. The top lid should be kept padlocked between collections, with only the building's maintenance staff responsible to open it daily to remove any contaminating items. On collection day, the top lid should be unlocked, contaminating items should have been removed, and the bin placed in position for collection.

Determine Suitable Recycling Bin Capacity

Bin capacity should be considered in relation to the number of residential units sharing the recycling containers, the number of sort streams required under the municipal program, and the degree of automation by the collection system.

As a guideline, the City of Toronto has used the bin capacity formula of a minimum of 6 cubic yards (4.6 cu m) recycling capacity for every 100 units collected weekly. This same volume converts to 1211.84 US gallons (4587 litres). Multi-family buildings using 90 or 95 US gallon recycling carts would, therefore, require a minimum of 13 carts for every 100 units.

Capacity considerations for individual communities, however, will be highly affected by the recycling program in place. For example, some semi-automated programs require the cardboard to be flattened and tied in bundles of specified dimensions beside the recycling carts. In this case, the collector could manually set the bundled cardboard in the hopper as he/she must get out of the truck anyway to connect the carts to be mechanically lifted. This method may reduce the number of carts required.

Automated systems are designed for all recycling materials to be contained in the carts, as the driver controls the lifting of the carts from inside of the vehicle. Although this is a convenient method of collection, considerably more carts may be

required. This is particularly the case with excess cardboard generated by new residents unpacking.

Frequency of Collection

Recyclables from multi-family buildings with 6 or more units, and that have a common collection point, should be collected weekly. In cases of existing structures that can demonstrate there is insufficient storage space to provide recycling bin capacity for weekly collection, more frequent collection of recyclables may be required to ensure maximum capture of recycling materials.

Storage and collection area

Recycling bins should be stored inside, where possible, provided that all building and fire codes are followed. This ensures better control over the proper use of the bins and minimizes opportunity for public contamination. The recycling room should be large enough to contain all the recycling bins to be used, be safe and clean for residents to access, permit easy movement of the bins, and allow for additional space for future program expansion.

In-unit storage and/or transfer containers

A mini Blue Box, basket or a reusable Blue Bag may contribute to a higher recovery rate, particularly when the box or bag has printed graphics to reinforce the items that are accepted in the recycling program. However, research has shown inconclusive results as to the long-term effects of these tools, partly due to the ongoing turnover of new residents.

Depending on an individual's recycling habits, such tools can be seen as a convenience or as a nuisance. Surveys have shown that often residents take their recycling to the bins on their way out to work, shopping, etc. They do not want to take the empty container with them nor have to come back to their unit with it. However, even if the mini Blue Box or Blue Bag is used only as storage within the unit, and not for transferring purposes, it can serve as an effective reminder that a program exists for the complex, and that certain items should be separated from the garbage.

Some programs recommend that residents transport the recyclables from their units to the bins in plastic bags and deposit the material loose into the appropriate bin. Although this can be promoted as the second "R" (Reuse), this method can pose a contamination problem in the recycling bin if residents do not understand the importance of depositing the material loose into the appropriate category. If plastic bags are not included in the municipal recycling program, it is imperative that there be a small clearly labelled waste receptacle beside the recycling bin instructing residents to deposit their empty plastic bags there.

Promotion and Education

Owners, Property Managers, and Superintendents: According to a recent focus group study, "superintendents in most of the study areas reported that they are

working mainly in isolation and without the help of the municipal waste management experts". (E&E Fund Project #199, pg 7)

Building staff need to be fully trained with regards to the responsibilities and requirements of the recycling program. Several programs have developed a "Handbook for Owners, Property Managers and Superintendents" to educate them regarding the responsibilities and to trouble-shoot problems with suggestions of how to resolve the issues. In addition, it also may be beneficial to offer a link to a website that allows owners and property managers to download literature regarding the program, as well as graphics or translated educational material for posting and distribution to the residents. A list of resources, including contact names and numbers, should be made available to the multi-family buildings to assist with concerns that may arise.

Written literature, however, cannot eliminate the need for face-to-face contact with the site staff. Site visits will be required to check on the bin contents, replace missing or outdated educational materials and faded bin labels, and offer guidance and support to the site staff. Depending on the specific building, there can be considerable rotation of site superintendents and property managers. Staff changes are usually not reported to the municipality and the new staff may not understand the program requirements that were explained to the previous staff.

Residents: As reported in focus groups and interviews "Residents are operating on the basis of habit, imitation and partial information". (E&E Fund Project #199, pg 3)

Appropriate literature is required in order to convey program information to residents. The most critical information that needs to be understood by residents is:

- What items are to be included in the recycling bins
- How the items are to be sorted or prepared (flatten cardboard, rinse out bottles)
- Where the recycling bins are located to deposit the items (if required to take the material to a designated location)

It is recommended that new residents be given a recycling package, shown the recycling location, and have the recycling program explained as part of their lease or agreement to live in the complex. Having a clause in the lease or agreement that states that recycling is mandatory can help to stimulate residents' participation in recycling.

It is important to know the demographics within the building to ensure the promotion and education materials and methods are applied appropriately.

Multi-lingual, multi-cultural, and socio-economic factors can affect the success of the recycling program if challenges are not acknowledged and addressed. If additional languages are required, it is recommended that recycling literature be translated as appropriate. These can be posted on a website for site staff to download and post or distribute as necessary.

In addition to distributing literature to each unit, it is recommended that recycling literature be posted in a common area(s) of the building in English, as well as in the other appropriate languages identified for the building. For durability, the postings can be contained in a protective case, or covered with plexi-glass or laminated. Common areas that may be suitable for the posting board include the lobby, mailbox room, laundry room, chute rooms, and recycling rooms. Having the recycling literature posted ensures that new residents have an opportunity to see the information, and offers repeated promotion and reinforcement of the program each time residents (or visitors) are exposed to the information. The use of pictures and other graphics to illustrate what can and cannot be recycled is recommended, particularly when residents speak multiple languages.

Collectors: It is important that the collectors, whether municipal forces or contracted, are adequately trained and fully understand their role in the multi-family recycling program. This includes understanding the acceptable recycling items, what constitutes contamination, the minimum amount of recycling material required at each site, and proper documentation.

It is recommended that collectors have a "problem sheet" for each collection day on which to record any issues with the site that would require follow up prior to the next collection day. These issues may include concerns such as contamination, bins not in the proper position for collection, bins not out, not meeting the minimum quantity to be considered fully participating, bin needing repair, etc. It should also state whether the recycling bin was emptied by the collector or not. The completed problem sheet should be submitted to Solid Waste staff for follow up at the end of each collection day.

Feedback

Site staff and residents need to hear how they are doing to stay motivated. Periodic communication with the site is recommended to update contact information, replenish resource materials, and offer guidance and support.

Training

To move beyond the feeling of disconnect and lack of responsibility for the recycling programs at multi-family buildings, it is imperative that key players that are directly involved with the recycling program (Property Managers, Superintendents, residents, and collectors) be adequately trained in all aspects of the program.

In the past, the City of Barrie offered an 8-hour Master Recycler course targeted at Property Managers, Superintendents and apartment residents who were committed to act as recycling champions within their buildings. The Master Recycler course was organized into four sessions:

- Day One: Introduction to Recycling
- Day Two: The MRF and Markets
- Day Three: Communications

- Day Four: Preparing to be Master Recyclers

The Master Recycler course participants were provided with information about the municipal recycling program as a whole, and how to communicate with multi-family residents to promote effective waste diversion through recycling. Upon successful completion of the 4 classes and a test, the participants were issued a Master Recycler Certificate. They became the on-site recycling contacts, educating new and existing residents, while promoting the program within their buildings. Subsequently, there were substantial improvements in the quality and quantity of the materials captured, and long-term benefits stemming from the Master Recycler course have been seen several years later. It is recommended that municipalities consider offering similar comprehensive training for key participants in the multi-family recycling program.

Sources and Links

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Best Practice Spotlight

Best Practices in the Use of Recycling Depots

Overview

Recycling depots offer a cost-effective alternative to curbside collection in small municipalities and serve as a supplemental channel for material overflow in larger communities. While this collection method is simpler to manage and operate than curbside collection, there are a number of challenges and barriers that prevent programs from achieving optimal performance. This section provides guidance on Best Practices that need to be employed across depot systems if performance improvements are to be achieved.

Key Benefits and Outcomes

By employing Best Practices in depot collection programs, municipalities can obtain the following effectiveness benefits:

- Improved diversion rates for communities that do not collect recyclables curbside, or smaller rural programs with lower volumes
- Increased tonnage of recyclables due to an available overflow channel for residents that have limited storage capacity
- Increased tonnage of recyclable materials not accepted at the curb, such as expanded polystyrene packing materials and film

Programs can become more efficient due to the following factors:

- Collection cost savings - communities that are large in area but sparsely populated can achieve cost savings by utilizing depots as an alternative to curbside collection
- Transportation cost savings - deposited material can be transferred with large roll off or other bulk carrier vehicles from fewer locations than if collected from every household in a municipality

Description and Implementation of Best Practice

Recycling Depots (depots) constitute an effective channel for municipalities to offer residents a location to bring their recyclables and help capture recyclable materials that would otherwise end up in the landfill. They are primarily used in small rural municipalities, where no curbside collection program exists.

Depots are also used in communities with high participation rates as an alternate option for residents. In these communities, the rationale for having a depot is to provide capacity for overflow materials between or in addition to curbside collections. Furthermore, depots are effective in municipalities with a high seasonal household percentage and in areas with small private roads where collection is difficult and costly. Depots in high participation municipalities can also provide for collection of

items not accepted at the curb, such as expanded polystyrene packing materials and film. Some materials that are too light or bulky make curbside collection difficult, as they are easily wind blown or take too much room in recycling containers. Designated drop off bins in recycling depots give residents an option to recycle these items. Large bulky or light materials separated at the recycling depot may sometimes be sent directly to end markets without any processing, provided quality control enforcement is available at the depot; however, transportation costs may be prohibitive if un-baled shipping weights are low.

Depots are a common tool for rural communities that are large in area but sparsely populated. They offer residents a place to bring recyclables where collection services would be very expensive compared to the amount of materials collected and where potential revenues generated from marketing recycling materials are low.

Depots are generally inexpensive to initiate, relative to curbside collection. The primary costs are the containers and transfer costs. Often municipalities contract out the rental of containers, complete with the delivery service to empty the containers at a processing facility or end markets. The other major costs are the labour to maintain the site, assist participating residents, and offer recycling program information. To contain costs, often municipalities use an existing municipally-owned location, such as a Transportation Works facility or a recycling depot set up at the municipally-owned landfill. Municipalities sometimes choose to open a depot without staff, however, this practice is not preferred as site maintenance and contamination control are made more difficult.

Key attributes of effective and efficient depot systems are:

- Situated in a safe and accessible location
- Convenient to use, ensuring smooth traffic flow
- Designed to limit the potential for contamination and illegal dumping by
    - employing trained and knowledgeable personnel
    - transferring/removing materials with adequate frequency
- Attractive and well-maintained
- Appropriate signage with clear instructions to residents
- Adequate promotion and education to enhance awareness of residents
- Robust record keeping processes
- Optimized container design and transportation system

Situated in a safe and accessible location

Proper planning is crucial in selecting a depot location. Depots situated on municipally-owned property constitute a good practice, as such arrangements facilitate proper oversight, regular maintenance, and improved risk management with respect to liabilities and hazardous materials. Accessibility to depots is high in locations visited frequently and regularly by area residents. These may include municipal community centres, sports arenas, or landfills.

Municipalities should determine the list of items that will be included in the recycling program by referring to Ontario Regulation 101 and by market availability. Materials beyond the regulated list should have sufficient and stable markets. Otherwise, excess items often become residue, thereby lowering the efficiency of the program.

Convenient to use, ensuring smooth traffic flow

In those municipalities where no curbside garbage collection is provided (residents bring household garbage to a municipal landfill), depots set up at landfills make it more convenient for residents to participate in the recycling program. (Those municipalities that do have a curbside garbage and recycling programs should also consider providing drop-off depots at the landfill or other strategic locations in the community to ensure sufficient capacity for overflow materials.) Depots located at landfills also help promote recycling of materials that could have ended up in the landfill. Most municipally-owned landfills are staffed; consequently, the addition of a recycling depot may be manageable utilizing the existing landfill staff. The staff are necessary to help encourage recycling and to reduce the potential for illegal dumping and contamination. Depots are best located where staff are available to oversee the site and report when bins are full.

Depots should be set up with an adequate number of containers, oriented in such a way as to minimize the effort associated with transferring materials from the car to the bin. This may be achieved by using a ramp or a higher platform for vehicular traffic. The number and capacity of containers will depend on the amount of materials collected at the depots and observed/desired resident participation rates (an estimate can be obtained through waste audits, which should be done at various times of the year to capture seasonal fluctuations). Depots should enable residents to drop off recyclables quickly and enhance their willingness to repeat the process in the future.

The site should be designed for safe operations by residents and employees. It should be of adequate size, allowing for good traffic flow. Effective flow of vehicular traffic is important, as convenience is diminished if residents need to wait in queue in order to reach the bins. Vehicles should generally drive in one direction, minimizing the need to back up. Ramp areas should have railing or other safety precautions as required.

Designed to limit the potential for contamination and illegal dumping

Depots that have been designed to limit the potential for contamination and illegal dumping contribute to the success of the program. Bins equipped with size-restricted openings help deter contamination. An example is an opening that allows flattened cardboard materials only. Flattening cardboard increases bin capacity and helps ensure boxes are emptied out prior to the transfer. Illegal dumping signs should be posted in the depot area citing municipal by-laws.

Illegal dumping is common at depots, but is often eliminated when depots are staffed and serviced with trained personnel. Employees can assist residents in placing recyclables into proper containers and provide general information about the

recycling program. Furthermore, employee dedication and program buy-in is critical to reducing contamination and illegal dumping issues. As a consequence, staff working at the depot should be fully trained and knowledgeable about the details of the entire municipal waste management program.

Depots without staff tend to have higher contamination and more illegal dumping of materials at gates, in front of, or around recycling bins. In some communities, un-staffed depots became so expensive and time-consuming to operate and maintain, that program managers chose to close the depot and start a curbside collection service. Thus, programs with un-staffed depots should develop a maintenance plan for the sites to ensure aesthetic and functional appeal. The assistance of enforcement staff may help educate and deter offenders.

Bins need to be emptied before overflowing. Overflowing bins create an impression that the municipality does not care to properly maintain the recycling program, which can negatively affect the attitude of the residents and their willingness to participate. Front-loader bins can be emptied on an appropriate schedule, driven by the required capacity. Carts and roll off bins are usually used when the depot is close to a processing facility and pick ups can be done more frequently. Appropriate front end containers, roll off bins with compaction or even highway transfer are used when the haul distances are substantial.

Attractive and well maintained

A depot that appears clean and orderly gives a positive perception to residents that the program is operating successfully. Paved areas that can be maintained during winter months help ensure that the site can be accessed by residents all year. If a depot is not paved, it should be graded to ensure water does not pond in the area and deter participation. Depot areas should be cleared of snow and sanded and/or salted, as required, in winter months; this practice also helps to minimize potential liabilities.

Any debris or non-recyclables should be removed promptly to keep the site appearance neat and tidy. If depots are not cleaned regularly they develop a poor reputation and residents may stop using the facility, often resulting in increased illegal dumping.

Appropriate signage with clear instructions to residents

Provisions should be made to display information in a manner that is understandable and heavily biased toward universally understood graphics, photos or displays of acceptable and unacceptable items. Depot signage should have large lettering that is clear and visible from a reasonable distance. The colours should be bright and complement the depot appearance. Standard graphics and symbols that are informative and easy to interpret should be used. The graphics and symbols should be consistent with the recycling program logos and font styles. Each bin should be clearly labelled to define the type of materials it can receive.

Large signs mounted near the depot entrance should indicate acceptable and unacceptable materials. Illegal dumping signs should also be posted at depots at various locations as required. For centres that are not visible from main roads, directional signs should be used to aid users in finding the depot.

The Knowledge Network contains a number of depot graphics and signage examples for download.

Provide adequate promotion and education to enhance awareness of residents

Residents need to become aware of the depot location and receive frequent reminders about the recycling program. A weather-proof information area at the site, with pamphlets available for residents to take away, can help in the promotion of the program.

Communities with high percentage of seasonal residents need to time their educational and promotional campaigns with the arrival of these seasonal residents. Some programs may choose to give a free blue box to residents for storing materials between depot drop-off trips.

Robust record keeping processes

It is important to accurately measure and record weights of materials collected at the depot. Regardless of the haul system used, materials should be weighed prior to tipping at the processing facility. These volumetrics allow for accurate Datacall submission and provide means to manage, evaluate, and fine-tune the program. Different materials should be weighed separately if materials are sorted into separate bins at the depot.

Optimized container design and transportation system

Municipal recycling program coordinators need to select an effective system of transporting recyclables to processing facilities or end-markets. Often waste audits and/or participation studies are needed to determine approximate material volumes on weekly, monthly, and seasonal basis. Once an expected material amount has been determined, container and transportation selections need to be considered.

Containers can range from 95-gallon carts, four- or six-yard closed bins that are material specific and require specialized haul trucks, four- or six-yard front loader bins, or roll-off containers ranging in size from 12 yard to 40 yards. Caution should be used before committing to the use of specialized haul trucks for non-standard bins, as there are limited options available in case of truck breakdown or other equipment failure. Specialized trucks are also likely to be unusable for other municipal operations, which will tend to increase overall waste management and recycling costs. For some municipalities, contracting the transportation of containers can help offset the capital investment start-up costs for purchasing the required vehicles.

Container selection will depend largely on processing capabilities (whether materials can be co-mingled for two-stream processing or single stream processing, or materials must be completely sorted). It will also depend on capital investment

funds available. Small programs may consider renting containers or contracting transportation services that include the provision of containers. Contractor availability and distance to processing facilities will also dictate the type of containers used. If a processing facility is nearby, smaller and/or standard containers, such as carts or roll off containers, may be more economical. In cases where long distance hauls are needed it is critical to incorporate compaction within the system to minimize transportation costs. This may be accomplished with the use of standard front end container that utilizes the truck compaction system where services are not available at the depot site. When services are available, roll off compactors with a ramp can be used. Where large volumes justify it, transfer trailers with or without compaction may be the best option.

Program managers should strive to maximize the use of containers to help ensure only full loads are picked up. Hauling full and densely packed containers will reduce transportation costs on a per unit basis. Depot staff should try to move materials around in the bin to help ensure all corners and other space is utilized. Staff can use loaders or hand tools to facilitate this process. It is not recommended, however, to ask residents or employees to enter the bins or try to move materials by hand due to the risk of injury.

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Best Practice Spotlight

Best Practices in Collection and Processing of Challenging Plastics

Overview

In an effort to increase waste diversion rates and remove non-biodegradable materials from the landfill, some Ontario municipalities are choosing to include auxiliary plastic materials in their Blue Box programs. Chief among these materials are Polyethylene (PE) film bags, polystyrene foam and containers, and oversized Polyethylene Terephthalate (PET) bottles. However, due to their physical properties, these plastics present a variety of challenges in collection and processing, hindering operational efficiencies and driving up the costs. This section is designed to provide guidance in making the choice to include these materials into the program and developing methods to recycle them in an effective and efficient manner. The handling of each material is described in detail below.

Key Benefits and Outcomes

By including challenging plastics to a recycling program, municipalities may experience the following benefits:

- Increased diversion from landfill
- Enhanced customer satisfaction levels

However, there are a number of drawbacks associated with collecting and processing these plastics:

- Extremely high cost per tonne
- Decreased operational efficiencies of trucks and processing facility
- Increased incidence of maintenance issues at the MRF
- Decreased storage space at the MRF
- Low marketing revenues due to limited markets

Section A: Best Practices in Handling PE Film

Up to 85 percent of the PE film generated by households is readily marketable, including grocery bags, retail shopping bags, newspaper sleeves, dry cleaning bags, and any other clean, dry bag marked with a #2 (HDPE) or #4 (LDPE) resin code. In Canada, rinsed HDPE milk pouches and outer bags, bread bags, sandwich bags and bulk food bags, diaper outer bags, frozen food bags, and over-wrap for toilet tissue and paper towels are defined as recyclable under market specifications. The films are mostly made of Low-Density Polyethylene (LDPE, #4), Linear Low Density Polyethylene (LLDPE, #4), and High-Density Polyethylene (HDPE, #2).

Other PE film pertinent facts include:

- Recyclable films in the residential waste stream comprise approximately 13% of the plastics. Recyclable PE household film comprises 85 percent of all

household films, offering an opportunity for increased recovery of household materials.

- Even in programs that don't ask for film and bags, this material has been known to approach four percent by weight of material at the MRF.
- Theoretical calculations have shown that one sorter can positively sort 28 kg per hour of household PE bags at a MRF, based on 70 bags per lb (4,325 bags per hour)
- A material recovery facility in California with an overall capacity of 200 tonnes per day reports a throughput of 30-40 tonnes per month of film, with 8 sorters spending at least some of their time picking bags.
- The value of the California facility's recovered film is low, at US $20 per ton, due to low quality. The California facility also reports that even with sorters handling the material, at least one hour per day is spent removing bags and film that have accumulated on the star screens.
- In Ontario, according to the CSR Online price sheet, PE film sells at $47 per tonne in March, 2007. The average price per tonne in 2006 was $137 per tonne and in 2005 reached a high of $148 per tonne averaged over the year.
- Collection of household bags and film is a challenge, with its high volume to weight ratio and potential to instantly become offensive litter if wind-borne.
- One study estimates the incremental gross cost of collecting and processing film at $900/tonne.

Collection

There are three mainstream methods of collecting PE film. Each of these is described in greater detail below:

- Retail drop-off collection
- Curbside collection, including single stream, two-stream, and blue bag
- Depot collection

Retail drop-off collection

Retail drop-off collection residents bringing plastic bags back to the point of purchase. With retail bag collection the costs are borne by the store and not the public recycling agency. However, frequently local recycling coordinators are not partners in establishing or operating these programs, leading to a lack of communication, gaps in public education, and no accountability for the materials collected. The following attributes can make a drop-off collection option a success:

- The recycling bin(s) provided must be accessible, clean, attractive, and serviced regularly
- Public education must be a priority, with various media as well as in-store displays used to communicate instructions on what and how to recycle at the store

- The material collected must be properly handled, processed and marketed to a reliable end use, and the public must be notified of this as part of the educational program.

The local community could provide collection bins and P&E, while the store covers the handling, processing and transportation costs to a processing center, either their own distribution center and facility or the local MRF.

Curbside collection: Two-stream scenario

In this scenario (mainly employed in US), residents deposit their various household bags and acceptable plastic films into one large plastic bag, and place it between the containers blue box and the fibres blue box or bundle. The lightweight bag must be wedged firmly in place to avoid being dislodged and windblown. The collection vehicle operator picks up this large bag, simultaneously registering that it is feather-light and squeezing it to ensure that no rigid objects are enclosed. If contamination seems evident, the bag is left.

These bags of bags are then placed in yet another plastic bag of a large size, approximately 60 gallons (227 litres), hanging in a convenient place on the truck body. Full bags are tied off and deposited in the newspaper or cardboard compartment of the truck.

Curbside collection: Single-stream scenario

In single-stream systems, aggressive public education campaigns are needed to ensure that residents again bag all their small bags and film products into one larger bag, and place this bag in their blue box or collection bag.

In programs that use an enclosed cart for single-stream collection, a practice not yet common in Ontario, residents should be educated not to deposit individual bags that can fall or blow out of the cart during the collection tip. Because of the commingling with all other materials, bags collected through single-stream programs may be more costly to retrieve and of lesser quality.

Curbside collection: Blue or clear bag scenario

The larger collection bag for the smaller bags could be a separate blue or clear bag, or another bag of bags could be stuffed into one blue/clear bag with the other materials. This separate blue/clear bag is then picked up and thrown in the truck with the rest of the bags, and possibly compacted. Again, the collection operator would check for light weight and the presence of rigid objects.

Depot collection

Several containers, such as 90-gallon roll carts, can be set up with PE liners for depot users to deposit bags and film. Large display signs can be set up adjacent to these containers illustrating the acceptable and non-acceptable materials for immediate, on-site instruction and reinforcement.

As needed, the site attendant can visit the collection containers and use a tool to compact the bags as much as possible in order to contain the largest number of bags before tying off and replacing the liner bag. These large, stuffed bags may then be stored in a covered dumpster or a compactor for later removal to the MRF.

Processing

The first point of capture for bags is the tip floor or a pre-sort station, before there is any potential for the bags to open and scatter individual bags. Sorters on each subsequent line should be trained to capture, bag, and then deposit any bags missed in the pre-sort into a storage bunker. Sorters may also be trained to de-bag any containers and fibres from plastic bags, but the recovery for recycling of these bags which may contain residual products is questionable.

The most efficient way of moving bags from both the tip floor and the sort lines into the storage bunker may be with a vacuum system. The vacuum system could load an overhead storage bin to save space, due to the light weight of the material. The vacuum system, or gravity, could also potentially load the material into the baler.

Automatic de-baggers that may be used in blue bag processing facilities could potentially also open the smaller bag inside that contains the accumulated household bags and scatter the smaller bags. Additionally, any blue bags that are stuffed full of smaller bags only must be directed away from the de-bagger and directly to the baler. Blue bags that held other recyclables may or may not be recyclable, depending on the market specification for blue film and the degree of moisture and contamination in these bags.

Baling film may be made easier and more frequent by adopting the "Sandwich Bale ™" pioneered by Wal-Mart stores. This is a bale with layers of film plastic alternating with layers of cardboard. When the bale is broken open, the film and OCC layers naturally and easily separate. However, a market must be found that will accept this type of bale, and then separate the materials for further processing (Ontario market availability for this products is unknown at this time).

Promotion and Education

Residents must be properly trained about the correct types of bags and films to include for recycling, the types that are prohibited, and the acceptable way to package the bags and film. Consistent and repetitive messages designed to motivate change toward specific behaviours and habits must be applied rigorously using any and all appropriate media channels.

The most important message is to "Bag the Bags". Additionally residents can be educated about "Tying the Knot" before stuffing bags into the larger bags.

Markets

The American Chemistry Council's recycled plastics markets database lists six companies in Ontario as buyers of post-consumer residential retail bags and other films. Additionally fourteen companies are listed as buyers of "post-consumer,

industrial, commercial, institutional" bags and film, which may indicate that they would purchase material collected in retail stores but not from MRFs. The largest end-use for this material is composite plastic lumber products. Large amounts of blue bags may reduce the quality and price of the material.

Ontario Communities Recycling Bags and Film

Fourteen communities in Ontario collect bags and film in their curbside programs (some of these at their depots as well). Ten of these municipalities instruct residents to place their bags and film inside one bag and tie it, then place this bag either in, or beside, their blue box (or equivalent) for containers (one community is single-stream but still uses blue boxes). Two communities instruct residents to place their bag in a second, gray box with fibre products. One single stream community instructs residents to place their bag inside their cart, and one blue bag community instructs residents to use a separate blue or clear bag for household bags and film.

Eight communities that collect bags and film allow the most of the materials in the complete EPIC list of grocery bags, retail shopping bags, newspaper sleeves, dry cleaning bags, rinsed HDPE milk pouches and outer bags, bread bags, sandwich bags and bulk food bags, diaper outer bags, frozen food bags, and over-wrap for toilet tissue and paper towels. Five communities restrict the list to grocery bags and/or shopping bags only.

Implementing PE film handling Best Practices

Retail drop-off collection is the desired approach for film recycling, because costs are shared by the retailer. Merchants have a business interest in providing recycling services on-site for their store brand bags, as well as competitors' bags, and residents would not have to make a special trip to recycle their bags. Active partnership by the municipal recycling coordinator is necessary to promote the program, build participation, and educate users. The preferred handling method is back-haul of the material to a retailer's distribution facility for baling. If a MRF must be used, the local recycling coordinator would be required to work with the facility to minimize material handling issues.

For communities that decline to use retail collection, or wish to supplement it with another method, depot collection is the next preferred method. Depots take advantage of the "free" labour and energy expended by residents in bringing this lightweight material to the location, as opposed to capture at every individual household. Site attendants, where they are used, can monitor for contamination and provide additional packaging and even compaction of the bags prior to delivery to the MRF. Adding bags to an existing depot would add very little incremental cost in terms of land, labour, and other factors.

For those communities that prefer to collect bags and films at curbside, the following practices should be followed:

- Emphasize public education, specifically the "Bag Your Bags" message

- Use a set-out method that minimizes opportunities for bags to become windblown litter
- Utilize vehicle operators to check for contamination and leave bags that are contaminated as an educational tool
- Combine large full bags with the fibre portion of the load in the truck to facilitate separation and removal at the MRF and to minimize bag breakage and contamination due to contact with broken, sharp-edged or wet recyclable containers.

For MRF processing of bags, effort should be made to remove bagged bags immediately after tipping or at a pre-sort station, before the bags can encounter MRF equipment. Handling of bags and contact with other recyclables should be minimized. In blue bag systems, care should be used with automatic bag breakers. Vacuum equipment may be an effective way of moving the material.

The highest value markets should be sought for the bags and film. To obtain these markets, producing high quality material must be a priority that begins with public education and continues throughout the handling and sorting process. Residents must be taught what to include and what is prohibited; operators must leave behind contaminated bags; contact with other materials at the MRF should be minimized. Markets should be consulted about the impact of recycling plastic bags in which other recyclables were mistakenly packaged by the residents and of recycling blue or clear collection bags (specifically, the impact of the blue bags should be assessed).

Ontario communities are already recycling bags and films through curbside and drop-off systems. If such programs are to be considered for widespread implementation in the province, more data should be gathered from these communities about the costs and operational impacts of such programs in order to accurately document best practices and to encourage continual improvement. Program costs should be justified in the overall recycling program budget, taking into consideration the community's waste reduction and recycling goals and how bag and film recycling helps them meet those goals.

Section B: Best Practices in Handling Polystyrene

Polystyrene resin is both effective and efficient in its original use – as packaging material. It is inexpensive to manufacture; therefore the costs of its original production and transportation are considered a reasonable trade-off for its many benefits. However, a cost-effective scheme for its post-use management is elusive because:

- It diffuses into society in its many uses, and bringing it back together in quantities large enough to process and market is challenging
- Its many shapes and forms render it difficult to efficiently package for transport, post-use

- The costs become larger as the product's quality is degraded; these costs can no longer be covered in the price

While polystyrene accounts for less than one percent of the municipal waste stream, at certain times of year, such as the holidays or consumer goods sales events, it becomes a significant and challenging component of the household-generated waste. In handling it, municipalities face a number of obstacles. Chief among them are:

- Polystyrene foam exhibits a very high volume to weight ratio, making economical transportation a challenge
- Polystyrene foam breaks easily when processed through MRF equipment, leading to contamination of marketed materials and affecting the cleanliness of the facility
- Polystyrene foam does not compress in the baling process, and may break into smaller pieces
- Foamed PS meat and produce trays have high potential of food contamination, possibly leading to sanitation issues at MRFs

Current Collection and Processing

According to the Canadian Polystyrene Recycling Association (CPRA), 11 Canadian municipalities are collecting polystyrene in their curbside programs, and another three are collecting through depot or special collection events only. However, some of these municipalities are located in other provinces, and at least six Ontario programs, which the CPRA does not list, are known to collect polystyrene. These communities all prohibit loose-fill polystyrene packaging ("popcorn" or "peanuts") in their programs.

Since the CPRA standards require baling, it is assumed that most of the foamed PS is baled. Some material from depot collection, if close to the CPRA plant, may be delivered loose.

Promotion and Education

There is no model for P&E for polystyrene products because each municipality's program reflects their unique collection and processing constraints, as shown by the following examples:

- The City of Kingston allows "Plastic/Styrofoam" containers in the blue box. Rigid and foamed plastic containers are allowed, but not loose fill packaging and protective foam must measure less than 36"x24"x8"
- The City of Peterborough allows rigid PS baked goods trays "marked #6 only" and foamed PS food containers (meat trays, egg cartons) in the blue box; however, foamed packing material is accepted only at drop-off
- The County of Wellington presumably allows rigid polystyrene packages in the blue box, as their guidelines are broad and do not use the resin identification code. However, Styrofoam is specifically prohibited

- Northumberland County collects foamed polystyrene "cushion" packaging at special collection events after the holiday season. Food packaging is prohibited. The material is accumulated in roll-off containers at drop-off depots. The County also accepts PS food containers in its curbside program as a component of "Plastic Jars, Bottles and Containers #1-7"

Markets

A polystyrene market currently exists in Ontario. CPRA, an 82,000 square-foot facility located in Peel Region (Mississauga), is designed specifically to recycle and sell polystyrene from the industrial, commercial and consumer waste streams. The plant capacity is about 5,000 tonnes per year. Polystyrene is recycled into office desktop accessories, nursery trays, automotive and hardware accessories, audio and video cassette cases, vacuum cleaner attachments and building products.

CPRA purchases two grades of polystyrene bales: Type A contains both rigid and foam PS and Type B contains only foam PS. Type A bales allow 10 percent contamination while Type B bales allow 15 percent contamination. The CSR Price Sheet shows that CPRA is currently paying 75 CDN$/tonne for material delivered to their facility. This price has not changed since 2001.

Implementation

Ontario is fortunate to have a major end-use processor for polystyrene accepting both foamed and rigid grades, either separated or mixed. For polystyrene, the constraints to recycling are issues related to handling and transportation, not markets.

Some municipalities in Ontario are recycling polystyrene, both the rigid and the foamed, at depots, at special collection events, and through curbside. However, a "model" program has not been identified, and very little is known about the handling issues, processing issues and costs of such programs

Communities that wish to add polystyrene to their recycling programs should begin with special collection events limited to foamed PS, tied to the holidays or periodic sales on consumer goods such as appliances and electronics. These events can be held at existing recycling depots, or, if arrangements can be made, in partnership with retailers selling these goods and possibly held at malls and shopping centres (similar to one method for collecting end-of-life electronics and possibly in tandem with such an event). The benefits of holding these events are:

- The public will provide the "free" transportation and sorting labour
- A container is not dedicated full-time at a depot while a sufficient quantity to process and ship is accumulated, with associated weather, storage space and contamination issues
- It may offer an opportunity for increased public awareness of the community recycling program. This is a way to keep costs under control yet still offer a service that many residents deem valuable.

Communities that wish to provide an ongoing polystyrene collection program for citizens should look first to depot collection. A separate collection container for foamed polystyrene would add only incremental costs to the depot operation; however, it would most likely need to be a covered container. Ongoing storage space would also be needed. The rigid polystyrene containers could be added to a "non-bottle rigid" plastic collection stream. Several marketing options exist for this material, including baling with the other rigid containers for export, or sorting to separate the HDPE, PET and PP then baling with the foamed PS. The advantage of collecting non-bottle rigid PS at depots is that the public could be trained to sort these from the plastic bottles by placing them in separate containers.

The next level of collection, if a community strongly desired to provide this service or if the collection at special events and depots proved impractical, would be curbside collection of polystyrene. Again, collecting the PS rigid containers mixed with other plastics would not be difficult at the curb, but market research would need to be conducted to determine the degree of MRF sorting needed. The foamed polystyrene would pose challenges in the areas of potential blowing litter, space in the collection truck, and then MRF storage and baling. Foamed loose-fill packaging, called "peanuts" or "popcorn" should be excluded due to serious litter concerns.

Regardless of the collection method chosen, communities need to calculate the transportation costs to the CPRA and determine if a polystyrene recycling program can fit into their overall budget, given the impact polystyrene has on their recovery rates and waste reduction goals.

Transportation and material storage will be the most costly elements of a polystyrene collection program. Food contamination could be costly in terms of downgrading marketed loads, and public education materials should stress that food containers must be rinsed before recycling.

Additional research is needed into the practices of communities currently collecting and processing polystyrene, to determine more specific details on operational issues, costs, and opportunities for improvement.

Section C: Best Practices in Handling Oversized PET Bottles

Large size PET water bottles, from 8 to 15 litres, are being marketed in Canada by at least two bottled water companies. These bottles, designed for home dispensing units, are displacing the 15 to 18 litre polycarbonate, multi-use water bottles captured by a deposit-return system. They are increasingly being found in the blue box program as residents correctly interpret them as being recyclable. These bottles are mandated to be recycled by Part 1 of Schedule 1 of Ontario Regulation 101/94 by virtue of the non-size specific definition of the PET beverage bottle.

Recycling oversized PET bottles is facilitated by:

- Their larger size. PET water bottles weigh up to 50 grams, capturing a significant amount of material in each handling step

- Packaging contents. Since they only package water, bottles are not contaminated by contents

However, these materials present some issues for program operators. These include:

- The large size of the bottles makes them a challenge to collect in traditional blue boxes, as they take up more space in the box and on the collection truck
- MRFs must remove these bottles early in the sorting process in the same step as removal of buckets and large contaminants
- Some MRFs may not have storage space for the additional bottle stream

Collection

These large size PET bottles take up one-third of the volume of a typical blue box, and a correspondingly large ratio of space in a single-stream or blue bag program. They also take up more space in the collection trucks. While scenarios about trucks making extra trips to MRFs solely because the large PET bottles have filled the compartments have been imagined, no evidence exists that this is a risk with the current market penetration. The impact of bottle size is less significant at depots, where containers are larger. For communities desiring to recover these bottles, an additional bin dedicated to these larger size containers could be provided. Distinguishing of these bottles by the public should be relatively easy.

Processing

The first point of capture for the large PET bottles is the tip floor, where they are pulled from the incoming container stream, much as buckets and large contaminants are removed. Virtually all of the PET bottles separated on the tip floor at Ontario MRFs are currently being discarded.

If the bottles are allowed to continue up the in-feed conveyor, in MRFs that have shaker screens for separating containers from fibre, these PET bottles end up in the fibre stream due to their size, weight and shape, and they are discarded there. In MRFs without screens, the bottles still may be too large to fit in the sorting chutes for the smaller PET bottles. Furthermore, most balers are capable of compressing these bottles, either in a mixed PET bale or as a specialty bale.

Installing a dedicated, PET bottle-only grinder at the point of first removal may be the most efficient processing method for these bottles. This alternative would require capital investment, operator training, Gaylord boxes for material storage, and a willing market.

Promotion and Education

It is unknown how many communities in Ontario are prohibiting these bottles and clearly stating the prohibition in their promotion/education material. Motivating residents to recycle these bottles, if such action is desirable, would most likely be relatively easy, as the bottles are unique and easily identified.

Markets

PET re-claimers may refuse to accept any large PET water bottles mixed with the other PET because their size makes them problematic. They are simply too big for the clearance between the high-speed conveyors and the automated bottle sorting units that most re-claimers utilize. The bottles have enough "memory" to spring back into a larger shape when de-baled. Even a few of these bottles can cause pile-ups on the sorting lines, which can happen very quickly and require line shut-down to clear.

If markets are willing to accept these bottles, most would prefer these bottles to be baled separately, but may accept these bales on the same truck with the other PET bales. Markets for ground material exist, but would have to agree to purchase material ground in a MRF.

If the bottles are made from a standard bottle resin with an intrinsic viscosity (I.V.) in the 8.4 range, and are made in a two-stage, injection-stretch blow moulded process, they are fully compatible with existing PET markets. Some bottles may be made from a higher-I.V. material in a one-stage process. There is concern that these bottles are not compatible in existing PET bottle markets.

Implementation

Virtually all communities in Ontario that receive these bottles for recycling are currently discarding them. Given the uncertainties, and the currently small market penetration of this product, the impact of disposal by the MRFs on the solid waste stream is not yet significant.

Currently much is unknown about the market penetration, recycling market demand, or resin composition of these 8 to 15-litre PET water bottles. PET markets have indicated publicly a desire for more recovered post-consumer PET of the current, typical composition; it is not known to what extent they would accept the larger bottles due to equipment constraints.

Communities wishing to recover these bottles, either through depot or curbside collection, should first find out whether the bottles sold in their region were all of the same resin composition. If they were, and the likelihood of this changing was small, the community would then seek markets for the material, either baled separately or ground. If markets were found, a system of handling the material to facilitate recovery at the appropriate point would be needed.

A retail store take-back program could be explored for these bottles, with the recovered bottles delivered to the MRF in large loads and handled, baled and marketed separately. For communities that choose to recycle these bottles curbside, a second blue box could be provided for residents.

Sources and Links

PE film

Recycled Products and Markets Databases, American Chemistry Council: http://www.plasticsresource.com/s_plasticsresource/sec.asp?TRACKID=&CID=86&DID=127

The Online Resource for Film Recovery in California: http://www.plasticbagrecycling.info/coord.php

Canadian Plastics Industry Association (CPIA), Environment and Plastics Industry Council (EPIC): *"Best Practices Guide for the Collection and Handling of Polyethylene Plastic Bags and Film in Municipal Curbside Recycling Programs"*.

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"It's in the Bag: The Direction of Residential Film Recycling", Patty Moore, Moore Recycling Associates and Kim Holmes, Plastics Recycling Update; *Plastics Recycling 2007*, February 13-14, Dallas, Texas.

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Polystyrene

EPIC Polystyrene Fact Sheet: http://www.cpia.ca/files/files/files_Fact_Sheet_on_Polystyrene.doc

CSR Online: The Price Sheet: http://www.csr.org/pdf/pricesheet/2007/03_2007ps.pdf

Fact Sheet: *"Polystyrene and the Environment"*, American Chemistry Council's Plastics Foodservice Packaging Group*:* http://www.polystyrene.org/environment/environment.html

Oversized PET Bottles

"Improving the Efficiency of the Blue Box Program", an AMO/AMRC Position Paper, July 2006: http://www.amrc.ca/policy/Improving