

Solid Waste Management Plan

Operational Services Division – Sanitation

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Executive Summary

“Waste generation is an indicator of an inefficient process and the needless depletion of valuable resources. Manitobans generate 900,000 tonnes of waste annually. The ability of local governments to continue to manage the quantities and types of waste now produced is in question. The hazardous nature of much of this waste increases the risk to the environment and human health. Manitoba’s resource recovery (recycling) efforts while more effective in some sectors than in others, are an inadequate response to the problem.” - Green Manitoba

In the past, the residents of the City of Brandon and the Province of Manitoba have generally not been required to scrutinize their waste generation and or handling practices. Positively, many residents have chosen education and participation in programming that benefits our community and environment. More and more, participation in responsible programming is being legislated to the municipalities, driving the need for participation by residents as a requirement rather than an option.

Within the City of Brandon there are a number of issues and factors that have and will impact the solid waste management system:

- As a community we have experienced some population growth. In conjunction with this growth, the need for processing of residential, commercial, industrial development (construction) waste has and will continue to increase.
- Eastview Landfill site licensing and legislative requirements associated with the operation of the site are scheduled for change in 2007. These requirements, aimed at increased environmental consciousness will impact costs of operation through increased regulatory, monitoring and reporting requirements.
- The current residential collection system is outdated and rapidly approaching the end of its lifecycle. The system requires a revamping / replacement that will service not only cost effective and efficient means of collection, but secondly will also support waste diversion in a true sense.
- Our waste diversion levels are far below provincial and federal levels. In order to prolong the life of our landfill, we need to be leaders in environmental stewardship and position the community to take advantage of Provincial recycling system reforms. In support of this, change is required with respect to the existing system.

In late 2006, as a result of the issues above, it was determined that an overall plan needed to be developed for the entire system. This plan is intended to direct the activities of the department over the next three years in meeting the challenges outlined above.

This plan outlines the current situation, municipally, provincially and federally as it relates to waste diversion and from that outlines a set of recommendations related to the recycling / garbage collection system, bylaws and fees, landfill operations and implementation. The plan includes an outline of various collection / recycling options



including costing and provides a recommendation and a proposed implementation schedule.

Introduction

The City of Brandon's Community Strategic Plan identified one of its desirable future statements to be; "Brandon will be a recognized leader in environmental stewardship." In order for our community to meet our desirable future, it will be necessary to not only look at the amount of green house gases we emit, or how we use our water but also in how much and what we dispose of in our grounds. Solid waste diversion is linked to clean and productive land. Diverting waste minimizes the land required for disposal sites for solid waste which in turn affects groundwater and soil conditions in our community. This impact can be reduced by diverting waste through recycling or reuse programs and by providing proper disposal techniques for waste that is harmful to our environment.

The City of Brandon in conjunction with the Province of Manitoba and a number of community groups and organizations has and continues to make significant shifts in the operation of both refuse collection, recycling efforts and landfill management all in an effort to become more environmentally conscious. The commissioning of the Materials Recovery Facility, Recycling Depot Collections, Household Hazardous Waste Days, the composting program and lined cell management are just a few examples of the changes that have been introduced within the last decade. The City of Brandon acknowledges the importance of acting as a leader of environmental stewardship by setting the example for responsible and effective waste management programs for the community and the industry. There are a number of decisions that we must make as a community as it relates to our garbage collection system, our recycling program and our commitment to environmental change as it relates to solid waste management.

Planning the overall future for solid waste management is difficult. With the advances in technology that are resulting from the more recent emphasis on the environment, new ways of recycling waste are being identified at an ever increasing rate. As the price of raw materials increase the economic viability of these processes is becoming more of a reality. For example if we simply look at oil, years ago no one would have thought that it would ever be economical to remove the oil from the tar sands, yet here they are today applying advanced technology and as such, doing what was said would never be done. The one thing that is clear is that we, as a community, need to seriously look at how we currently divert waste and position ourselves to be able to take advantage of these advancements in the future in order to protect our own local environment now and going forward.

This document is the first of a number of documents that will need to be developed over the next decade. This is a three year plan focused around positioning the community to increase diversion levels and to take full advantage of existing recycling programs. The short time frame for this planning is due to the rapid changes in technology and in



wanting to be able to continue to evaluate strategies as we go forward. It also allows us to ensure that the recommendations contained in this report can be effectively implemented.

This document will outline:

- current collection and recycling systems;
- fee structures and bylaws;
- perspective of the national and legislative trends;
- how we as a community are “measuring up”;
- identify a framework for going forward that will include recommendations, timeframes and financial impacts as they relate to solid waste management.

This framework has been developed to reinforce the following ten year goals:

- to meet or exceed the diversion rates of the best communities in the country;
- develop a system that is affordable and efficient;
- to extend the use of the existing landfill beyond 75 years;
- to contain all ground and water contamination to the landfill site.

This report outlines our existing practices, evaluates their effectiveness in meeting the goals outlined above and identifies future recommendations. These recommendations are a result of nearly a year of investigation and research that involved not only literature review and research, but visits to communities such as Regina, Winnipeg, Prince Albert, Saskatoon, and Toronto, as well as discussions with some of the industry leaders related to equipment, recycling, and technology in Canada and the United States.

Solid Waste Diversion in Manitoba

The Manitoba Government has stated that as a province we will be a leader in caring for our environment and in doing so, has established Manitoba's Green Strategic Framework as outlined below:

The vision: a greener and more prosperous Manitoba

The Manitoba government's strategic framework for a green, prosperous, growing province is a guide to how we will continue to approach preserving and protecting our environment, promoting the health and well-being of Manitoba families and stimulating and managing sustainable economic growth.

Seven priorities for a greener future

Since 1999, the Manitoba government's strategy has been to focus on the following seven priorities to promote a healthy environment and a sustainable, growing economy.



Acting on energy and climate change

We're addressing the most serious threat to our planet's future and taking advantage of Manitoba's unique energy situation for the benefit of all.

Protecting our water

We're taking significant steps to ensure safe drinking water and preserve and enhance Manitoba's system of lakes and rivers.

Protecting our natural areas

We're working hard to add to the greatly increased protection we have already introduced for our parks, protected areas and other important habitats.

Reducing waste and preventing pollution

We're making progress on recycling and reducing waste in communities across Manitoba.

Growing a sustainable, prosperous economy

We're working with the private sector to grow the economy in sustainable ways - through innovation and adaptation.

Fostering a green and healthy society

We're promoting greater awareness about everyone's responsibility to preserve and protect the environment and how it's tied to the health and well-being of Manitoba families.

Greening the provincial government

We're leading by example by ensuring the government runs its internal operations in a green, sustainable, innovative way.

In keeping with this strategic framework, there have been a number of initiatives that have occurred in the last couple of years that directly impact solid waste management and emphasize the role of the Province:

- Green Manitoba, an agency of the Government of Manitoba, was established to deliver programs to foster environmental innovation and community development. This includes community-based approaches to promote waste reduction and the efficient use of water and energy. Green Manitoba is being poised to guide the process in working in co-operation with Manitoba Conservation, industry stewards, municipalities, environmental non-government organizations (ENGOS) and consumer groups to implement revised product stewardship programs for the priority material areas.
- The Province of Manitoba has redefined operational requirements for all Landfills – establishing significant increased requirements for planning, monitoring, reporting and documentation of process and development.



Due to the nature of lower population density and large expanses of land available within the prairies, the issue of waste diversion and the environment often does not receive the sense of urgency that it receives in large centers of high population density within the country. The Province of Manitoba has yet to recognize or face the issues that Nova Scotia, Ontario and British Columbia have in the management of volumes of waste generated within their borders. In these areas while the practice of trucking unwanted materials to other jurisdictions for “burying” in an “out of sight, out of mind” fashion was at one point in time a solution, it is no longer the case as municipalities are now recognizing the environmental impact to their own communities in taking on someone else’s waste. As a result municipalities are expending significant resources in the areas of education, training, collection and processing systems, and new programming aimed at waste minimization or diversion across the country.

In 1989 the Manitoba Government, through the Canadian Council Ministers of the Environment (CCME), joined the other provinces in a commitment to cut solid waste in half over a ten year period. In 1990, the province passed the Waste Reduction and Pollution Prevention Act (WRAPP) to provide legislative authority and the ability to use a range of options to address solid waste reduction. At that time, an aggressive plan of 50% reduction in waste on a per capita basis by the year 2000 was supported. The strategy was developed by a multi-stakeholder Waste Reduction Action Committee (WRAC), and set the vision for waste reduction for years to come. The strategy was based on the concept of distributor responsibility, and in 1993 efforts focused on the development of a multi-material product stewardship program. This initiative had Manitoba businesses and municipalities share the cost of recycling materials collected through the municipal systems. This model remains today as the Manitoba Product Stewardship Program, funding municipalities on a per tonne basis for the collection of eligible materials.

Manitoba Product Stewardship Supported Recycling

In Manitoba, the cost of recycling programs is funded through local municipal government, through the funds received from the sale of recycled goods, and currently, through the Manitoba Product Stewardship Corporation (MPSC). MPSC is “an independent, non-profit organization representing the interest of all sectors of Manitoba, including consumers, industry, municipalities and government”. MPSC operates at “arm’s length” from the provincial government, and is currently funded solely by the two cent levy on all beverage containers (excluding dairy) sold in Manitoba. It was established to provide a stable, long-term source of funding to Manitoba municipal and local governments for the development and maintenance of household recycling programs.

Municipalities can determine whether or not they want to enter into the program, but in order to be eligible for MPSC funding at a minimum they must collect newspapers including flyers, aluminum food and beverage containers, glass food and beverage containers, steel food and beverage containers and PET (#1 plastic) bottles. Other



optional materials they can collect are telephone directories, magazines and catalogues, boxboard (non-corrugated), residential corrugated cardboard, aseptic containers (“juice” boxes), gable top beverage cartons, HDPE (#2 plastic) containers, and #4, #5, and #7 plastics.

Annually an audit of recycling operations is conducted under the MPSC program in order to determine the level of funding that will be received. This audit is conducted by an independent auditor who reviews diversion levels, the applicable costs of program (advertising, equipment, etc.) and assesses the rate at which a community will be funded for the upcoming year on a per tonne basis. Funding rates are calculated through a three step process:

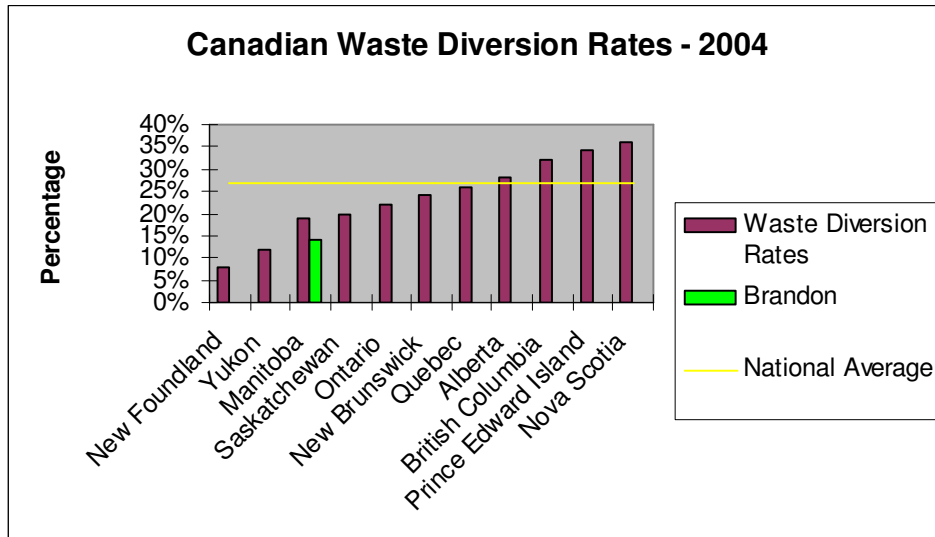
- Municipalities are grouped according to their populations into five categories. (Previously MPSC used 2 categories – “Winnipeg” and “outside Winnipeg”)
 - City of Winnipeg
 - City of Brandon
 - Municipalities with populations between 5,001 – 15,000
 - Municipalities with populations between 1,001 – 5,000
 - Municipalities with populations below 1,000;
- For each municipality in the category, MPSC calculates their average recycling program costs from the last three years (as outlined above);
- Benchmarks are established for each category based on the principle that MPSC will pay “up to 80% of the cost of efficient recycling programs”. It is important to note that while MPSC’s target is to pay for 80% of the cost of the recycling program, the reason that they benchmark these programs is to determine whether or not the municipality is running an “efficient” operation.

In MPSC’s initial operating years, they generated a surplus of funds from the two cent levy, but as communities have come on board, the balance has shifted to the point that the model is no longer sustainable. As will be discussed further in this report, a number of provinces have moved to an “extended producer” arrangement where producers in fact pay for the disposal or return of packaging. Manitoba, through Green Manitoba has been working towards this model. At this point it is unclear how the change to the current MPSC model will impact the funding to municipalities for recycling.

Measuring Up

In 2000 in an effort to evaluate the effectiveness of the WRAPP Act, the Province of Manitoba commissioned Earthbound Environmental to complete a review of province wide landfill diversion rates comparing that of 1990. Out of this study, the average waste generated per capita in the province was 250 kilograms per year. Brandon ranked second last in the province by generating 396 kilograms per year per person or 37% over the provincial average. The national average for residential waste generation is 383 kilograms per year per person or approximately 30 green garbage bags annually. From a waste generation side, the City of Brandon while high for the province appears to be in line with the country averages.





On the other side of this equation when we look at diversion rates, Manitoba does not perform well as compared to other provinces. For this report, diversion refers to how well we are able to deflect garbage from the tipping face. Diversion can take place through reuse, recycling, alternate treatment programs, etc. In 2004, the province diverted 19% of garbage, while Brandon only diverted 14%. We can see by this study in comparison to other provinces and cities, we have a considerable way to go if we hope to meet the diversion rates of the best communities in the country.

Household Hazardous Waste (HHW) Generation in Manitoba

Samples of waste in Winnipeg and rural areas in 2000 indicated there was 1,776 tonnes of HHW in the residential waste stream in Manitoba. This represented less than one percent of the 279,994 tonnes of residential waste generated in Manitoba that year. While this may seem like a minor amount, even a small amount of hazardous waste can cause considerable damage. For example, just one litre of used oil can contaminate 1,000,000 litres of water.



Estimate of Annual HHW Generation in Manitoba in 2000

	Rural		Winnipeg		Total	
	Tonnes	%	Tonnes	%	Tonnes	%
Batteries	226	35.3	279	24.6	506	28.5
Medicine	74	11.5	37	3.2	110	6.2
Flourescent Tubes	33	5.1	75	6.6	107	6.0
Used Oil & Filters	45	7.1	142	12.5	187	10.5
Paint	54	8.4	395	34.8	449	25.3
Solvents	63	9.8	207	18.3	270	15.2
Other HHW	146	22.8	0	0	146	8.2
Total HHW	641		1135		1776	
% of Residential Waste		.52		.73		.63

Notes:

1. MARRC, the Manitoba Used Oil program, is now much more mature than in 2000 and it is anticipated that the volume of used oil and filters in the residential waste stream is less than in 2000.

Currently in Manitoba there are two different systems for collecting household hazardous waste. In Winnipeg, a depot has been set up that operates from 9:00am to 4:00pm on the first and last Saturday of each month from April to November and then the first Saturday of the month from December to March. In the case of rural Manitoba (in which Brandon is considered), there are collection days setup in communities generally in the spring and fall of each year. The transportation and disposal cost of the chemicals collected is funded through Manitoba Conservation (Green Manitoba).

Studies show that households in Manitoba threw 1,776 tonnes of HHW into landfill sites in 2000. These products are safe to use in our houses and fill important needs, however our waste disposal system is not designed to accommodate the higher level of risks associated with their disposal. Manitoba Conservation spent \$435,000 supporting collection events throughout the province in the year 2000 and \$740,000 in 2005/2006, however demand for the service is much higher than available budget will support. Several groups, such as the Association of Manitoba Municipalities, the Regional Waste Management Task Force and environmental groups, along with many citizens have asked for a larger program with improved service.

Extended Producer Responsibility

As mentioned earlier, the existing product stewardship model is not financially sustainable. The challenge in trying to repair this existing system is in determining how fees are collected to fund the program. The program is funded through a levy on drink containers and while these containers do make up a significant portion of recyclable



materials, the levy on those products in fact funds the recycling costs of other products such as newspaper, cardboard, tin cans, plastic containers, etc. To increase the levy on drink containers, in order to increase the revenue for the program, would place a large burden on this specific market and does not encourage environmental responsibility for those producers of the other products. As a result, the Manitoba Government along with a number of other provinces and countries have and are now looking at extended producer responsibility programs to fund recycling programs.

Extended Producer Responsibility (EPR) is a strategy designed to promote the integration of environmental costs associated with products throughout their life cycles into the market price of the products. This means that firms, which manufacture, import and / or sell products and packaging, are required to be financially or physically responsible for such products after their useful life. They must either take back spent product's and manage them through reuse, recycling or in energy production, or delegate their responsibility to a third party, a so called producer responsibility organization, which is paid by the producer for spent product management. In this way, EPR shifts responsibility for waste from government to private industry, obliging producers, importers and / or sellers to internalize waste management costs in their product prices. A life-cycle perspective is taken in ERP frameworks: "Producers of products should bear a significant degree of responsibility (physical and / or financial) not only for the environmental impacts of their products downstream from the treatment and disposal of their product but also for their upstream activities inherent in the selection of materials and in the design of products" (Organization for Economic Co-operation and Development 2001, p, 21-22). The major impetus for EPR came from northern European countries in the late 1980s and early 1990s, as they were facing severe landfill shortages.

The best example of this type of program is related to the selling of beer. Every time a consumer purchases beer whether in glass bottles or cans the cost of the container is included in the selling price. Once you return the container you are reimbursed a deposit and then the containers are reused. The cost of reusing the bottles is contained in the price the consumer pays for the product initially and as such, most consumers are not aware they are paying for the recycling. The entire distribution system and production system is based on getting the containers back and as a result the recovery in this type of system is over 80%. Some leading private sector companies in the manufacturing sector, for example Xerox, Sony, Electrolux and HP, who see business value in recovering their products at the end of their life have established these types of programs in various countries around the world.

Green Manitoba has identified four priority areas for application of this type of program:

- Tires;
- Multi-material Recycling (Blue Box Recycling Materials);
- Household Hazardous Waste;
- Waste Electronics.



There have been a number of stakeholder meetings that have taken place over the past few years, and according to Green Manitoba, the legislation should be presented shortly to support these programs. To give an example of this type of change, we need only look at the history of Tire Stewardship:

In 1992 the Province of Manitoba began collecting a levy of \$3.00 on the sale of all tires within the province. On March 6, 1995 the Tire Stewardship Board was established to manage the program. The basic premise behind the establishment of the Tire Stewardship Program, and others like it, was to take the cost of managing certain waste materials from the municipal tax base to the users and producers of these end products.

From the \$3.00 levy that began in 1992 municipalities received \$0.50 per tire. This provided them with a way to recover some (not all) of the costs associated with recovering, hauling and storing tires at the landfill site. Revenue generated from the levy for example for the City of Brandon was:

- 2002 - \$1,792
- 2003 - \$1,903
- 2004 - \$1,950
- 2005 - \$445
- 2006 - \$0

In June of 2005 the portion of the levy forwarded to the municipalities was discontinued and the Tire Stewardship Board was also replaced by an interim board in July of 2005. After consultation within industry, a new organization was established to lead the process of designing and implementing a more sustainable approach to handling this waste product. On November 14, 2006 the new Tire Stewardship Regulation, 2006 was enacted under the Waste Reduction and Prevention Act (WRAPP) to help develop a new plan and approach to used tire management. The new Regulation is designed to achieve the following objectives:

- increase industry steward responsibility for program design and performance;
- resolve the financial challenge confronting the Manitoba Tire Stewardship Board;
- provide more flexibility for stewards to match program revenues with expenditures;
- reduce government involvement in program management by eliminating the government designated Tire Stewardship Board and levies and by providing greater stakeholder involvement and oversight.

This new organization called Tire Stewardship Manitoba will focus on creating a financial model that will allow processors a better opportunity to develop markets for the end products and for the development of new products. A new financial



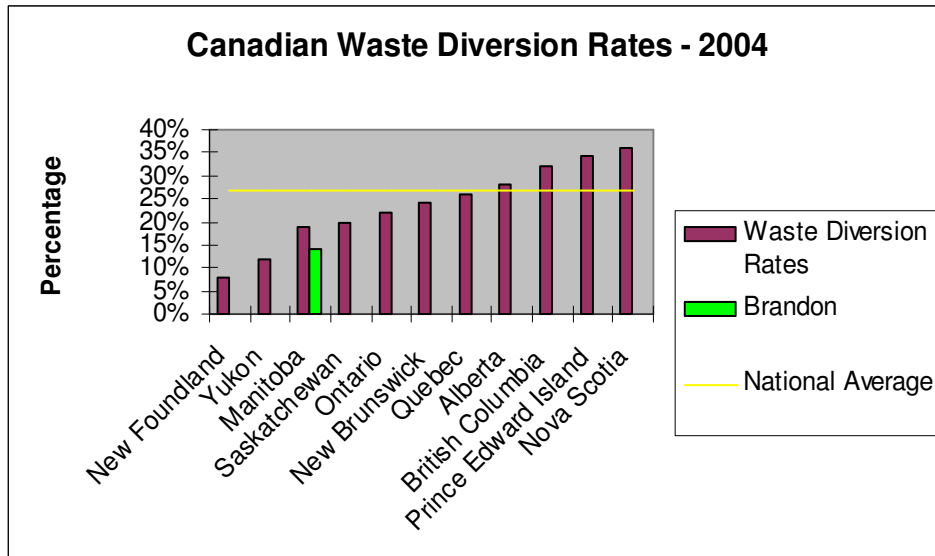
model will include a levy that will take into consideration all types of tires and not just the smaller passenger tires. Within the new financial model being developed, TSM is looking to reinstate payments to municipalities for temporarily storing scrap tires on site before they are collected for processing. With this in place municipalities will receive payment for all types of tires and not just the smaller passenger tires that were in the old program. This new model should make the new program more sustainable and allow municipalities with a way to remove larger tractor tires from their landfills. At some landfills these larger tires are being stockpiled on site with no way to dispose of them.

National Waste Diversion

In 2004, waste diversion averaged 27% in Canada, with a significant gap between the top and bottom provinces. In looking to the most successful provinces, the higher diversion rates have typically been accompanied by provincial mandates of extended producer responsibility/stewardship legislation and / or waste regulations including landfill bans. These have been driven as a result of various influences such as population density, public and political desire to support environmental initiatives, or simply the inability to deal with the volume of waste generated in the province. For example, the Province of Ontario imposed legislation that mandated municipalities, over 5,000 residents or those who had existing curbside pickup with under 5,000 residents, to implement blue box collection programs in 2002 aimed at waste diversion as a result of the lack of ability to manage ever increasing waste levels. This legislation became even more critical in March 2007, when Michigan passed legislation banning Canadian waste from state landfills meaning now Ontario waste would either need to be trucked further or handled within the province. The Minister of the Environment in Ontario has now declared a target of 60% diversion and is considering landfill bans in order to continue to reduce the amount waste going to landfill. Solid waste management has become a very expensive issue in Ontario and therefore legislation has been used to help support the need to change in order to keep costs manageable over the long term.

The following chart highlights provincial averages as published by Stats Canada in 2004. Manitoba ranks seventh in terms of diversion, ahead of only the Yukon and Newfoundland. The City of Brandon, at this same time, diverted approximately 14% of residential waste. Similar to this, Manitoba ranked as seventh in comparison to other provinces in terms of percentage of residences with access to recycling programs in 2006 according to Statistics Canada.





Nova Scotia, Prince Edward Island, British Columbia, and more recently Ontario are the top waste diverting provinces and they share many program similarities, which generally speaking, provide easy access to recycling and composting programs to nearly all residents resulting in high participation levels.

Nova Scotia has become a world leader at diverting valuable materials from disposal. The province has accomplished the following in support of waste diversion:

- 99% of residents have access to a curb side collection of recyclable and compostable material;
- They have implemented landfill bans on the disposal of beverage containers, corrugated cardboard, newsprint, scrap tires, used oil, lead-acid batteries, waste paint, automotive antifreeze, glass food containers, steel/tin cans, selected plastics and compostable organic materials. These materials must be recaptured for re-use or recycle and are not permitted to go to the landfill or fines are issued;
- They have expanded the deposit/refund system on beer and liquor bottles to include all beverage containers with the exception of milk. Milk containers are recycled through province-wide collection programs;
- They have legislated the operators of convenience stores, vending and fast food outlets, as well as organizers of public and private events, to provide receptacles for both litter and recyclables.



With this model, Nova Scotia established that via stewardship, landfill material bans / regulations and the establishment of resource recovery programming within the province's borders, waste diversion could not only increase, but offer new employment and economic spin off. Nova Scotia's solid waste management system saves at least \$31 million a year, or \$33 for every Nova Scotian compared to the old landfill system, according to a new study released by General Progress Index (GPI) Atlantic in July 2004.

Avenues to Waste Diversion

There are a number of different avenues that the most successful provinces have employed to achieve the results that they have. The following list establishes the most prevalent programming within these leading communities:

Type of Approach	Examples
Economic Instruments - EPR	Special Taxes Product charges Advance disposal fees Deposit/refunds schemes Subsidies and tax credits for production and use of environmentally preferable products
Regulatory Approaches	Prohibition of certain hazardous materials or products Disposal bans Mandated Recycling
Voluntary Industry Practices	Voluntary codes of practice Public/private partnerships Leasing and "servicing" (in which companies as diverse as photocopy manufacturers to carpet manufacturers lease their products or provider services, thereby retaining ownership of the product, including responsibility for its end-of-life disposal)
Product take-back programs	Mandatory take-back Voluntary or negotiated take-back programs
Procurement/consumer programs	Procurement guidelines and policies Information disclosure programs



To give a better idea of how each of these types of approaches has been applied, the following is a brief outline of Extended Producer Responsibility, Regulatory Approaches, and Voluntary Industry Practices:

Extended Producer Responsibility / Stewardship

As outlined before, Extended Producer Responsibility (EPR) programs "are all characterized by the continued involvement of producers and/or distributors with commercial goods at the post-consumer stage. EPR extends the traditional environmental responsibilities that producers and distributors have previously been assigned (i.e. worker safety, prevention and treatment of environmental releases from production, financial and legal responsibility for the sound management of production wastes) to include management at the post-consumer stage."

Simply put, in EPR programming producers are held responsible for the waste streams created as a result of their products, as well as life cycle management of their products. This programming requires the producers to be financially responsible for the elimination of unnecessary waste and or re-use of materials as a first priority. As a secondary focus they look at the collection, transportation and transformation of raw recyclable goods into new materials though this still inherently impacts our environment.

In its May, 1996 *Guiding Principles for Packaging Stewardship*, the Canadian Council of Ministers of the Environment (CCME) stated that "packaging stewardship is a concept by which industry, governments and consumers assume greater responsibility for ensuring the manufacture, use, reuse, recycling and disposal of packaging has a minimum impact on the environment." This statement introduces two of the key elements of the concept of stewardship:

- concern about environmental impacts throughout a product's lifecycle; and
- the assumption of responsibility for those impacts by various actors other than – or in addition to – the party who has physical control of the product at any given point in time.

Provinces have worked towards the operation of various stewardship programs within and across their borders. These stewardship programs range in terms of complexity and success. The most successful steward programs involve that of a deposit / return program, whereby across the nation these programs have achieved in excess of 80% return rates. In British Columbia, they have had a deposit / return program for soft drink and beer containers since the Litter Act was introduced in 1970. Over time the beverage industry introduced a range of products and containers not envisioned in the Litter Act, so in October 1997, in response to municipal government concerns about the cost of recycling and disposing of beverage containers, they enacted the Beverage Container Stewardship Program Regulation (1997) which replaced the outdated Litter Act. Within two years of the program expansion, containers for wine, spirits, water, juice and new-age beverages containers were included, the following recovery rates were reported:

- non-alcoholic beverages: 75% (this includes the recovery of aseptic / polycoat containers which had been in the system only three months)



- wine / spirits: 85%
- beer: 95%

The industry-designed program was cost-effective enough to have Encorp Pacific Inc. report an operating surplus of \$5 million in 2000.

A second type of stewardship program involves that of non deposit recyclable or hazardous material program. As stated earlier, the basic premise of stewardship programming provides funding for dealing with post life goods, and / or delegates the need to reduce, re-use and or recycle materials. In Nova Scotia, consumers can return leftover paint to any of the province's ENVIRO-DEPOTS at no charge. Paint products collected from ENVIRO-DEPOTS are sorted and processed at a facility in Springhill, Nova Scotia. Unused paint is recycled into new usable paint that meets industry standards. ENVIRO-DEPOTS will accept latex and oil-based paints including aerosols, as well as stains and varnishes. The salvaged paint collected in this program amounted to 302,000 litres in 2005, up from 259,000 litres in 2004.

A second example of non deposit programming is The Resource Recovery Fund Board (RRFB) appointed by the Nova Scotia Ministry of Environment and Labor to oversee and run the Used Tire Management Program. When a new tire is purchased in Nova Scotia, a one-time environmental fee is applied at the point of sale. Retailers submit the fee to RRFB to support the costs of collecting and recycling the tires. RRFB then uses the levies as an incentive for the collection, shredding, crumbing and manufacturing of value-added products. According to the RRFB, by 2000, the program had managed to collect 300,000 tires from stockpiles and about 80% of the newly generated tires. By 2004, RRFB Nova Scotia has diverted more than 6.3 million tires from landfills. Every year over 900,000 used tires are collected from tire retailers across Nova Scotia for recycling into useful new products. In 2004 the tire recovery rate was 82.17%.



In an effort to understand EPR programs and to provide a comparison of the provinces across the country the following chart highlights available stewardship programs.

	Container Deposits			EPR/Product Stewardship										National Voluntary	
	Beer	Soft drink	Liquor	Packaging	Printed Papers	Lubricating Oil	Paint	Other HHW	Pharmaceuticals	Electronics	Sharps	Tires	Ozone Depleting Substances	Rechargeable Batteries	
Nova Scotia	✓	✓	✓			✓	✓			✓		✓	✓	✓	
British Columbia	✓	✓	✓			✓	✓	FP	✓	✓		✓	✓	✓	
PEI	✓	✓	✓			✓						✓	✓	✓	
Alberta	✓	✓	✓			✓				✓		✓	✓	✓	
Quebec	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	
New Brunswick	✓	✓	✓			✓						✓	✓	✓	
Ontario	✓		✓	✓	✓		D	D	D				✓	✓	
Saskatchewan	✓	✓	✓			✓	✓			✓		✓	✓	✓	
Manitoba	✓	\$	∅	D	D	✓	D	D	D	D	D	✓	✓	✓	
Newfoundland	✓	✓	✓			✓						✓	✓	✓	

√ Program in place

\$ 2 Cent levy – no deposit

∂ Environment Tax – 10 cents/container

D Draft Legislation FP Flammables and Pesticides

The Province of Manitoba is currently working towards the further development of stewardship programs across industry, as indicated above via draft legislation notations. At current, Manitoba Product Stewardship offers payment to Municipalities for the collection, handling and marketing of residential recyclable materials as discussed in the previous section.

In the leading solid waste diverting provinces, responsibility for stewardship financing extends directly to the producer, or company that introduces the product into the province. These responsibilities span nearly all recyclable or hazardous materials specifically resulting in funding of programs and facilities that process materials. The Province of British Columbia has intricately designed its system to ensure costs are recovered by the producer based on volumes produced and amount of processing required. In addition, the provincial legislation for stewardship programs mandates a required recovery rate of materials at 75%.



These programs offer greater funding in comparison to Manitoba towards the operation and sustaining of programs. Currently, funding in Manitoba via the two cent levy on non dairy beverage containers is stretched across multiple materials and programs applying responsibility for all materials via a single market. To concrete this example, within Nova Scotia's Milk Packaging Stewardship program, municipalities are paid based on the gross cost of recycling cartons and jugs, not the net costs. Gross costs are based on the costs of the entire curbside basket of goods per tonne, multiplied by 3%, which represents the weight of the cartons and jugs in the stream. During the first year of the program's establishment, municipalities were paid \$303 per tonne of cartons and jugs recycled. In the second year, municipalities received \$326 per tonne of material, and in 2004 and 2005, this figure rose to \$380 per tonne. Municipalities are also able to keep the revenue generated from the sale of materials. As mentioned previously, the Manitoba system of product stewardship pays the City of Brandon \$128 per tonne for all "blue bin" type recyclables; there is no differentiation between product types. While this appears to represent a significant difference in systems, it is important to note that the \$380 per tonne may not be indicative of all of their recycled goods, some pay more and some may pay less.

As indicated in the chart above, Green Manitoba is poised to deliver new legislation with respect to other recyclable and / or hazardous materials. For example, the Packaging and Printed Paper Stewardship Legislation is pending cabinet approval in late 2007, with other draft legislation slated to follow. As these programs develop, municipalities in Manitoba will come under increased pressure to compliment this legislation with appropriate regulation, collection and handling programs. In following the leading models established in provinces such as Nova Scotia, British Columbia and Prince Edward Island it would be reasonable to believe as stewardship legislation develops in Manitoba the burden and responsibilities for funding currently sitting with the municipalities will shift at least in part over to the producers. In this time of development it is important municipalities initiate programs and a framework that will allow them to take full advantage of the ERP fitting with Green Manitoba's visions for waste diversion. New waste diversion programs should also assist in establishing financial benchmarks and support in the launch of new stewardship programming.

Voluntary Industry Practices – EPR

Recently, industry voluntary programs are developing, whereby industry is stepping forward prior to legislation to implement programming. Call2Recycle! is a voluntary, industry-initiated program managed by the Rechargeable Battery Recycling Corporation (RBRC). This is an international program, operating in both Canada and the United States. RBRC is a non-profit industry initiated and funded organization, whose mission is to be the leader in the collection, transportation and recycling of portable, rechargeable batteries. Participating brand owners voluntarily pay fees to fund the collection, recycling and public education activities of the program. To identify their involvement in the program, participating brand owners and distributors place the RBRC seal on the packaging of new rechargeable batteries. In 2004, the weight of rechargeable batteries collected and recycled in the U.S. and Canada was 4,467,737



pounds. This represents an increase of 7.7% from 2003. Also in 2004, 48,000 used cell phones were collected for recycling in the United States and Canada.

A second example includes The National Task Force on Packaging, established at the request of the Canadian Council of Ministers of the Environment, who has developed the National Packaging Protocol. The Protocol was a voluntary covenant viewed by members of the Task Force as a ten-year commitment, and as a challenge to turn around Canada's packaging waste generation and disposal practices. Under the terms of the protocol, stakeholders voluntarily agreed to reduce by 50% the amount of packaging sent for disposal by the year 2000. The Protocol outlined six packaging policies for Canada and established three milestone targets for the diversion of packaging waste from disposal compared to a base year of 1988. According to the National Packaging Protocol 1996 Milestone Report, by 1992, 36.5% of all packaging was being reused and 23% was being recycled. By 1996, 45.7% was being reused and 25% recycled. The National Packaging Protocol achieved its target of diverting 50% of packaging material (by weight) from landfills four years ahead of schedule. More specifically, about 11.7 million tonnes of packaging waste were diverted between 1988 and 1996.

Regulatory Approaches

The implementation of provincial and municipal landfill bans has complemented stewardship programs in many of the leading waste diverting provinces and municipalities. In Nova Scotia, as legislation passed in several areas for stewardship on March 31, 1996, the province followed with landfill bans of those same materials, as well as others, to be effective April 1, 1996.

Disposal Bans	Date
Disposal ban on redeemed beverage containers	04/01/96
Disposal ban on corrugated cardboard	04/01/96
Disposal ban on newsprint	04/01/96
Disposal ban on scrap tires	04/01/96
Disposal ban on lead-acid batteries	04/01/96
Disposal ban on leaf and yard waste	06/01/96
Disposal ban on waste paint	04/01/97
Disposal ban on ethylene glycol (automotive antifreeze)	04/01/97
Disposal ban on compostable organic material (industrial, commercial, institutional and residential)	11/30/98
Disposal ban on steel/tin food containers	09/01/98
Disposal ban on glass food containers	09/01/98
Disposal ban on low-density polyethylene plastic bags and high-density polyethylene plastics	09/01/98



These bans have been instrumental in helping Nova Scotia achieve high levels of waste diversion and serve to support diversion programming in that the users, whether residential, industrial and commercial are required to comply with recycling these components. There are two main reasons for implementing bans, with the first of course being to increase diversion and save landfill space. The second reason and probably the most critical, is in most cases the extended producer solutions require quantities of product in order to make them economically sustainable. For example, in the case of the paint recycling plant in Nova Scotia, there would have been a huge investment in equipment and start up overhead, if there had only been a few thousand litres to convert versus the hundreds of thousands, the recycling effort would not have been economically viable. Waste in these instances is considered a raw material and bans assist in ensuring this raw material is available and that the recycling method is sustainable.

As stated earlier in this report, it is important to note bans generally follow the operation of easily accessible programming for all sectors. Without this easy access to programs such as hazardous waste drop off systems or blue box programs, landfill bans would be difficult to maintain or enforce. Generally speaking, following the implementation of adequate diversion programming landfill bans are implemented as a means to further increase diversion via “mandatory participation” following initial programming such as curb side collections, thereby increasing overall receipt of materials for processing and marketing.

Landfill bans are enforced differently in the residential sector versus the industrial or commercial sectors, as discussed in the following section:

Landfill Bans – Residential

Enforcement of landfill bans within the residential sector requires monitoring of collection at the source. This is generally accomplished via “spot checks” using appropriate personnel and monitoring equipment within the collection vehicles. Spot check locations are determined using visual indicators such as: increased refuse levels on a comparative level, low use of recyclable containers, clear bag requirement for refuse etc. For example, most areas of Nova Scotia, including the Town of Antigonish, in an effort to further monitor compliance with respect to landfill bans have required refuse be placed in clear bags. This allows collection personnel to quickly identify banned materials. Failure to comply with these regulations results in garbage and recyclables being left at the curb. Garbage bags containing recyclables are tagged with a rejection sticker and left to be properly sorted by the homeowner.

In addition, many municipalities have launched bylaws in support of landfill bans, including mandatory recycling and refuse bag maximums. These bylaws have been supported with programs that have provided the desired alternative so it is easy for citizens to comply. Most provinces and municipalities have allotted grace periods



between program commencement and regulatory compliance to encourage “buy in”. After this grace period however, enforcement has been consistent and ongoing.

Landfill Bans – Commercial and Industrial

In the commercial and industrial sectors, Landfill bans are typically managed at the landfill tipping face. When commercial haulers tip at the face, audits are performed on the loads to determine load contamination with recyclables. Loads containing recyclables are fined, or exposed to significantly higher tipping fees. In the late 1990's, as Ontario established tipping bans, municipalities realized significant increases in revenue as a result of contaminated loads. Many commercial haulers at this time took the approach of shipping refuse into Michigan in an effort to contain costs, rather than choose alternative programs and education to comply with the landfill bans. This change in practice provided only short term “cost” relief, and further negative environmental impact due to increased transportation. As the state of Michigan began developing waste diversion initiatives they passed legislation banning out of state refuse from its landfills in March 2007. As a result, users within the Province of Ontario are experiencing costs of land filling which are far greater than the costs of diversion programming.

In other areas, efforts to assist commercial and institutional businesses in development of programming have occurred through bylaw creation. Municipalities such as Cape Breton Regional have developed a bylaw requiring commercial and institutional business to develop and maintain a written waste management plan identifying all types of waste being generated and how the waste will be disposed of or recycled, as well as a written litter management plan to clearly identify how litter will be contained. Construction projects requiring a building permit also require planning identifying all wastes, disposal and recycling methods.

Trends for Manitoba

Successful waste diversion programs over the past decade have generally contained economic and regulatory approaches. Increasingly today, industries are developing product take back programs either on a mandatory or voluntary basis. Provincial and Municipal leaders in waste diversion have initiated programs in several areas. Most of these leaders commonly provide residential curbside access to recycling and composting collection for in excess of 90% of the province. These top diverting provinces have ensured viable alternatives to disposal prior to the implementation of, or enforcement of bans or fines, recognizing the key to participation sits with program visibility and availability to the residents. Keys to success include adequate funding as the core element, driven via extended producer responsibility / stewardship and municipal commitment, followed second by provincial, and municipally driven regulation, recovery and material marketing programs.

Waste diversion rates across the country are increased when programs are readily and easily accessed by residents and by industrial, commercial and institutional (ICI) sectors.



It is important to understand each of these sectors is different, however each shares the common need associated with appropriate and accessible diversion programming and support. Materials and levels of generation vary across sectors, and as a result the subsequent disposal methods require different supports. Simply placing landfill bans and or delegating enforcement back to the generators will not address the issue of diversion. Means of collection and recycle must be available to the sectors. The municipality must be prepared to support the diversion efforts via appropriate programming.

Currently, the Province of Manitoba has established a 50% diversion goal by the year 2010. In a bid to improve waste management, the provincial government is revising two existing waste programs, tires and packaging/printed paper, and plans to introduce two new programs - household hazardous waste and electronic waste.

The Province's new approach envisions a greater role for industry in managing the wastes that are generated from the products they produce. Companies are to become "stewards" of their post-consumer waste. However, while the use of stewardship programs to drive responsibility and funding of initiatives, is a common and necessary tool, it alone will not yield significant results.

Kenton Lobe, President of Resource Conservation Manitoba, a non profit environmental group states "It's a well-intentioned effort, but they're missing the boat" on the series of new waste programs being developed by the Province of Manitoba. Further work and responsibility in terms of policy and program will be required by municipalities in attaining the established goal of 50% diversion levels by 2010.

Within this statement and within our province and community, it is clear nearly a decade of waste diversion programming has been lost. While our community has taken steps, most of these have been in support of our provincial mandates and requirements. The cost of new waste diversion programming will be capital intensive on the front end, but can and will generate long term environmental benefits and reduced costs over the long term. Previously, programs such as curbside collection of recycling and organics appeared expensive to municipalities not operating them. However, if taken in comparison to the long term costs of landfill management under new and pending regulations, and the environmental impact there is a different picture. As with many industries, increased throughput and efficiencies will drive cost improvements; both of which take time to develop. Remanufacturing processes are becoming more prevalent and affordable as increased flows of materials are realized. As increasing numbers of municipalities adopt true diversion, increasing flows of re-useable and recyclable materials are available making viable new remanufacturing processes which return goods to market. Provinces such as Nova Scotia are demonstrating responsible environmental programming can not only improve environmental impacts, but also reduce overall costs. As stated previously, Nova Scotia's solid waste management system saves at least \$31 million a year, or \$33 for every Nova Scotian, compared to the old landfill system.



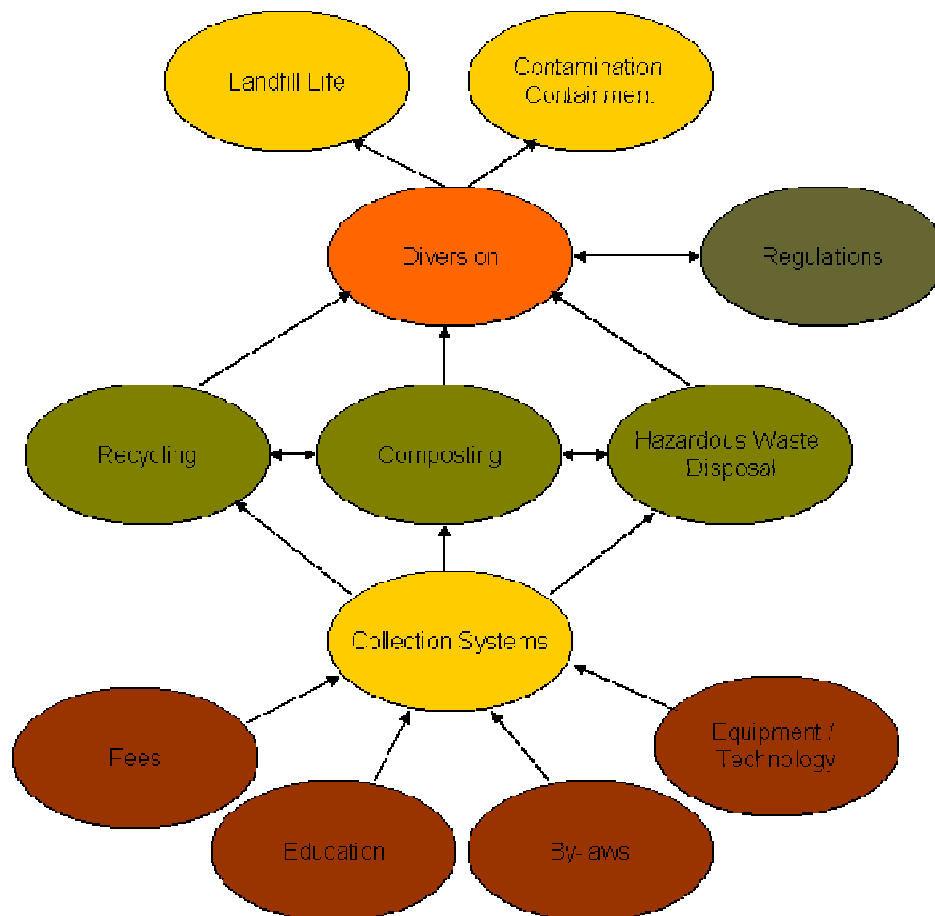
Solid Waste Diversion as a System

Simply put, a system is an organized collection of parts (or subsystems) that are highly integrated to accomplish an overall goal. The system has various inputs, which go through certain processes to produce certain outputs, which together, accomplish the overall desired goal for the system. So a system is usually made up of many smaller systems, or subsystems.

As stated in the introduction the goals of our solid waste system are:

- to meet or exceed the diversion rates of the best communities in the country;
- develop a system that is affordable and efficient;
- to extend the use of the existing landfill beyond 100 years;
- to contain all ground and water contamination to the site.

In order to achieve these goals, it is important to identify, evaluate and understand the interrelationship of the parts (or subsystems) of our solid waste system. The diagram below pictorially displaces this interrelationship.



In looking at the entire system we can see that in order to increase our landfill life and contain contamination on the site, we need to divert materials from the site. The common strategies that exist in diverting waste are; recycling (metals, cardboard, plastics, etc.), composting and hazardous waste disposal however diversion can also be impacted as previously mentioned by regulation. The level of participation in these strategies is predominantly dictated by the type of collection systems available to support them. In establishing the collection system it is more than just the equipment (trucks and bins) that needs to be considered but also aspects such as by-laws, fees, technology and education need to be factored in.

By understanding the interrelationship of these elements it becomes easier to understand how changing one of these sub-systems can impact the balance within the entire system. For example, based on a recent example, if there is not enough opportunity to properly dispose of household hazardous waste due to regulations related to our landfill license, then citizens dispose of it through normal collection which then decreases our diversion rates and increases the level of contamination at the landfill which then needs to be contained. As we review each of these sections and make recommendations, it will be important to understand and evaluate them in consideration of the entire system.

Solid Waste Management in Brandon

The section will first outline the existing waste management system and then will provide an assessment of its effectiveness in meeting the goals as outlined previously.

Landfill License

In accordance with the Waste Disposal Ground Regulation 150/91, made under The Environment Act, The City of Brandon is permitted to operate a Class 1 Waste Disposal Ground. This facility is known as the Brandon Waste Disposal Ground and is situated at NW 17-10-18 WPM, in the City of Brandon, in the Province of Manitoba. The landfill site has been in operation since the mid 1970s and is the only landfill available to City residents and commercial haulers for the disposal of solid waste in Brandon.

In general terms, the City of Brandon as operator of the Brandon Waste Disposal Ground (from this point forward to be called the Eastview Landfill Site) is currently responsible to ensure that:

- Solid waste shall be deposited in a designated active area (trench or berm confined area);
- Site supervision while the waste disposal ground is open;
- Waste and or leachate is contained within its boundaries and does not contaminate the ground water;
- Control measures are adequate to prevent rodent and insect production;



- Burning of readily combustible materials such as boughs, leaves, straw, paper products, cardboard, non-salvageable wood and packaging materials derived from wood is permitted under required specifications;
- Burning of domestic garbage, rubber tires, railway tires, derelict vehicles, petroleum or petroleum based products and pesticide containers is not permitted;
- All bulky metal waste and rubber tires must be deposited in an area other than the active area (tipping face – required diversion).

Under the regulations of operating a Class 1 Waste Disposal Ground, it also states that unless otherwise approved by the Director of Manitoba Conservation, the City of Brandon is not permitted to accept the following wastes:

- Liquid industrial waste;
- Liquid waste;
- Dead livestock;
- Radioactive waste or materials;
- Un-bagged asbestos;
- Soils or sediments containing contaminants at concentrations in excess of the criteria specified;
- Hazardous wastes.

The City of Brandon from time to time will request to dispose of these types of items and in those cases are required to obtain a permit (from the Director of Manitoba Conservation) which clearly details the types of materials acceptable and those that are not. It also details how a product must be handled for safe disposal.

There are currently two different issues affecting the future operation of the landfill. This first one is related to how leachate from the site is treated. Currently leachate is piped from the site and is processed through the Waste Water Treatment Plant. Under the new Waste Water Treatment Plant License, one of the restrictions is we can no longer treat leachate through the facility. This change will now require the leachate to be treated or contained on site at the landfill. This issue is further compounded by the fact in the winter of 2006 / 2007 the landfill was identified as the City's snow dump site once the Cristall Property was sold for development. The landfill is not open to commercial haulers, but the snow collected from City roads is being trucked to this site. The additional leachate from this process may impact the type and cost of the system that will be required to process the leachate at the landfill site. As a result, it may require an additional site to be identified as the City's snow dump.

The second issue is that Manitoba Conservation has been in the process of reviewing landfill permits over the past three years and on June 8, 2007 issued the City of Brandon a draft copy of their proposed permit based on pending draft legislation. Under this document, the Eastview Landfill Site will be required to adhere to increased monitoring and reporting within the next six to eighteen months as outlined below:

- Sample, monitor, analyze or investigate specific areas of concern regarding any seepage and (surface and ground water) discharge rates;



- Determine environmental impact associated with the release of any pollutant from the Waste Disposal Ground;
- Develop an operations manual;
- Submission of an annual report of all activities at the Waste Disposal Grounds for the previous calendar year;
- Develop a Contingency and Emergency Response Plan in accordance with the Industrial Emergency Response Planning Guide (MIAC September, 1996).

With these requirements in monitoring and reporting, operational and developmental costs associated with the landfill will increase as well. In some cases these changes will be managed internally. However in the cases of development, sampling, monitoring and analyzing special designations/certifications will be necessary and will require the commissioning of contracts.

Under this new permit, similar to other landfills, one of the greatest challenges Brandon will face in the coming months will be in the handling and treatment of leachate. Currently many landfills are linked to waste water treatment systems, or they truck leachate to existing municipal waste water treatment systems for treatment. Due to the unpredictable composition of leachates, the Province of Manitoba has introduced the need for landfills to develop planning for containment and treatment of leachate materials. Definition with respect to the how treatment is attained open for review, however it is clear that introduction of leachate to the municipal flows of waste water treatment will not be considered as a viable option.

Landfill Operations

At the opening of the Eastview Landfill Site, essentially all materials with the exception of clean fill were directed to the tipping face. The tipping cells were constructed primarily of a clay base in an effort to contain materials and leachate. Concerns with hazardous wastes, recycling, or composting were not as prevalent as they are today. The idea of the day was “out of sight out of mind”, such that “safe handling of waste consisted of burning or burying”. Where as, over the last decade as a result of increasing awareness, environmental concern, and regulatory requirements further landfill control has been initiated.

The City of Brandon, in an effort to meet changing regulations set forth a path of continued development of its landfill control policies. Landfill control is the process of measuring, monitoring and control of materials delivered to the landfill site. As indicated earlier, the basis of Landfill Control is meeting the regulatory requirements of the Province of Manitoba, often as mandated federally. A fence surrounding the perimeter of the landfill site ensures site security. The scale house, and site operators monitor visitors, volumes and waste types entering the site.



As a result of this monitoring, “source separation” whereby residents and / or businesses are required to place materials at material specific locations has supported waste diversion from the landfill tipping face. Now upon entry to the site, each vehicle is directed to one of the following locations:

- Tipping face;
- General recycling area – metal, tires, compost, trees/wood, batteries;
- Clean fill area;
- Material Recovery Facility – recyclable material drop off.

It is important to note “source separation” has been successful on site with the residential, lower volume materials whereby the resident depositing materials is directed to the appropriate tipping areas. Secondly, off site “source separated recyclables” entering the landfill site through the residential collection stream are removed via the sort process in the Materials Recovery Facility. In both cases, waste diversion efforts are being realized. However large volumes, such as those brought by commercial haulers are often mixed in nature, and result in an inability to separate. Often, the composition of commercial waste is high in OCC (cardboard) and paper materials. The mixing of waste with these recyclable materials often result in contamination, negatively impacting potential value of the materials. To date, participation in source separation by the commercial sector is voluntary and generally the business incurs additional cost, resulting in varying levels of participation.

Tipping Face

The landfill operates the tipping face in a very similar fashion to that of earlier years. Materials entering the tipping face are pushed, compacted, and covered with fill as mandated by regulatory requirements. The significant change is in the volumes and types of materials entering the tipping face as a result of the diversion through recycling, composting, and hazardous waste collection.

The current processes for maintaining and compacting at the tipping face involves the use of a large compactor unit with steel wheels, a common process within the industry. One of the measures in landfill operation is compaction or how well the garbage is crushed and pressed together. The better the compaction rates, the longer the life of the landfill. High costs of capital and operation are associated with tipping face maintenance in order to achieve optimal compaction ratios. Under a review performed by the department, the compaction ratios under current operations were in the range of 50%. This ratio is impacted by the season, the types of garbage and the operator time expended at the tipping face.

Materials entering the tipping face include general household waste (which is not placed in blue / clear bags) , general commercial waste and contaminated soils / materials. For resident hauled residential waste there is a \$3.00 charge over the scale for loads less than 500kg and \$34.00 / tonne for loads over the 500 kg.



Cell Development

The landfill is broken up into cells or “pockets” of garbage. A cell is an area of land developed with a liner and drainage system ensuring the liquids generated through the decaying process are contained on site. Over the thirty plus years that the landfill has been in operation, there have been many changes in how the cells within the landfill are developed. Initially cells were lined with a clay base but now a polypropylene liner is used. Until the point the community undertook the active recycling program, cell development occurred every two years, with the cell being dug the first year and then lined the following year. This timeframe has now been extended to every four years. Currently, the excavation, lining and leachate collection systems associated with one cell costs in the range of \$750,000 so this shift in development provides cost improvement efficiencies on top of reducing the need for landfill space.

Recycling

The definition of recycling is to pass a substance through a system enabling the substance to be reused. Recycling is one of the easiest and best understood means of diverting garbage from the tipping face. The concept of recycling as we know it has been around for at least the last forty years, when the aluminum industry in the United States started recycling aluminum cans and blinds due to raw material shortages at the time. In the 1970s, drinking bottle deposits became the means by which bottlers could have their bottles returned for re-use instead going into landfills. There are numerous examples of how this principle has been applied during this time, through various systems and applications.

In Brandon, formal recycling first started in 1989 when the Westman Recycling Council held two outdoor recycling depots and has continued to expand to where we now have a recycling system that includes residential pickup and sorting, depots and other recycling initiatives.

For many when one hears the word recycling, one thinks of the plastic bottle or the tin can, but there are a number of other products recycled as part of the existing program. Our existing program can be broken into two different elements. There is the landfill recycling programs and the residential / depot recycling programs.

Landfill Recycling Programs

The following sections outline the types of materials and programs that are available to support recycling at the landfill.

Batteries

For large equipment batteries used in vehicles and large equipment, we encourage individuals to drop off batteries to Westman Salvage or Fisher Auto Electric because



under our license we are not permitted to store batteries at the landfill. When we find them in loads, we collect and immediately transport them to Fisher Auto Electric. In these cases, a fee of \$3.00 is charged for the load under 500 kilograms. We believe under the new proposed license, in the future we may be able to collect these as long as they are stored and monitor appropriately.

A program does exist for small rechargeable batteries. While most electronic stores are now offering this service as well, citizens can now drop off their rechargeable batteries at the Civic Service Complex. These batteries are collected and forwarded once quantities are sufficient to precipitate shipping. There is no fee for this service.

Equipment Oil

The Eco Centre is located at the Eastview Landfill Site and is the collection point for used lubricating oil. The building was developed through funding provided by the Manitoba Association for Resource Recovery Corporation (MARRC). Ongoing funding is provided for the operation and marketing of this service through MARRC and the City of Brandon. The City of Brandon provides the staff for managing and decanting the oil, while MARRC provides the funds for decanting, shipping and advertising of the service. City staff are certified every three years to handle and decant the used oil. 2007 is the last year of the original ten year contract and a new contract is currently being negotiated.

Used Cooking Oil

There is a program for collecting commercial used cooking oil. The department places a container at the commercial site and picks up from the site when the container is full. This oil is used in the processing into bio-diesel and is free to the businesses who participate. A fleet vehicle has been modified to ensure the safe handling of this product.

Freon Depleting Devices

Freon depleting items include refrigerators and air conditioners. These items are required to be marked as "Freon Free" prior to being allocated as scrap metal. The recapture of Freon is required to be done by a certified technician. A local supplier performs this work at the landfill once an adequate quantity of appliances is identified. The landfill charges \$34.00 per item for this service in order to recover the cost of the servicing.

Metals

Two sites are available for metals recycling in the community. One site is located at the East View Landfill Site and a second is Westman Salvage. At the landfill, the metal pile is used for Freon depleted appliances, by residents who drop off loads of metal waste and at times some metals are collected from the tipping face (if easy to access and depending on the time of the year) through residential and commercial collection. The metal at the landfill is sold through a contract with Gerard Metals.



Tires

A separate area is located at the Eastview Landfill for the collection of vehicle tires. These tires are picked up on a monthly basis by a company from Steinbach through the Tire Stewardship Program. There is no specific fee charged for dropping of tires other than applicable residential or commercial tipping fees.

Under this program, large tractor tires are no longer accepted so these tires are stock piled and used around the landfill for barriers.

Propane Tanks

An area is designated at the Eastview Landfill for the collection of propane tanks. Once collected, tanks are taken to Co-op where they accept them for refurbishment and then resale. In an average year there are approximately 200 tanks collected. No specific fees are charged for this other than applicable residential or commercial tipping fees and the City does not receive any revenue for the tanks.

Clean Fill

Clean fill according to City bylaw is considered to be non-contaminated material from excavations, streets or driveway renovations, building and basement demolitions, or other similar activity, which is exclusively comprised of concrete smaller than 300mm (11.8 inches) in any direction, cinder blocks, asphalt, gravel, dirt, or other similar biologically and chemically inert materials; and includes industrial fill material and residential fill material. Fill materials are required on site as cover material within the lined cell. Under current legislation, all refuse must be covered daily in such a manner to prevent blowing of materials and control nuisance rodents. Those bringing clean fill to the landfill are presently charged \$1.30 / tonne.

E-Waste

Starting in June of 2007, the City of Brandon partnered with Green Manitoba to establish an e-waste collection initiative for residents. Every Tuesday, Wednesday and Thursday a collection point was set up at the East View Landfill Site. City staff stacked e-waste items on pallets and secured them for shipping. Once a full truck was loaded it was sent to Noranda Sims in Ontario for processing. The cost of the shipping was covered through Green Manitoba and no fee charged to the residents for this program.

Heavy metals found in e-waste are the source of much of the negative elements found in leachate generated within the landfill cells. At the time this report was written, this was a pilot program. It is anticipated there will continue to be pressure to establish e-waste as an ongoing program.



Residential / Depot Recycling Program

Depot Recycling

The first recycling effort in the community was implemented in 1990. The program offered the residents of the City a depot/drop off center for metal and plastic products. This program consisted of containers at the then K-Mart parking lot (34th and Victoria), at the hospital and at a drop off depot run by volunteers. These volunteers developed into Westman Recycling Council. The collection of materials was limited to metals as the materials were marketable locally. These items were picked up on a weekly basis by a decommissioned rear load refuse truck. Often times, these containers were not in need of weekly dumping, however commitment to their dumping on a regular basis was deemed important in an effort to place the program in the public eye. Large bulkier metal items that were taken to the landfill by residents were stockpiled and later baled on site by the scrap dealers. At that time, regulations were such that residents could bring all items to the landfill, including freon depleting devices without any financial impact.

The depot program continues to be popular and has grown and expanded significantly over the past decade. At current, there are nine collection depots around the City and the collection types supported at each are as follows;

Location	Paper	Metal	Plastic	Glass	Compost Material
Rideau Park	X	X	X	X	X
Sportsplex	X	X	X	X	X
Green Acres (1st and Richmond)	X	X	X	X	X
Brandon Shoppers Mall	X	X	X	X	
34 th and Victoria	X	X	X	X	X
Westridge Community Center	X	X	X	X	X
Heritage Co-op (Richmond Ave)	X	X	X	X	
6th and Pacific	X	X	X	X	
20 th Ottawa	X				
Landfill**	X	X	X	X	X

** The depot at the Landfill is located outside the scales and therefore there is no fee.

The initial Depot Program was intended to capture source sorted materials for movement to markets. At each depot, containers were color coded and labeled to indicate to users in which containers to place materials. As the popularity of the program has grown, so has the need to service the sites. Given the daily operations, dumping of each material, has resulted in the need to commit one truck nearly full time to recycling operations, a strain on the sanitation resources and budget. With the launch of the Materials Recovery Facility and the ability to quickly and efficiently sort single stream



materials, and excess capacity in the refuse collection truck, it was decided the department would co-mingle the recyclable materials. The result was dumping of paper, metal and plastic within the same material load, with glass to continue as a separate pick up. This change in operation has reduced depot service time by 50% daily. As a result of these changes, the depot program now permits what can be deemed as “single stream” drop off. Single stream drop off refers to the mixing of recyclable materials with exception of glass.

The depots are well utilized with approximately 50% of the existing recyclable stream coming from this system. It is believed the reasons these depots are so well used are due to the following:

- a number of individuals outside of the City utilize these depots for their recyclable materials;
- a number of citizens, while committed to recycling, do not want to purchase blue or clear bags to support the existing recycling system;
- this is currently the only means to recycle glass material.

While this system certainly addresses some of our recycling needs, there are a number of issues related to depot operation. The first one is the amount of goods that are “pilfered” from the containers to be transported and turned in for deposit return in other provinces, such as Saskatchewan. While many would not see the collecting of someone else waste as being “stealing”, in fact when these items are removed, they are taking money out of the community’s recycling system. In the case of aluminum cans, which garner top dollar (approximately \$2,300 / tonne) in the recycling markets and when sold these funds are returned to the community to support the recycling program. The second issue is the amount of illegal dumping that takes place at these sites. On a daily basis, the department is required to clean up branches and other refuse from these sites. As outlined above, we know these items must have been transported to this site, so we believe the fee charged at the landfill must be one of the barriers in citizens responsibly handling them.

Residential “Blue Bag” Recycling Program

In around 2000, there was discussion in the community about the need for a “blue box” type of recycling system similar to the ones introduced in a number of communities across Canada. At that time there were three separate types of systems for recycling: one where the materials were sorted at the curb out of a blue box and into a compartment within the truck; one where all recycled goods were “co-mingled” in the truck and then sorted at a sorting depot; and finally a “wet” sort system where recyclables are sorted from garbage. As a result of the type of collection system that the City had, it was determined the “wet” sort system would work best in combination with a “blue bag” program for the community. There were a number of individuals who visited facilities using the “wet” sort systems and after this research Westman Recycling Council in partnership with the City of Brandon and the Manitoba Infrastructure Program built the Materials Recovery Facility located at Eastview Landfill. It was in the best interest of all



parties a facility be built due to the increasing flow of recyclable materials that were being captured in the City of Brandon and surrounding areas. In the spring of 2003 the facility was opened under the name of Westman Material Recovery Facility.

The current “blue bag program” is run in conjunction with the regular refuse collection cycle. Within this program residents are requested to bag recyclable materials within transparent blue bags, which are removed from the refuse stream through a sort process done within the Materials Recovery Facility. The materials permitted within these bags include:

- Plastics – containers, milk jugs, glass, etc.;
- Metals – tin cans, aluminum cans, etc.;
- Paper products – newspaper, magazines, cereal boxes, cardboard, etc.

Similar to the depot program, the blue bagged recyclable materials enter the Materials Recovery Facility in a “single stream” state. At the time the program was started it was believed the “blue bags” would be the only recyclable materials removed from the waste stream, but with the need for recyclables being required to keep the facility sustainable, there was a period in which black bags were also being opened in order to capture these goods. The practice of opening black bags was soon halted due to the danger presented to sorting line personnel as a result of “sharps” and other dangerous goods being placed in black bags. Also these “dirty” recyclables obtain a lower price from recyclable material buyers than clean material.

When the City of Brandon’s blue bag system was implemented, there was a large increase in recyclable material recovery from residents. Before this system was implemented recycling was done primarily through a depot program and at the Westman Recycling Facility on 6th Street. That system was inconvenient for most users and for many it was just not accessible. The new system made it easier for many to participate and in conjunction with the extensive education at the time, performance increased. The system however, has not necessarily performed to the level of other systems in communities across Canada.

In an effort to compare the City of Brandon with other municipalities, a waste audit was conducted to determine the rate of recovery of recyclables through the existing “blue bag” program. In order to complete this, two collection days were compared over a six month period. One day audited was comprised of nearly all front street pick up while the other day had predominantly back lane pick up for collection purposes. During the period from April/06 – September/06 the rate of recovery in the front street area was more than double that of the back lane area.



Recyclables Recovered on a Monthly Basis From April 2006 to September 2006						
	Day 4 – Lane Containers			Day 5 – Front Street		
	Waste-In	Recyclables	%	Waste-In	Recyclables	%
Month	Tonnes			Tonnes		
April	227.9	8.9	3.91	188.41	16.30	8.65
May	413.74	27.63	6.68	348.67	30.45	8.73
June	334.34	13.95	4.17	291.35	95.56	32.80
July	351.35	16.46	4.68	259.82	40.25	15.49
August	412.5	45.64	11.06	205.98	33.67	16.35
September	248.68	35.09	14.11	258.89	32.41	12.52
Total	1988.51	147.67	7.43	1553.12	248.64	14.96

From this study we believe there are a number of factors contributing to the low participation in the system:

- socio-economic factors contribute to the differences shown by this waste analysis as the affordability of blue bags may be a barrier to participation for some;
- the “bulk type” containers permit a certain amount of anonymity when it comes to what is being placed in a container or whether or not someone is participating in a recycling program;
- the “bulk type” containers are often scavenged for their recyclable materials, especially if these items can be returned for deposit in other jurisdictions;
- the individual containers are often viewed as a reflection of the owner. In general these containers are better maintained, garbage is handled more appropriately, instances of illegal dumping is less, etc. because it is easier to link with the owner.

Composting

In 1993, the City of Brandon began a tree chipping and composting program at the East View Landfill Site in order to remove these materials from the landfill tipping area. As new equipment and technology has been employed in this process, there has been improved consistency and efficiency of the process. With an increase in capacity of the composting process, the depot program has been expanded over the years to include collection of compostable materials at more locations. These depot sites were located along side the depot sites previously described. Yard waste collection bins have been located at the prior mentioned depot sites.

Trees and Branches

In the initial stages the only collection method for these materials was by citizens bringing them directly to the landfill site and voluntarily separating these materials from regular refuse upon entering the site. Participation was low as many people had to adjust their behavior to make a separate trip to bring trees and branches to the landfill.



Sanitation employees were charged with processing (chipping) the trees on a weekly basis with the use of an industrial hand fed tree chipper. This system, though very slow and labor intensive, was adequate in the early years as the volume collected remained low.

By the mid 1990's the behavior of residents significantly shifted with the sorting of branches at the landfill and with the volumes, the City of Brandon was required to change the handling and processing of wood and tree material. At that time, a contract was established and tendered to private companies to grind the wood and tree materials on site. This process significantly increased the capacity of the compost program in terms of ability to accept wood and tree materials.

This change in process also allowed for the establishment of the Christmas Tree Depot program run in conjunction with the Keystone Centre annually. The trees are collected in the Keystone Centre parking lot and the Parks Department comes down and chips them. The chips are left on site for approximately one month and the public are free to take them for their own use. After that time the Sanitation Department comes out and removes the chips and places them in the landfill's compost pile.

Yard Waste

In conjunction with the "blue bag" program, was a "clear bag" program established for yard waste to encourage residents to use clear bags for garden waste, such as grass clippings. Residents place clear bags in their refuse containers with other recyclables and waste collected during their scheduled collection. Once in the MRF clear bags are picked off the line by sorting staff and placed in a bin destined for the compost piles.

The second element of the system is the depot system. At five of the depots, are containers to hold yard waste. The depots are heavily used in the spring and fall and over the past few years supplementary containers have been added in order to meet the demand. The constant collection of these bins is required during these peak times.

The resulting tree chippings, grass and other yard and garden waste from these various systems are stockpiled on site in large windrows. In 1994, the City of Brandon purchased a compost turner, which has not only improved the consistency but the efficiency of this process. In the summer, every couple of days the piles are turned and water added to aid the composting process. In the winter, these materials are stockpiled and the process is restarted again in the spring. Throughout the years there have been various attempts to integrate different waste streams into the process (ie. manure from Maple Leaf, etc.). This type of work is ongoing.

Currently the finished compost products are consumed entirely by the Parks Department for landscaping projects within the City resulting in a positive diversion of materials from the tipping face. In addition, in 2007 as part of the Earth Day Celebrations compost was given out by the bag to residents.



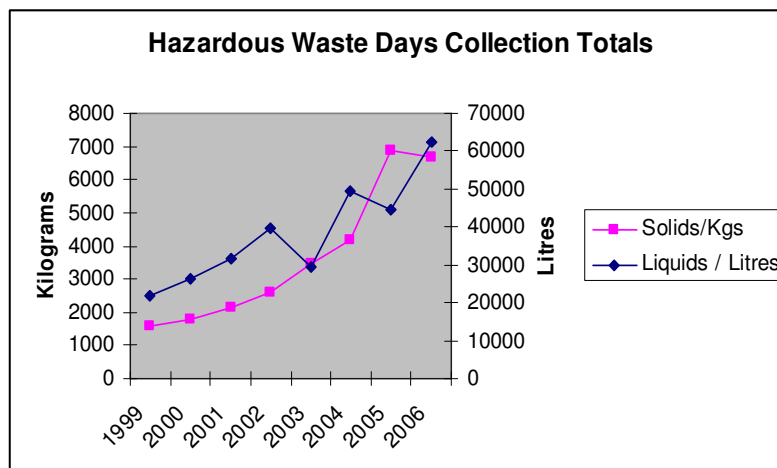
Hazardous Waste

Hazardous materials can often be identified by certain characteristics they possess such as being corrosive, flammable, reactive or toxic. Hazardous materials are used in many companies and residences for activities as ordinary as cleaning to highly specialized manufacturing processes. Most materials are consumed during use although in other instances some hazardous materials may no longer be required, such as pesticides, some may have reached the end of their lifespan, and some may have been found to be a health or environmental concern, such as lead paint and asbestos. These hazardous materials and their containers become waste and must be disposed of safely.

Companies are required by law to properly dispose of hazardous waste and in doing so incur the cost of such disposal. Residents are also required to properly dispose of household hazardous waste (HHW) but at present there are few alternatives to do so and these alternatives can be quite costly.

In the City of Brandon, we currently have two HHW days annually, one in the spring and one in the fall. During these days, residents are encouraged to drop off their HHW at a predefined site where it is decanted, labeled and shipped out of Brandon for disposal. This program is run through a partnership between the City of Brandon, the Rotary Club of Brandon and the Province of Manitoba. The City provides some manpower, the site, and advertising funds. The Rotary Club provide volunteers to assist with the collection and transfer of goods to the handlers and the Province of Manitoba contracts and funds the disposal company to remove the chemicals from the community.

The program has been running since 1999 and participation has continued to increase to the point that during the spring collection in 2007, cars had to be turned away before the end of the day. Residents were then required to hang on to their waste until the next collection event. There is some concern residents would not store these chemicals and they end up in the landfill via the residential collection system, further contaminating leachate at the site.



A request has been made to the Province to increase the frequency of this program but at the time of this report, a response was pending.

Residential Collection System

The current residential waste collection system was first implemented in 1989. Prior to the automated system implementation, the City employed rear load packer trucks staffed with three men. In 1989 through technological improvements in collection systems, the implementation of a one man automated side load system was completed within the City. The change from manual to automated collection had an immediate beneficial impact on the overall health and well being of employees.

The implementation of the automated system has removed the injuries associated with manual collections, and secondly has greatly increased the career length of refuse drivers. This has been demonstrated by significant reductions in compensation claims amongst refuse collection personnel; showing a reduction from \$12,745 in 1988 to \$2,777 in 1989. Two of the three drivers who started with the current system in 1989 remain as operators today. In the early years of manual collection, careers for personnel averaged three to four years.

The second benefit of the new system was the general improvement in the cleanliness of the City. The large containers satisfied the demand of the day, removing refuse previously set in bags or refuse cans in the lanes for collection into larger lane, or individual residential containers. In both cases, the containers served well in preventing scavenging from animals. In recent years some drawbacks to the system include the increase in the amount of graffiti on the containers, use of containers by commercial businesses and contractors to dispose of waste without having to pay tipping fees and the amount of garbage placed outside the containers requiring a second pickup system.

In the initial stages of implementation there was much public resistance to the proposed change. These issues included:

- capacity of containers causing seasonal overflow issues;
- decreased employment opportunities due to reduction in total number of collection staff required;
- distance for residents to haul refuse (75 feet to lane containers);
- concern containers would be lost or stolen;
- where the containers were going to be placed – most residents did not wish to have the container “in their backyard”;
- concern over responsibility for containers, and the cleaning and maintaining the areas around containers behind residences.

After an initial backlash to the change, it quickly became apparent to most citizens the City was moving in the right direction with the new collection system. It is believed the efforts of staff working with the public to ensure timely resolution of concerns accelerated public acceptance. The commitment to dealing with the individual concerns of residents



has carried through to this day and has been a significant reason for the continued success of this system within the community.

At the time of original implementation the current system was considered best in class and recycling or waste diversion was not a big concern for government. This system was put in place to reduce the negative impacts on the employees who collected the waste, as well as to improve operational efficiencies. Operating cost savings were projected in the 1987 report the automated collection. In March 1990, a review demonstrated an actual cost of \$239,000 versus the 1987 estimate of \$256,000, proving efficiencies beyond the initial projections.

Current Route Structure

The current route structure was established with the current collection system, and has been only modified since 1995 to incorporate development changes. The City has experienced tremendous growth in residential and multi residential properties. This growth has been for the most part in the west end with some in the north and south ends of the City, resulting in significant unbalancing of the routes. Some routes/days have exceeded capacity, or offer little or no capacity for future growth, whereas others hold capacity with little potential for growth. This issue continues to challenge the operation with existing resources in terms of its ability to maintain the current level of service.

In an effort to understand route capacity and balance within the current system an evaluation of routes was performed. The review took into account the cycle and packing times, packing ratios, and no-tip time (breaks, for preventative maintenance and travel time to and from landfill). Two days of the existing five day cycle show a need to work overtime or receive assistance in order to complete routes. Other collection days are approaching capacity as new development takes place in those areas.

Overall current system capacity is 90% based on the existing hours of operation, leaving the collection system little opportunity for absorption of future growth. The following table breaks this capacity down by collection day.

**City of Brandon 5 Day Collection Cycle
Capacity of Routes**

	Tipping & Packing (min.)	Unload Travel (min.)	Non Tip (min.)	% of Available Capacity
Day 1	965.2	180	225	95.16%
Day 2	866.05	115	225	84.45%
Day 3	991.15	100	225	91.4%
Day 4	767.65	65	225	73.45%
Day 5	1156.35	180	225	108.4%
Total	4746.4	640	1125	90.58%



Containers

In the fall of 2006, staff undertook a container audit in order to determine the overall condition of our current containers and estimate their remaining life. At that time it was determined a significant portion of our current metal containers would need to be replaced within twelve to eighteen months, with the remaining containers to be replaced within 5 years. Most of the containers are not in need of being replaced are in newer areas or have already been replaced since the initial implementation.

In a report to Council in 1990, it was estimated the steel containers would have a life expectancy of 20 years. The containers are currently in their 19th year of use and nearing the end of the anticipated useful life cycle. The life expectancy of the plastic lids was estimated at 5 years meaning a number of containers are on their third or fourth set of lids. The estimated life expectancy of the 120 gallon front street containers was 10 to 15 years.

As a result of the ages of the containers within the collection system, the cost of maintenance and repair has begun to surge. To further illustrate this, in the summer of 2005 the department averaged 4.14 container repairs per day, whereas over a similar period in 2006 the average was 7.5 container repairs per day. The repairs include changing out lifting brackets, repairing lids, etc. As containers start to fail, there is risk to both the equipment and personnel if the failure occurs when the container is being lifted.

Over the years, staff has tried to reduce the impact of metal prices on container prices by making purchasing decisions when prices were low. This decision making process has now been impacted in the last few years due to a decrease in suppliers to the point that today there is only one supplier remaining. The cost of containers is now set by the supplier and prices do not fluctuate as they did when there was competition in the market. When purchased in 1989, the cost of the front street containers currently in operation was \$213 per unit, whereas those same front street containers are now in excess of \$346 per unit due to the low volumes now being produced.

Trucks and Packers

The trucks are versatile in they are able to effectively pick up both back lane and front street containers with the same truck. Since the original implementation in 1989, the City of Brandon has purchased two sets of trucks and packers in support of the collection service. The first trucks were a set of 1989 Mack single axle vehicles with 24 yard capacity. By the end of their lifecycle the trucks had fallen behind growth within the City, and as a result were not able to keep up in terms of route performance. The single axle units limited load size, resulting in more frequent trips to unload. This significantly increased travel time to accommodate higher refuse volumes. The department was forced to use extra operators or pay overtime on a daily basis to ensure service was provided as set out in the 5 day collection cycle.

In 1999, the City purchased four 1998/99 Peterbilt tandem axle garbage trucks with 31 yard capacities. The combination of the tandem axle and the larger hopper capacity

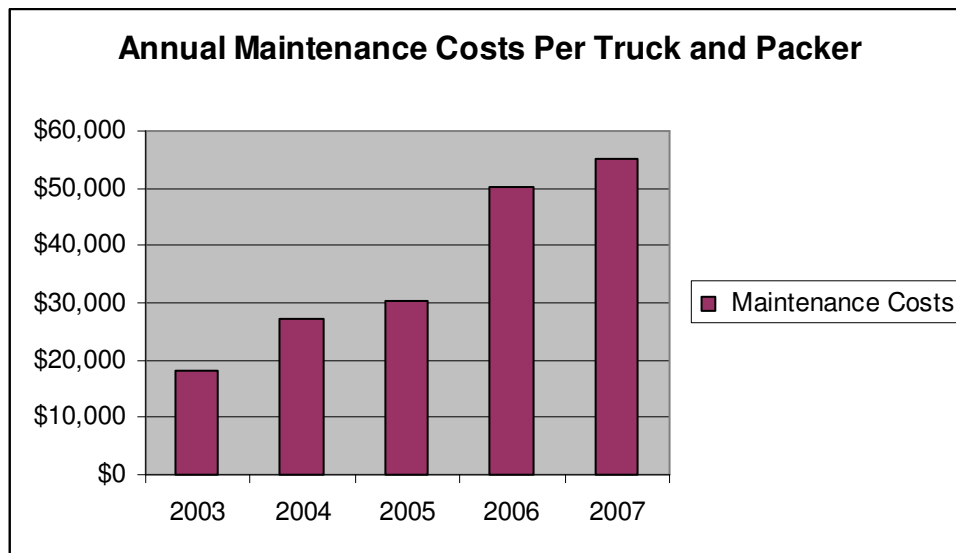


allowed almost double the loading and allowed the department to regain some capacity within the system through a significant reduction in travel times.

Replacement parts for the packers on the trucks are becoming difficult to source and replace as the original manufacturer of this equipment has been taken over by a company whose major focus is on a line of equipment with the newer technology. Fleet Services has been forced to find other sources, such as producing parts locally to replace the parts. This has proven to be an expensive and slow process.

The existing trucks and packers operate with container dump and packing cycle time in the 30 to 36 second range and have a compaction ratio of 466 lbs/yd³. The existing lifting system drops garbage loads from approximately 12 ft into their hoppers, placing large strain on the equipment due to the range through which the garbage is lifted and the weight that is dropped.

As with other areas of the City's fleet, Fleet Services has based equipment purchases on the lifecycle costing model that not only takes into account the initial cost but also the cost of operation including maintenance, fuel efficiency, etc. In reviewing the information on the existing trucks and packer, since 2004 maintenance costs on a vehicle by vehicle basis have risen to over \$35,000/year for the truck and packer. Over the previous two refuse truck life cycles, costs of maintenance have increased dramatically following the seventh year of operations. This indicates the existing replacement cycle may not be adequate to control operating costs and this will need to be evaluated when new equipment is purchased.



Bylaw

The solid waste system is governed under bylaw 5863/20/91 "Solid Waste Collection & Disposal By-law" which includes the following highlights:

- all property within the City with a structure or structures located thereon shall have suitable refuse containers located thereon and property owners and/or occupants shall either utilize the City refuse collection system or arrange for commercial refuse collection at the expense of the property owner or occupant:
 - the owners and operators of apartment complexes, including condominiums or row houses containing eight or more units shall at their expense either provide a refuse container compatible with the City refuse collection system or arrange for commercial refuse collection;
 - the developer of any other new residential properties, including duplexes, triplexes and apartment complexes including condominiums or row houses with seven or less units shall be required to supply at their expense Type 2 or Type 3 refuse containers which shall serve two or more residences;
 - the developer of any new single family residence shall at their expense be required to supply either a Type 1 refuse container, for those residences with front street refuse collection, or a Type 2 or Type 3 refuse container which shall be shared between two or more residences, for those areas with rear lane refuse collection.
- Type 1 refuse containers shall be placed at edge of driveway/curb with wheels away from the curb adjacent to the roadway for collection not before 1800 hours prior to the scheduled collection day and no later than 0700 hours on the day of collection and removed from the street by 0000 hours the day of the collection. Refuse containers assigned in accordance with this by-law shall stay with that address. If a refuse container is damaged or lost at any time except when placed on the street for collection, the owner or occupant of the property will be responsible to have the container replaced at the owner's expense.
- Residents shall keep all areas where refuse containers are placed clear of snow and litter, in such a manner suitable for mechanical pick-up without operators being required to make manual adjustments to allow for pickup of containers. No refuse shall be allowed around the refuse containers.
- Small tree branches and twigs shall be tied in bundles not to exceed one meter in length and other garden refuse must be bagged or boxed and placed inside the refuse container.
- The following items shall not be allowed in the containers:



- poisons, acids, caustics, explosives or other dangerous materials, until instructions have been received from the City Engineer and/or a Provincial or Federal Environment Control Official, as appropriate;
 - sod, concrete, building materials, appliances or furniture. Property owners or occupants shall, at their expense, make arrangements to have this material hauled to the landfill site either by the owner or occupant or arrange for commercial refuse collection;
 - ashes shall not be mixed with other refuse, but shall be placed cold in suitable non-combustible containers as approved by the City Engineer, and set inside refuse containers;
 - all animal waste should be double bagged before disposing in a refuse container.
- In the event that any owner or occupant of any property shall fail to comply with any of the foregoing provisions or conditions, the City shall not be required to remove the refuse from the premises and the removal thereof shall be the sole responsibility of the owner or occupant.
 - Any owners or occupants of property producing more solid waste than can be accommodated in the refuse containers shall be required either to provide containers compatible with the City refuse collection system and approved by the City Engineer or to arrange for commercial refuse collection at the expense of the owner or occupant.
 - The City may authorize or endorse a hazardous waste disposal depot to provide residents a means by which to dispose of hazardous waste items.
 - The City Engineer may authorize a special cleaning program to promote the beautification of the City and to provide residents a means by which to dispose of large items.
 - The City shall not provide refuse collection services beyond the boundaries of the City of Brandon without prior approval from City Council.
 - No person owning or occupying property shall allow litter to accumulate upon that property in such a manner as to be unsightly or in such a manner that said litter may be blown or otherwise carried by the natural elements onto a public place, public area or private property.
 - Persons owning or occupying property shall keep the ditches, sidewalk, lane at the rear of, and/or the boulevard in front of and flanking, the property free of litter.
 - No person shall load a vehicle used for the conveyance of litter in such a manner that the load may be readily disturbed by vehicular movement or wind unless such vehicle is so constructed as to totally enclose the load or the load is



covered by a tarpaulin, netting or other device of adequate size and design so as to totally cover the load and to prevent material escaping from the load.

- Owners and tenants in lawful control of a public area shall provide litter receptacles in appropriate and easily accessible locations and shall be responsible for the servicing and maintenance of these receptacles.
- Every proprietor of any place where foodstuffs or refreshments are sold in cartons, containers or papers, and the business is carried on under such circumstances that cartons, containers or papers are discarded in the vicinity by patrons of the place, shall keep the premises and all public or private lands, streets, lanes or passageways within a distance of 100 meters from the premises free of all discarded cartons, containers or papers by collecting and disposing of the same at such times and in such manner as shall be satisfactory to the City Engineer.
- All residents of the City are permitted to deposit residential refuse and residential fill material at the designated area in the landfill site, which shall be established and identified by the City. Such deposits may be made during hours that the landfill site is open, and are subject to the City's annual fee schedule. The materials deposited shall not contravene the other provisions of this by-law or the terms of reference in the license issued to the City under The Environment Act or regulations as amended.
- The City will only accept hazardous waste or contaminated soil for which the Province of Manitoba has licensed the City to handle at the landfill site and which the facilities are able to handle. A permit must be received from the Sanitation Section prior to disposal and the permit fee, as established by resolution of City Council, must be paid. The Sanitation Section has the right to refuse hazardous waste or contaminated soil which, in their opinion, is not in the best interest of the City to accept.
- It shall be an offence for any person to deposit or accumulate or permit to be deposited or accumulated upon his premises anything which would or may become offensive or injurious to health, or to allow such deposit or accumulation to remain upon his premises when ordered to remove same by the City or its agent.
- The City Engineer may, by written notice, require the removal of any accumulation of dirt, stones, old implements, scrap iron, or other rubbish from streets or other public or private property by the person depositing same or permitting same to remain on the property owned or occupied by him. This regulation shall not affect any property that has received authority from Council which allows for the operation of any commercial or business establishment that requires the accumulation of the above materials.



- Any person who violates, contravenes, or fails to observe and carry out any provisions of the By-law is guilty of an offence and liable on summary conviction to a fine not exceeding \$1,000.00 and costs or to imprisonment for a term not exceeding one (1) month, or to both such fine and such imprisonment.

The by-law was approved in 1991 and is in need of updating to reflect any changes as a result of this report. There are many aspects contained within the by-law that are not being enforced due to the difficulty in “catching” those individuals who are not abiding by the by-law. For example there has been an increase in the amount of illegal dumping and in the amount of refuse such as mattresses and furniture being left around the backlane containers. Some hazardous waste products such as paint are being disposed of in the refuse containers. The bagging of garbage such as grass clippings is not taking place. While the existing bylaw does a good job of outlining the types of containers, placing requirements for business owners around providing litter containers, and reinforcing those items that are prohibited, etc., it does not set out consequences other than fining for not complying with system expectations. Part of the enforcement issue has come down to being able to “prove” who has performed the infraction. In the case of the front street containers this is easy, but with the back lane bins, it is almost impossible to clearly prove who the culprit is unless they are caught in the act.

Fees

The following is a break down of the fees charged at the landfill directly from the fee schedule approved by Council.



TIPPING FEES		2007
(A)	Commercial refuse per tonne, calculated to the nearest kilogram (minimum 1/2 tonne charge per trip) – includes manure with weights greater than (E) below	34.00
(B)	Household refuse, flat fee	3.00
(C)	Recyclable wastewater sludge, per tonne calculated to the nearest	7.20
(D)	Manure - per load less than 9 tonnes or 22 cu meters	20.00
(E)	Industrial fill material, per tonne calculated to the nearest kg (minimum 500 kg per trip)	1.30
(F)	Scaling vehicles	30.00
(G)	Freon Depleting Devices Fridge, Freezer, Dehumidifier	34.00
COMMERCIAL REFUSE COLLECTION FEES		
	Per pick up and per cubic meter	14.80
EXTRA MUNICIPAL REFUSE		
(A)	Per tonne, calculated to the nearest kilogram	39.35
(B)	Up to and including 1/2 tonne	37.70
PER CAPITA FEE FOR EXTRA MUNICIPAL REFUSE AGREEMENTS		
	This fee shall be calculated based on the latest census figures available from Statistics Canada or such other method as mutually agreed upon by both parties to the agreement	12.90
PERMIT FOR DISPOSAL OF HAZARDOUS WASTE OR CONTAMINATED SOIL		
(A)	Daily permit fee for refuse generated within City limits	165.00
(B)	Daily permit fee for refuse generated outside of City limits	220.00
(C)	Contaminated soil disposal per tonne to the nearest kilogram	39.35
SOLID WASTE CONTAINER CHARGES FOR NEW HOUSING CONSTRUCTION		
(A)	Single dwelling, rear lane access	345.00
(B)	Single dwelling, front street access only	425.00
	Minimum (12 or fewer units)	1375.00
	For each additional multiple of 12 or less	1375.00
(D)	Mobile park & condominium developments	
	Single user container developments (per unit)	425.00
	Multiple user container developments (per unit)	114.58

At the current time the majority of the City's waste management services is funded through the general tax base. The remaining revenue is collected through user fees upon entering the landfill site. At the current time the net cost of waste management services to the tax payer is approximately \$1,040,000 per year, with the remaining costs supported by user fee revenues in the amount of \$1,450,000 per year. User fees are charged in an effort to recover the associated costs of handling and processing of waste entering the landfill site. All commercial and residential users of the landfill site are



currently required to pay user fees upon entering the site. In this method, commercial users are charged a per tonne fee for all refuse dumped at the landfill, the rate for 2007 is \$34.00 for all refuse originating within the City limits. All refuse originating outside the city limits is subject to an additional surcharge of \$5.35 per tonne. Residential users are charged \$3.00 per vehicle entry, up to a maximum of 500 kilograms, beyond this weight they are charged the per tonne commercial fee.

The City of Brandon also provides commercial collection to a number of businesses throughout the city. The department does not actively pursue customers within this sector, rather services are provided to those that are unable to secure local commercial services. These situations occur in areas of the City where large front load containers cannot be accommodated in lane ways, requiring side load containers. In general, this happens in the downtown areas, or areas where pick ups are restricted to through lanes. These customers are charged per pickup and per cubic meter, the rate for 2007 is \$14.80 per cubic meter/pickup.

Other ancillary fees are charged to customers for bringing in materials such as manure, wastewater, sludge and industrial fee material. Permit fees are charged for disposal of items such as contaminated soil, asbestos and Freon depleting devices. A permit for the disposal of contaminated soil and asbestos is required prior to acceptance of the material at the Eastview Landfill Site.

In the case of commercial garbage, most businesses understand that the cost of disposing garbage is one of the costs of doing business and they establish contracts with commercial haulers to handle this and they pay the appropriate bill. Some smaller businesses or mobile businesses (small construction, landscaping, etc.) have been identified as utilizing the back lane bins or have illegally dumped in order to avoid paying the garbage disposal fees.

For residential garbage, while there is generally little issue for normal garbage disposal, large or unusual items (tree branches, furniture, etc.) can present a problem. The Eco Centre, regular and the E waste depots, are free to residents and are actively utilized. Programs such as the tire, Freon depleting devices, and trees programs involve a fee for service, whether it is the \$3.00 residential tipping fee or the \$34.00 fee for Freon depleting devices. For these items, the instances of illegal dumping or the underutilizing of the programs is significantly higher. In the cases of trees and branches, these are often left at the depots (even though signage indicates this is prohibited) or beside the containers in the back lanes. Tires and batteries can also often be found in back lane containers. Over the past two years since the implementation of the Freon depleting device fee, the cost of the City cleaning up illegally dumped items has exceeded the revenue that is generated by the fee. In 2006, we generated \$2,108 in revenue and it cost the City \$6,144 in cleanup costs for equipment and labor.



Alternate Systems

Recycling Systems

When we look at some of the programs that have been employed in other communities we can see that there are a number of options that could be considered to increase our waste diversion levels. The chart below indicates some of these programs including the associated diversion rates.

	Bulk Item Pick Up	Pay as you Throw/Bag Limits	Curb Side Recycling	Curb Side Organics	Recycling Depots	Organics Depot	Collection Bans	Landfill Bans	Waste Management as a Utility	Wet / Dry Sort
Markham, ON	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Guelph, ON	Yes									Yes
Port Coquitlam, BC		Yes	Yes	Yes	Yes	Yes	Yes		Yes	
Edmonton, AB			Yes	**	Yes	**	**	**		
Antigonish, NS			Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Sydney, NS		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Regina, SK			***Yes		Yes	*Yes				
Winnipeg, MB			Yes		Yes	*Yes				
Prince Albert, SK			Yes		Yes	Yes			Yes	
Saskatoon, SK					Yes	Yes			Yes	
Windsor, ON	Yes	Yes	Yes		Yes	Yes	Yes			
Brandon, MB					Yes	Yes				Yes

*Yes - requires dropping at the landfill

**Edmonton composts residential waste & sewage sludge mixtures

*** Regina has a voluntary program with a private contractor

Collection Bans refer to recyclable or organic bans

Bulk Item Pick Up

In the case of this type of program, residents are able to call in and request a large item to be picked up for a small fee. These objects can be items such as couches, bundled branches, appliances, etc. There are a couple of different ways in which payments are collected; cash / receipt upon pickup, through an additional charge on a utility bill or by pre-purchasing a sticker and placing on the item to be picked up. In all cases, there is definition around what constitutes a "large item" in order to prevent the stock piling of items for one pick up.



Pay as you Throw / Waste Management as a Utility

These types of programs can be designed in a number of different ways. They can be based on a container size, on the number of bags of garbage, etc. but generally they all do not charge for recyclable pickup. The more a household recycles the less it costs them to dispose of garbage. These systems are generally supported through either a blue box program or a multi-color bagging system so as to segregate garbage from recyclables. In many cases there is also a separate system for organics as well.

Curb Side Recycling

This is the traditional type of blue box program with which most people are familiar. The one change occurring is the automation of these systems. In the past many blue box programs either had all recyclables picked up and sorted at a sorting facility or they picked up recyclables and sorted them at the time of pickup into different compartments in the vehicle. These systems were generally done through manual collection systems.

As technological improvements have been made in automation, many communities are starting to look at automating their recyclable pickup systems. Communities such as Toronto, Vancouver, Regina, etc. are all in the process of converting their systems to be automated.

Curb Side Organics

Under this type of program, there is a third type of container or bagging system used to segregate organic material such as yard waste or kitchen waste from the rest of the garbage so that it can be composted. These containers / bags are placed out at the curb at the same time as the recyclables and garbage. One of the challenges in establishing these types of systems is related to the climate. In many Canadian communities it is almost impossible to collect organics in the winter because they freeze in the containers before they can be picked up. The way some combat this is to only run an organics program in the summer and in other cases they ask that organics be bagged in the winter.

Organics Depots

Another type of program for organics is to establish depots throughout the community. The depots act as collection points for both yard waste and kitchen waste. In some cases the communities having depots, provide containers (counter top containers, five gallon pails, etc.) to residents to help them collect compostable waste in their homes. The depots are picked up regularly and the organics are composted at a specific site. Some communities have established neighborhood compost piles. In these cases, the organic waste is processed onsite and the compost is available for use by the local community.

Collection Bans

These programs are similar to landfill bans however they restrict pickup of materials at a residential level. The types of materials that are often banned are hazardous waste, tires, vehicle batteries, construction materials, etc. In most cases if loads contain these



materials, then the containers are not picked up and it becomes the responsibility of the home owner to re-sort and properly dispose of the banned material.

Wet / Dry Sort

This system is where different bags are used to sort various types of garbage. For example, some sort systems segregate recyclables from regular garbage (similar to ours). Other systems have residents sort dry materials from wet materials. In either case the garbage is then sorted at a sort facility and the garbage is processed appropriately. Initially a number of these facilities were in operation, however many have converted to a single stream system.

Collection Systems

As a result of a shift in focus for governments over the last twenty years from collection to diversion there has been a corresponding change in technology. Most mid and large size cities across the country have converted to automated collection systems for reasons similar to the reasons that Brandon converted their system. While there are still a number of different communities still doing manual collection, we have not considered this to be an alternative in this analysis.

In the fall of 2006 the department issued a Request for Information (RFI) for Collection System in order to ascertain the likelihood of maintaining our current system with the truck / packer style and lift mechanism currently in use. In addition to the RFI, staff visited Saskatoon, Regina and Toronto in order to see there equipment in the field.

As mentioned earlier a collection system is broken into two different areas: the containers and the truck.

Containers

The industry standard for container sizes is now 95 gallons however some cities are beginning to implement the use of smaller bins such as 45 and 65 gallon containers as they introduce new collection systems.



In communities where various container sizes are offered, it is generally hinged on whether or not the community has requested residents to pay for garbage pickup.

	20	25	30	35	45	65	95	Pay System
Vancouver	X		X		X	X	X	Yes
Prince George		X		X		X	X	Yes
Moose Jaw						X	X	No
Squamish						X		No
Medicine Hat							X	Yes
Toronto			X		X	X	X	Yes
Kamloops			X		X	X	X	Yes
Port Coquitlam							X	No
Saskatoon							X	No
Regina							X	No

A 95 gallon plastic container costs approximately \$70 per unit complete with a 10 year warranty.

The second kind of container is a plastic resin 120 gallon container like the one currently use in our front street program. These containers cost approximately \$346 and are only available through one company.

The reason for the difference in cost between the two container types is stems largely from the quantities that are being produced. The plastic containers (as pictured above) are now the generally applied standard in the industry and as a result the quantities produced are sufficient to allow for low production costs. In addition there is more competition in the market for the production of these containers. The second units have gone up in price over the years as their popularity has declined.

The third type of container is the metal containers. There are very few systems like this now in use, and one of the challenges is the metal price for these containers and the single source manufacturing. These containers cost approximately \$800 each depending on the size of the container.

Trucks and Packers

It is important to note the difference between vehicles on the market is really in the packing and lifting systems. For the most part the chassis of the vehicle is common between the various vehicles. The larger companies in the industry producing packing and lifting systems are Pendpac, Labrie, and Heil. While each of these companies have slight differences in their equipment related to how the hydraulic systems operate, the lifting range, etc., the following is a general description of the performance of their systems.

Our existing packing and lifting system was designed and produced by Witke, who have now been bought by Pendpac. Pendpac continues to manufacture this system, however in Canada is producing less of these units as customers are moving towards their new



lines because of the performance differences. This packer and lift system operate with a container dump and packing cycle time of 30 to 36 seconds and a compaction ratio of 466 lbs/yd³. The lifting range for this system is approximately 10 feet.

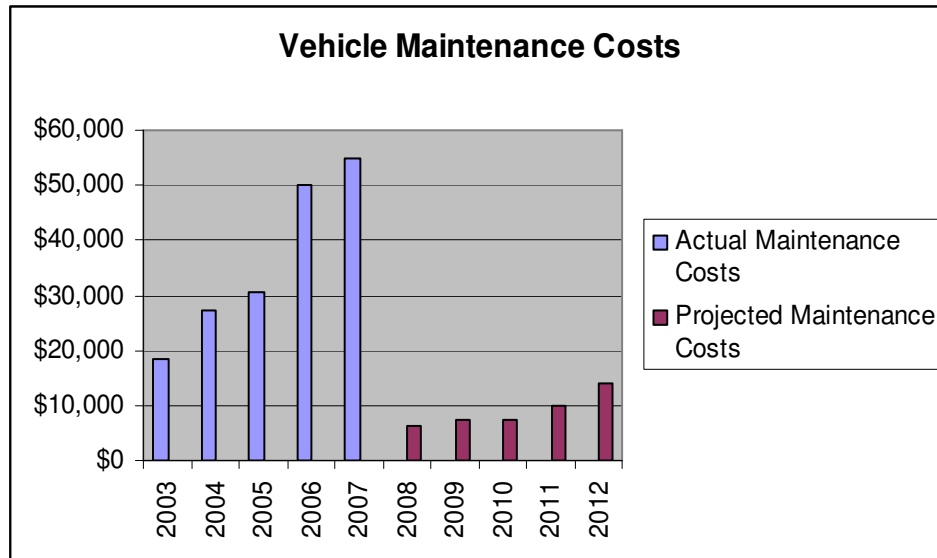
The new industry standard packer and lift system is available through Pendpac, Labrie and Heil. They operate using a continuous pack system and have a lift cycle time of 6 to 8 seconds per container. The compaction ratio is 799 lbs/yd³ or a 40% improvement. The higher compaction ratio means fewer trips to the landfill are required in a day and there are more productive hours on the vehicles. The lifting range for this lift system is approximately eight feet. The pictures below are of a Pendpac truck, but all the vehicles are very similar.



The continuous pack and decreased lifting cycle time means these trucks provide a substantial increase in system capacity over the original system. The other impact with these operating systems is because of the smaller range, and the smaller load dumping capacity (300 gallon versus 600 gallon loads) there is less strain on the lifting system, meaning lower cost of maintenance.



The chart below outlines the anticipated maintenance.



Bylaws and Fees

Bylaw

As mentioned previously a number of communities have instituted things like landfill bans, but more importantly they have establish expectations for the operation of their system and outlined immediate repercussions for not complying. For example, in some communities if the lid on the container is not closed at the time of pick up, then the container is not picked up. Similarly, in other cases, if garbage bags of any nature are in recycling bin then the bin is not picked up because in those cases the communities have asked for the recyclables to be loosely placed in the container. In both of these examples, the occupants are required to rectify the problem and the containers are then not picked up until the next cycle. In implementing these types of controls, it is important to allow occupants to go through the “learning curve”, but through education and communication it has been demonstrated these expectations have been set and complied with in a number of communities.

Fees

In those communities that have achieved substantial diversion levels, they have coupled their programs with increases in the amount paid to send garbage to the tipping face. As discussed previously, in Ontario when they substantially increased tipping fees, it resulted in commercial haulers trucking their garbage to Michigan rather than creating recycling programs. Now since the recent legislative changes in Michigan, they are being forced to look at recycling with the businesses and industries they support, in order to keep costs down. The following is a chart outlining the tipping fees in various communities across Canada.



Sanitation Fee Schedule Comparison

City	Commercial Waste	Residential Cost per Tonne	
	per / tonne	Minimum Charge	Cost per Unit
Medicine Hat	\$20.00	less than 1000 kg \$3.00	above 1000 kg \$20.00 per tonne
Moose Jaw	\$21.63	less than 450 kg \$2.00	above 450 kg \$21.63 per tonne
Winnipeg	\$22.50	less than 1000 kg \$4.00	above 1000 kg \$22.50 per tonne
Lloydminster	\$24.00	\$10.00 per tonne	
City of Camrose	\$26.00	less than 192 kg \$5.00	above 193 kg \$26.00 flat fee
City of Brandon	\$34.00	less than 500 kg \$3.00	above 500 kg \$34.00 per tonne
Red Deer	\$37.00	\$37.00 per tonne	
Lethbridge	\$40.00	\$10.00 per tonne	
Saskatoon	\$40.00	less than 250kg - N/C	above 350 kg \$34.00 flat fee
Prince Alberta	\$42.00	\$5.00 per load	above 100 kg \$30.00 flat fee
Dryden	\$70.00	\$70.00 per tonne with a \$14.00 minimum charge	
London	\$75.00	Less than 200 kg \$15.00	Above 1000 kg \$75.00 per tonne (\$300 for asbestos)
Barrie	\$105.00	First 500kg/year – N/C	\$105.00 per tonne
Peterborough	\$85.00	less than 100 kgs \$5.00	\$85.00 per tonne
Kingston	\$110.00	\$110.00 per tonne	
Halifax	\$115.00	less than 100 kgs \$5.00	\$115 per tonne
Moncton	\$55.88	\$55.88 per tonne	

In most cities the amount of commercial waste is every bit as large an issue as residential waste. There are a number of means by which to encourage commercial haulers to promote recycling. Material bans generally place a surcharge on loads entering the landfill tipping face contaminated with materials prohibited under the ban. Material bans have worked effectively in other jurisdictions to divert material from tipping face as has been discussed previously. Another way of doing this is to create a different tipping fee for recycling loads and a substantially higher fee for garbage loads. The Ottawa Valley Waste Recovery Facility has implemented a policy to help ensure its waste diversion objectives are being met. It increases tipping fees substantially for customers that have more than 15% recyclables in a load of refuse. The way they determine this is by having personnel checking each load coming in. This encourages commercial haulers and their customers to be more responsible when making their disposal decisions.



User pay programs have been established in over 6,000 municipalities in North America over the last 20 years. According to an article in the Canadian Tax Journal, “User pay programs provide a means of financing waste collection and disposal, and they give users a financial incentive to reduce waste through source reduction, reuse and recycling”. A properly designed “Pay as you Throw” program once implemented will provide residents with an incentive to participate in waste reduction programs.

In conducting the research for this report, it was evident in order to have an effective “Pay as you Throw” program or to establish garbage as a utility there needs to be infrastructure and programming in place providing clear alternatives.

Options

A number of different options that were investigated as part of this analysis as it relates to the collection and recycling systems. The cost model for each of these options is contained in Appendix A, B, C and D. In all cases the fee recommendation and thus the revenue associated with those fees remains constant across the options.

Option 1 – Replace the existing system with the same system configuration. This would include the following:

- replacing the existing trucks / packers (four) with same vehicle technology;
- adding an additional truck / packer and driver;
- replacing all the backlane metal containers with metal containers;
- replacing 50% of the front street containers;
- keeping the existing blue bag / clear bag and depot systems.

Option 2 – Replace the existing system with individual household garbage containers. This would include the following:

- replacing the existing trucks / packers (four) with the new vehicle technology;
- replacing all the containers with a 120 gallon container for each household;
- keeping the existing blue bag / clear bag and depot systems.

Option 3 – Replace the existing system with individual household garbage, recycling containers. This would include the following:

- replacing the existing trucks / packers (four) with the new vehicle technology;
- adding an additional truck / packer and driver;
- replacing all garbage containers with a 95 gallon container for each household;
- providing all households with a 95 gallon recycling container;
- providing all households with a five gallon organics container;
- converting all existing depots to organics depots except for the one at the Shopper’s Mall.



Option 4 - Replace the existing system with individual household garbage containers and implement a manual curbside recycling program. This would include the following:

- replacing the existing trucks / packers (four) with the new vehicle technology;
- adding an two additional recycling trucks, two drivers and two collectors;
- replacing all garbage containers with a 95 gallon container for each household;
- providing all households with a five gallon recycling container;
- providing all households with a five gallon organics container;
- operate the existing depot system.
- add additional depots to handle organics.

The chart below provides a breakdown of the capital and a four year operating projection for each one of the options.

Option	Capital Cost 2008	Current Operating Budget 2007	Operating			
			2008	2009	2010	2011
Option 1	\$4,155,900	\$1,140,947	\$1,143,347	\$1,208,089	\$1,243,177	\$1,275,180
Option 2	\$2,476,000	\$1,140,947	\$1,119,697	\$1,159,843	\$1,193,966	\$1,224,984
Option 3	\$3,750,000	\$1,140,947	\$1,138,942	\$1,186,347	\$1,169,726	\$1,161,322
Option 4	\$3,036,000	\$1,140,947	\$1,265,741	\$1,325,032	\$1,357,558	\$1,296,285

In reviewing these calculations, the reason Option 1 and 2 do not have the impact to operating costs in 2010 and 2011 that the other options have, and it can be attributed to the increase in diversion levels that are anticipated once the separate recycling program is put in place.

Recommendations

In this section, we will outline the recommendation for the City of Brandon's solid waste management system and then provide the rational in doing so. The recommendations are divided into key system units including Landfill Operations, Recycling / Garbage Collection System, Bylaws / Fees and Implementation:

Landfill Operation Recommendations

- Recommendation #1 - Develop and implement a formal Operations Manual in compliance with the proposed Operating Permit issued by the Provincial Government.
- Recommendation #2 - Develop a Contingency and Emergency Response Plan in accordance with the Industrial Emergency Response Planning Guide (MIAC September, 1996).
- Recommendation #3 – Conduct an engineering study on leachate/surface water run off and develop a system to manage these streams to comply with the proposed Operating Permit.



- Recommendation #4 – In conjunction with Recommendation #3, conduct a engineering study for utilizing the old landfill at 17th Street East as a snow dump.
- Recommendation #5 – In conjunction with Recommendation #3 and #4, develop a sampling and monitoring plan for seepage and surface / ground water discharge.
- Recommendation #6 – Develop an annual reporting process / format for submission to the Province as per the proposed Operating Permit.
- Recommendation #7 - Explore alternate compaction equipment at the time the existing compactor is being replaced.

Rational

The rational for a majority of these recommendations is simply to ensure that the City is in compliance with the new Landfill Operating Permit. There is some concern that in developing a solution to address the leachate at the landfill that having the City's portion of a snow dump located at the site may require a different engineered solution. As a result, as part of the engineering study, it is being recommended that the old landfill site (17th Street East and PR 110) also be explored as a snow dumpsite so that a cost comparison of both alternatives can be considered in the evaluation.

With the changes in the operating license there will be an increase in the operating budget as a result of increased monitoring and reporting requirements. The estimated annual increase will be in the range of \$75,000 annually. In 2008 the department has budgeted \$40,000 additionally to cover groundwater monitoring requirements alone. In terms of development, it is estimated these costs will run in the range of \$50,000 per project to cover costs associated with planning, engineering and impact assessments. These costs have been incorporated in the cost model presented in a following section of this report.

In terms of alternate landfill compaction equipment, with the improving technology and development of material balers municipalities are reviewing available options. In performing this review of operations, it has been determined the potential for improved cell life with the application of baling processes for tipping face refuse is viable. The potential impact to compaction ratios via employment of a refuse baler is in the range of a 25% increase. With the upcoming scheduled replacement of the Compactor unit in 2009, the department will be required to further investigate this model of operation, and the potential this application may have at the Eastview Landfill Site. While increasing diversion levels remains the top priority, until programs and systems are in place to handle all of the various waste streams, it will remain important to ensure that the landfill is maximized in its operation.



Recycling / Garbage Collection System Recommendations

- Recommendation #8 - Implement a residential recycling / garbage collection system that include the following elements:
 - the collection system would be split into two systems; one for garbage and one for recyclables (additional refuse containers could be purchased and owned by the owner).
 - each residence would be provided with one 95 gallon garbage container and one 95 gallon recycling container.
 - each residence would be provided with a 5 gallon kitchen waste container that could be used to collect waste to go to the organics depots.
- Recommendation #9 - Convert the existing depots except for the one at the Shopper's Mall into organic / yard waste depots.
- Recommendation #10 - Establish a bulk item collection system with a nominal pick up fee.
- Recommendation #11 - Work with business and industry to support the establishment of individual workplace recycling programs.

Rational

The current system has been in use since 1989 and for all intents and purposes has lived up to the expectations of the system at the time it was implemented. The system was meant to clean up the City, reduce worker injuries and compensation claims and to improve operating efficiencies. The system however has not necessarily assisted in encouraging citizens to reduce their amount of garbage or to participate in recycling. To purchase five trucks and replace the existing containers with an identical system would have an approximate capital cost of \$4.2 million. The price tag is due to the high cost of replacing metal containers and while there is an alternative plastic containers that size, the cost is similar to the metal containers. A large backlane metal container is in the range of \$1,100 while a 95 gallon container is \$70 meaning we can purchase 15 containers for the price of one large container.

There are other issues of concern with one of the greatest being the risk of obsolescence. There is now only one company that produces the side load packer and lifting system that we currently use and only a few remaining locations in Alberta and Texas that have not converted. As concerns about diversion have increased across North America, most communities have gone to the smaller bin systems and as such, the industry has retired the old systems and has invested in the technology to support a smaller bin system. We will need to replace our trucks and packers at least once (and maybe twice as the life cycle costing is evaluated) in the life of the next set of bins and there is a significant concern that the trucks will not be available and a customer solution could be required, driving up the cost of packer replacement. When we consider the



efficiencies of the new packer systems, and the reliability of that equipment, it further enhances the business case.

In the past the reasons for switching to an automated system was in providing a better quality work environment for its collection staff, control operating cost and to clean up the City. The focus now needs to be in how to influence waste diversion amongst residents. We know in order to attain the highest recycling participation rates, many cities are moving towards dedicated home to home curbside recycling collection. At current, the only large city in Canada that does not currently have a blue box program in place is Calgary, and in some provinces it is legislated. The Cities of Regina and Saskatoon are both in the process of changing from the same system as in operation in Brandon, to new technology, consisting of single resident bins and Winnipeg has already made the conversion. Through the analysis of recyclable recovery rates in Brandon we know at a minimum individual bins are providing more than double the diversion rate of the larger back lane bins. This type of program provides little barrier for residents to participate. It is anticipated a well run program will have participation rates in excess of 85% over the whole city.

To verify some of our findings, we contacted the City of Winnipeg to enquire about their experience in recycling participation rates in the autobin collection areas and about the results they had experienced with the implementation of their blue box program. The following is a summary of that information:

- they had also experienced a significant decrease in participation levels in areas where back lane bins were being utilized.
- when the City of Winnipeg began their blue box program a number of years ago they had City wide participation of around 50%. Since that time participation rates have grown to 86% city wide. It has been stated within the industry that peer pressure does encourage participation. In other words, people will participate if they know others will be aware if they are or are not participating within a program. The City of Winnipeg and many cities appear to agree the blue box program had a direct impact on their participation levels.
- A study is completed on an annual basis during a five week period. In the blue box program, a resident is considered as participating if they set their box out once in a five week time period. The facts and figures from their report support our evaluation that participation is related to social and economic conditions, often linking into the areas for which residents live.

The proposed organic depot program addresses a couple of issues. The first one is that it provides an alternate avenue for residents to address their quantity of garbage. While we certainly hope individuals consider either back yard composting or using the depots on a regular basis. We are also aware some may not choose to do so however, the option to take their organics to the depot is there in the case when they have too much garbage for their regular container. This also ensures we do not oversize the containers for those exceptional circumstances such as fall leaf pickup. The second aspect that this starts to bring to light is the diversion of kitchen and organic waste from the garbage



stream. At this time we did not propose a specific organics pickup process however we believe in order to meet the diversion levels in other communities, this will need to be an element of our future system. In this initial phase we believe the depots and the five gallon kitchen waste containers will bring a level of awareness to the community and will position us to better address this in future phases of the plan. It also provides us the time to monitor the performance of other organic pick up systems across the country.

On another front, while it is not being recommended at this time, this system positions the community to consider a “Pay as you Throw” system in the future. The trucks will contain cameras, are GPS and barcoding prepared and the containers are imbedded with computer chips as part of the manufacturing process. There are a number of communities utilizing these systems for this type of program, so there is little reason this can not be considered for the future.

The capital cost of implementing this system will be approximately \$3,750,000 which will include the purchase of five trucks, the conversion of a truck to do bulk pickups and 32,000 ninety-five gallon containers and 16,000 five gallon containers. To validate that only five new trucks would be required to pickup the 32,000 containers, it was a comparison to Port Coquitlam. In Port Coquitlam, they currently pick up 36,000 containers (three systems – garbage, recycling and kitchen waste) with five trucks.

While much of our focus has been around the risk and cost of converting the system, there are additional benefits:

- Currently new home owners are required to purchase their own containers and the cost of one front street container is \$425 while with the new system the two containers will be purchased for around the \$200 when we add on the cost of transportation;
- Apartment residents will be able to participate in this program due to plans placing recycling containers at these locations. Currently commercial haulers take refuse directly to the tipping face, so even those individuals who might have been placing items in blue bags will not have had those items recycled. The garbage will continue to be picked up by the commercial haulers;
- Converting to this system will generate savings in the existing recycling contract with IPI. In discussions with IPI, they believe that they will no longer ship recyclables into Winnipeg, but will ship them directly to market from Brandon. This will save us the cost of trucking. In addition there will be labor savings on the sort line that will also be passed on to the City. These savings have been included in the Option 3 and 4 cost models.

Bylaws and Fees Recommendations

- Recommendation #12 - Remove the Residential Tipping Fee of \$3.00.
- Recommendation #13 - Remove the Freon Depleting Device Fee.



- Recommendation #14 - Establish a Commercial Recycling Tipping Fee and start the process of the implementing a spread between Commercial Refuse and Recycling Fees.
- Recommendation #15 - Update the bylaw to reflect the changes in the system for Council approval.
- Recommendation #16 - Update the bylaw to establish enforceable consequences for non-compliance to the system for Council approval.

Rational

As discussed, one of the issues arising from the implementation of fees has been the increase in illegal dumping. The revenue we generate from the Residential Tipping Fee and the Freon Depleting Device Fee does not cover the cost of the clean up and further more the illegal dumping is a bad reflection on the community. Secondly, it is important in implementing the new system that citizens are provided with no cost / low cost alternatives to address large garbage items.

It is estimated commercially (refuse generated by business) in excess of 30% of all refuse is composed of cardboard or other paper products that could be diverted and recycled. Currently the one fee for tipping provides no incentive for the commercial haulers, industry or business to implement recycling programs in their workplaces or to consider alternate packaging diversion programs. Establishing this type of fee structure will encourage recycling at the same time will ensure that cost recovery levels can be maintained. If we were to look at the same cost models as presented earlier and apply the split fee, then we can see in the chart below that in implementing Option 3 (as recommended) we will have the ability to hold operating costs.

Options	Capital Cost 2008	Current Operating Budget 2007	Operating				15 Year Cost Operations & Capital
			2008	2009	2010	2011	
Option 1	\$4,155,900	\$1,140,957	\$1,143,347	\$1,208,089	\$1,243,177	\$1,275,180	\$27,185,027
Option 2	\$2,476,000	\$1,140,957	\$1,119,697	\$1,159,843	\$1,193,966	\$1,224,984	\$22,848,843
Option 3	\$3,750,000	\$1,140,957	\$1,138,942	\$1,186,347	\$1,169,726	\$1,161,322	\$22,093,385
Option 4	\$3,036,000	\$1,140,957	\$1,265,741	\$1,325,032	\$1,357,558	\$1,296,285	\$24,867,298

At this point of time, it has not been recommended to implement landfill bans. As mentioned, bans are generally implemented in order to support Extended Producer Responsibility programs in order to ensure they have a quantity of raw material to support their program. Green Manitoba has been actively working with producers to establish these programs and through this process, bans maybe implemented at a provincial level to support this activity. At a municipal level we may at some point in time choose to implement bans as a means for increasing revenue for our programs, but it is believed with the changes being proposed, this may only complicate the implementation of the other programs.



As discussed, the existing bylaw will be required to be updated to reflect any of the approved changes and Council will be able to approve those changes as part of the bylaw process.

Implementation Recommendations

- Recommendation #17 - Contract with a communication / education professional to develop an education program to support the change over in system.
- Recommendation #18 - Establish an ongoing reporting system to provide diversion information to the community.
- Recommendation #19 - Research and develop the next phase of this strategy based on progress in reaching a 50% diversion target, considering changes in Green Manitoba's programming and in evaluating new technology.

Rational

The new system will bring about as much change to the City as the original conversion to the automated system, and a considerable amount of education and communication with citizens will be required. In an effort to facilitate this, a staff person would be assigned full time to meet individually with citizens to work through issues and concerns on a request by request basis. Additional staff will be utilized to support this activity as required. Some of the most common concerns and questions that are anticipated include:

- Front Street or Back Lane Pick up – where will I place my container?
- Elderly and disabled residents - how will I get my container to the curb or lane for collection?
- Large / bulky items – how will residents deal with these items?
- I will have less space and ability to dispose of my refuse – what will I do?
- Do I have to put out the recycling container each time?
- Apartments and condominiums – how will these be serviced?
- What should be placed in the recycling bins?

Many of these issues were the same issues identified when the system was first installed and at that time considerable support was provided in order to smooth the transition. It is clearly understood the success of the implementation will be directly impacted by the communication and support provided in making the change.

There will be two separate levels of education required around the proposed changes. The first one will be in terms of having the community understand the “why” or “need” behind the changes. The challenge will be having the community understand the need for increased diversion and to understand the need to convert the entire collection system when some containers are still functional and to understand that the collection system change is part of a bigger picture. The second level will be in education around



the system, bylaws and programs in themselves. Of course the better the message is developed and delivered the better the result.

In order to effectively meet the needs of all participants in the program different strategies will need to be developed in order to target different segments of the population. A different strategy for home owners, businesses, apartment dwellers and school children will broaden our focus and provide better opportunity to achieve our waste diversion goals. To this end, we anticipate contracting with a professional in this field to develop both an initial but also an ongoing communication and education plan that will incorporate website, print and visual media.

Implementation

As mentioned previously, we would anticipate implementing the recommendations over a three year period. The following is a breakdown of a proposed schedule for all the recommendations.



Proposed Implementation Schedule

[illegible]

Conclusion

At this point in time, the City of Brandon is at a significant decision point in solid waste management; the existing collection system bins have outlived their expected life cycle, the trucks are due for replacement and the existing “blue bag” recycling program has not yielded satisfactory diversion levels. Our community has said that, “Brandon shall be a leader in environmental stewardship” and this is an opportunity to position ourselves to achieve that desirable future.

The ten year goals established and which provided the framework for this initial phase were:

- to meet or exceed the diversion rates of the best communities in the country;
- develop a system that is affordable and efficient;
- extend the use of the existing landfill beyond 75 years;
- contain all ground and water contamination to the landfill site.

Implementing the recommendations contained in this report is the first step in this process and it will not enable us to meet these goals, however it will position us as a community to continue to push towards them. As these are implemented, we will need to continue to closely monitor the industry, review available technologies and measure our own diversion levels.

As we all become more aware of the impact we as individual have on the environment, regulations and financial impacts in not being environmentally responsible will continue to increase. As a municipality we need to protect ourselves from these costs and ensure we provide the systems and leadership to allow our citizens to assist us in meeting these challenges head on.



Appendices

Appendix A – Option 1 Cost Model

Appendix B – Option 2 Cost Model

Appendix C – Option 3 Cost Model

Appendix D – Option 4 Cost Model

Appendix E – Curbside Recycling

Appendix A
Cost Model - Option 1

REVENUES		Budget 2006	Budget 2007	Budget 2008	Budget 2009	Budget 2010	Budget 2011
Conditional Grants	12.2487.0000	(\$360,000.00)	(\$360,000.00)	(\$367,200.00)	(\$376,380.00)	(\$376,380.00)	(\$376,380.00)
Sales	12.0616.0000	(\$23,675.00)	(\$20,500.00)	(\$26,200.00)	(\$26,700.00)	(\$26,700.00)	(\$26,700.00)
Services	12.0691.0000	(\$18,705.00)	\$0.00	(\$32,796.00)	(\$33,780.00)	(\$33,780.00)	(\$33,780.00)
Garbage Removal Fees	12.0692.0000	(\$17,303.00)	(\$81,992.00)	(\$20,000.00)	(\$20,000.00)	(\$20,000.00)	(\$20,000.00)
Tires	12.6014.0157	(\$2,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Snow Dumping	12.6014.0245	(\$5,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Household Refuse	12.6014.0901	(\$39,000.00)	(\$30,000.00)	(\$5,000.00)	(\$7,500.00)	(\$7,500.00)	(\$10,000.00)
Freon Deleting Devices	12.6014.0902	(\$2,104.00)	(\$1,200.00)	\$0.00	\$0.00	\$0.00	\$0.00
Material Recycling Fees	12.6014.0908	(\$10,964.00)	(\$19,200.00)	\$ (19,200.00)	\$ (24,632.89)	\$ (33,336.52)	\$ (43,504.15)
Recycling - External	12.6014.0909		(\$98,502.00)	(\$98,502.00)	(\$98,502.00)	(\$98,502.00)	(\$98,502.00)
Receipts - Commercial	12.6014.0990	(\$750,000.00)	(\$912,000.00)	\$ (931,194.00)	(\$949,817.88)	(\$968,814.24)	(\$988,190.52)
Municipal Fees	12.6014.0991	(\$35,510.00)	(\$49,344.00)	(\$50,000.00)	(\$50,000.00)	(\$50,000.00)	(\$50,000.00)
TOTAL: REVENUES		(\$904,261.00)	(\$1,572,738.00)	(\$1,550,092.00)	(\$1,587,312.77)	(\$1,615,012.75)	(\$1,647,056.67)
EXPENSES		Budget 2006	Budget 2007	Budget 2008	Budget 2009	Budget 2010	Budget 2011
RESERVE APPROPRIATIONS	12.2566.1544	\$175,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000
Disposal Site Fees - City Internal	12.1022.0248	(\$12,375.00)	(\$30,000)	(\$30,000)	(\$30,000)	(\$30,000)	(\$30,000)
Recovery Commercial	12.1022.0249		(\$1,768)	(\$1,820)	(\$1,820)	(\$1,820)	(\$1,820)
Recovery Residential	12.1022.0250	(\$496,400.00)	(\$540,400)	(\$570,500)	(\$591,500)	(\$591,500)	(\$591,500)
Litter Collection	12.0165	\$31,257.00	\$28,560	\$21,121	\$14,688	\$14,982	\$15,281
Bulk Item Pick Up	12.0166	\$15,048.00	\$19,086	\$36,910	\$37,069	\$37,810	\$38,567
Sanitation Administration	12.0204	\$168,188.00	\$148,531	\$268,631	\$275,539	\$281,050	\$286,671
Disposal Sites	12.0208	\$724,159.00	\$636,371	\$630,539	\$654,482	\$667,572	\$680,923
Landfill Development	12.0209	\$226,240.00	\$10,000	\$0	\$0	\$0	\$0
Composting Operations	12.1021	\$176,326.00	\$170,380	\$107,448	\$155,597	\$158,709	\$161,883
Eco Center	12.1024	(\$1,783.00)	\$1,576	\$1,322	\$1,417	\$1,445	\$1,474
Material Recovery Facility	12.1025		\$66,212	\$99,709	\$101,042	\$103,063	\$105,124
Haul Site Leveling	12.6280	\$20,810.00	\$17,986	\$0	\$0	\$0	\$0
Commercial Collection	12.9963	\$51,570.00	\$27,776	\$15,623	\$15,799	\$16,115	\$16,437
Residential Collection	12.9964	\$1,213,607.00	\$1,196,280	\$1,149,138	\$1,172,121	\$1,195,563	\$1,219,474
Recycling Operations	12.1023		\$644,180	\$649,093	\$662,075	\$675,316	\$688,823
Solid Waste Initiatives - Advertising	12.9965.0003	\$18,915.00	\$18,915	\$16,225	\$16,225	\$16,550	\$16,880
Additional Costs - Organics Processing					\$12,668	\$13,335	\$14,018
TOTAL: OPERATIONS		\$2,310,562.00	\$2,713,685.00	\$2,693,439.00	\$2,795,401.96	\$2,858,189.30	\$2,922,236.19
TOTAL NET COST: OPERATIONS		\$1,406,301.00	\$1,140,947.00	\$1,143,347.00	\$1,208,089.19	\$1,243,176.55	\$1,275,179.52

Appendix B
Cost Model - Option 2

REVENUES		Budget 2006	Budget 2007	Budget 2008	Budget 2009	Budget 2010	Budget 2011
Conditional Grants	12.2487.0000	(\$360,000.00)	(\$360,000.00)	(\$367,200.00)	(\$376,380.00)	(\$376,380.00)	(\$376,380.00)
Sales	12.0616.0000	(\$23,675.00)	(\$20,500.00)	(\$26,200.00)	(\$26,700.00)	(\$26,700.00)	(\$26,700.00)
Services	12.0691.0000	(\$18,705.00)	\$0.00	(\$32,796.00)	(\$33,780.00)	(\$33,780.00)	(\$33,780.00)
Garbage Removal Fees	12.0692.0000	(\$17,303.00)	(\$81,992.00)	(\$20,000.00)	(\$20,000.00)	(\$20,000.00)	(\$20,000.00)
Tires	12.6014.0157	(\$2,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Snow Dumping	12.6014.0245	(\$5,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Household Refuse	12.6014.0901	(\$39,000.00)	(\$30,000.00)	(\$5,000.00)	(\$7,500.00)	(\$7,500.00)	(\$10,000.00)
Freon Deleting Devices	12.6014.0902	(\$2,104.00)	(\$1,200.00)	\$0.00	\$0.00	\$0.00	\$0.00
Material Recycling Fees	12.6014.0908	(\$10,964.00)	(\$19,200.00)	\$ (19,200.00)	\$ (24,632.89)	\$ (33,336.52)	\$ (43,504.15)
Recycling - External	12.6014.0909		(\$98,502.00)	(\$98,502.00)	(\$98,502.00)	(\$98,502.00)	(\$98,502.00)
Receipts - Commercial	12.6014.0990	(\$750,000.00)	(\$912,000.00)	\$ (931,194.00)	(\$949,817.88)	(\$968,814.24)	(\$988,190.52)
Municipal Fees	12.6014.0991	(\$35,510.00)	(\$49,344.00)	(\$50,000.00)	(\$50,000.00)	(\$50,000.00)	(\$50,000.00)
TOTAL: REVENUES		(\$904,261.00)	(\$1,572,738.00)	(\$1,550,092.00)	(\$1,587,312.77)	(\$1,615,012.75)	(\$1,647,056.67)
EXPENSES		Budget 2006	Budget 2007	Budget 2008	Budget 2009	Budget 2010	Budget 2011
RESERVE APPROPRIATIONS	12.2566.1544	\$175,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000
Disposal Site Fees - City Internal	12.1022.0248	(\$12,375.00)	(\$30,000)	(\$30,000)	(\$30,000)	(\$30,000)	(\$30,000)
Recovery Commercial	12.1022.0249		(\$1,768)	(\$1,820)	(\$1,820)	(\$1,820)	(\$1,820)
Recovery Residential	12.1022.0250	(\$496,400.00)	(\$540,400)	(\$570,500)	(\$591,500)	(\$591,500)	(\$591,500)
Litter Collection	12.0165	\$31,257.00	\$28,560	\$21,121	\$14,688	\$14,982	\$15,281
Bulk Item Pick Up	12.0166	\$15,048.00	\$19,086	\$36,910	\$37,069	\$37,810	\$38,567
Sanitation Administration	12.0204	\$168,188.00	\$148,531	\$268,631	\$275,539	\$281,050	\$286,671
Disposal Sites	12.0208	\$724,159.00	\$636,371	\$630,539	\$654,482	\$667,572	\$680,923
Landfill Development	12.0209	\$226,240.00	\$10,000	\$0	\$0	\$0	\$0
Composting Operations	12.1021	\$176,326.00	\$170,380	\$107,448	\$155,597	\$158,709	\$161,883
Eco Center	12.1024	(\$1,783.00)	\$1,576	\$1,322	\$1,417	\$1,445	\$1,474
Material Recovery Facility	12.1025		\$66,212	\$99,709	\$101,042	\$103,063	\$105,124
Haul Site Leveling	12.6280	\$20,810.00	\$17,986	\$0	\$0	\$0	\$0
Commercial Collection	12.9963	\$51,570.00	\$27,776	\$15,623	\$15,799	\$16,115	\$16,437
Residential Collection	12.9964	\$1,213,607.00	\$1,196,280	\$1,125,488	\$1,123,875	\$1,146,352	\$1,169,279
Recycling Operations	12.1023		\$644,180	\$649,093	\$662,075	\$675,316	\$688,823
Solid Waste Initiatives - Advertising	12.9965.0003	\$18,915.00	\$18,915	\$16,225	\$16,225	\$16,550	\$16,880
Additional Costs - Organics Processing					\$12,668	\$13,335	\$14,018
TOTAL: OPERATIONS		\$2,310,562.00	\$2,713,685.00	\$2,669,789.00	\$2,747,155.96	\$2,808,978.38	\$2,872,041.05
TOTAL NET COST: OPERATIONS		\$1,406,301.00	\$1,140,947.00	\$1,119,697.00	\$1,159,843.19	\$1,193,965.63	\$1,224,984.38

Appendix C
Cost Model - Option 3

REVENUES		Budget 2006	Budget 2007	Budget 2008	Budget 2009	Budget 2010	Budget 2011
Conditional Grants	12.2487.0000	(\$360,000.00)	(\$360,000.00)	(\$367,200.00)	(\$376,380.00)	(\$376,380.00)	(\$376,380.00)
Sales	12.0616.0000	(\$23,675.00)	(\$20,500.00)	(\$26,200.00)	(\$26,700.00)	(\$26,700.00)	(\$26,700.00)
Services	12.0691.0000	(\$18,705.00)	\$0.00	(\$32,796.00)	(\$33,780.00)	(\$33,780.00)	(\$33,780.00)
Garbage Removal Fees	12.0692.0000	(\$17,303.00)	(\$81,992.00)	(\$20,000.00)	(\$20,000.00)	(\$20,000.00)	(\$20,000.00)
Tires	12.6014.0157	(\$2,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Snow Dumping	12.6014.0245	(\$5,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Household Refuse	12.6014.0901	(\$39,000.00)	(\$30,000.00)	(\$5,000.00)	(\$7,500.00)	(\$7,500.00)	(\$10,000.00)
Freon Deleting Devices	12.6014.0902	(\$2,104.00)	(\$1,200.00)	\$0.00	\$0.00	\$0.00	\$0.00
Material Recycling Fees	12.6014.0908	(\$10,964.00)	(\$19,200.00)	\$ (24,200.00)	\$ (24,632.89)	\$ (33,336.52)	\$ (43,504.15)
Recycling - External	12.6014.0909		(\$98,502.00)	(\$138,679.20)	(\$168,911.27)	(\$190,494.37)	(\$232,022.14)
Receipts - Commercial	12.6014.0990	(\$750,000.00)	(\$912,000.00)	\$ (931,194.00)	(\$949,817.88)	(\$968,814.24)	(\$988,190.52)
Municipal Fees	12.6014.0991	(\$35,510.00)	(\$49,344.00)	(\$50,000.00)	(\$50,000.00)	(\$50,000.00)	(\$50,000.00)
TOTAL: REVENUES		(\$904,261.00)	(\$1,572,738.00)	(\$1,595,269.20)	(\$1,657,722.04)	(\$1,707,005.12)	(\$1,780,576.82)
EXPENSES		Budget 2006	Budget 2007	Budget 2008	Budget 2009	Budget 2010	Budget 2011
RESERVE APPROPRIATIONS	12.2566.1544	\$175,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000
Disposal Site Fees - City Internal	12.1022.0248	(\$12,375.00)	(\$30,000)	(\$30,000)	(\$30,000)	(\$30,000)	(\$30,000)
Recovery Commercial	12.1022.0249		(\$1,768)	(\$1,820)	(\$1,820)	(\$1,820)	(\$1,820)
Recovery Residential	12.1022.0250	(\$496,400.00)	(\$540,400)	(\$570,500)	(\$591,500)	(\$591,500)	(\$591,500)
Litter Collection	12.0165	\$31,257.00	\$28,560	\$14,663	\$14,688	\$14,982	\$15,281
Bulk Item Pick Up	12.0166	\$15,048.00	\$19,086	\$36,910	\$37,069	\$37,810	\$38,567
Sanitation Administration	12.0204	\$168,188.00	\$148,531	\$268,631	\$275,539	\$281,050	\$286,671
Disposal Sites	12.0208	\$724,159.00	\$636,371	\$630,539	\$654,482	\$667,572	\$680,923
Landfill Development	12.0209	\$226,240.00	\$10,000	\$0	\$0	\$0	\$0
Composting Operations	12.1021	\$176,326.00	\$170,380	\$107,448	\$155,597	\$158,709	\$161,883
Eco Center	12.1024	(\$1,783.00)	\$1,576	\$1,322	\$1,417	\$1,445	\$1,474
Material Recovery Facility	12.1025		\$66,212	\$99,709	\$101,042	\$103,063	\$105,124
Haul Site Leveling	12.6280	\$20,810.00	\$17,986	\$0	\$0	\$0	\$0
Commercial Collection	12.9963	\$51,570.00	\$27,776	\$15,623	\$15,799	\$16,115	\$16,437
Residential Collection	12.9964	\$1,213,607.00	\$1,196,280	\$1,149,138	\$1,152,874	\$1,140,153	\$1,154,145
Recycling Operations	12.1023		\$644,180	\$696,323	\$713,567	\$727,838	\$742,395
Solid Waste Initiatives - Advertising	12.9965.0003	\$18,915.00	\$18,915	\$16,225	\$16,225	\$16,550	\$16,880
Additional Costs - Organics Processing					\$29,090	\$34,765	\$45,438
TOTAL: OPERATIONS		\$2,310,562.00	\$2,713,685.00	\$2,734,211.00	\$2,844,069.27	\$2,876,731.44	\$2,941,898.50
TOTAL NET COST: OPERATIONS		\$1,406,301.00	\$1,140,947.00	\$1,138,941.80	\$1,186,347.24	\$1,169,726.31	\$1,161,321.68

Appendix D
Cost Model - Option 4

REVENUES		Budget 2006	Budget 2007	Budget 2008	Budget 2009	Budget 2010	Budget 2011
Conditional Grants	12.2487.0000	(\$360,000.00)	(\$360,000.00)	(\$367,200.00)	(\$376,380.00)	(\$376,380.00)	(\$376,380.00)
Sales	12.0616.0000	(\$23,675.00)	(\$20,500.00)	(\$26,200.00)	(\$26,700.00)	(\$26,700.00)	(\$26,700.00)
Services	12.0691.0000	(\$18,705.00)	\$0.00	(\$32,796.00)	(\$33,780.00)	(\$33,780.00)	(\$33,780.00)
Garbage Removal Fees	12.0692.0000	(\$17,303.00)	(\$81,992.00)	(\$20,000.00)	(\$20,000.00)	(\$20,000.00)	(\$20,000.00)
Tires	12.6014.0157	(\$2,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Snow Dumping	12.6014.0245	(\$5,000.00)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Household Refuse	12.6014.0901	(\$39,000.00)	(\$30,000.00)	(\$5,000.00)	(\$7,500.00)	(\$7,500.00)	(\$10,000.00)
Freon Deletng Devices	12.6014.0902	(\$2,104.00)	(\$1,200.00)	\$0.00	\$0.00	\$0.00	\$0.00
Material Recycling Fees	12.6014.0908	(\$10,964.00)	(\$19,200.00)	\$ (24,200.00)	\$ (24,632.89)	\$ (33,336.52)	\$ (43,504.15)
Recycling - External	12.6014.0909		(\$98,502.00)	(\$138,679.20)	(\$159,527.31)	(\$171,444.93)	(\$193,351.79)
Receipts - Commercial	12.6014.0990	(\$750,000.00)	(\$912,000.00)	\$ (931,194.00)	(\$949,817.88)	(\$968,814.24)	(\$988,190.52)
Municipal Fees	12.6014.0991	(\$35,510.00)	(\$49,344.00)	(\$50,000.00)	(\$50,000.00)	(\$50,000.00)	(\$50,000.00)
TOTAL: REVENUES		(\$904,261.00)	(\$1,572,738.00)	(\$1,595,269.20)	(\$1,648,338.08)	(\$1,687,955.69)	(\$1,741,906.46)
EXPENSES		Budget 2006	Budget 2007	Budget 2008	Budget 2009	Budget 2010	Budget 2011
RESERVE APPROPRIATIONS	12.2566.1544	\$175,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000
Disposal Site Fees - City Internal	12.1022.0248	(\$12,375.00)	(\$30,000)	(\$30,000)	(\$30,000)	(\$30,000)	(\$30,000)
Recovery Commercial	12.1022.0249		(\$1,768)	(\$1,820)	(\$1,820)	(\$1,820)	(\$1,820)
Recovery Residential	12.1022.0250	(\$496,400.00)	(\$540,400)	(\$570,500)	(\$591,500)	(\$591,500)	(\$591,500)
Litter Collection	12.0165	\$31,257.00	\$28,560	\$14,663	\$14,688	\$14,982	\$15,281
Bulk Item Pick Up	12.0166	\$15,048.00	\$19,086	\$36,910	\$37,069	\$37,810	\$38,567
Sanitation Administration	12.0204	\$168,188.00	\$148,531	\$268,631	\$275,539	\$281,050	\$286,671
Disposal Sites	12.0208	\$724,159.00	\$636,371	\$630,539	\$654,482	\$667,572	\$680,923
Landfill Development	12.0209	\$226,240.00	\$10,000	\$0	\$0	\$0	\$0
Composting Operations	12.1021	\$176,326.00	\$170,380	\$107,448	\$155,597	\$158,709	\$161,883
Eco Center	12.1024	(\$1,783.00)	\$1,576	\$1,322	\$1,417	\$1,445	\$1,474
Material Recovery Facility	12.1025		\$66,212	\$99,709	\$101,042	\$103,063	\$105,124
Haul Site Leveling	12.6280	\$20,810.00	\$17,986	\$0	\$0	\$0	\$0
Commercial Collection	12.9963	\$51,570.00	\$27,776	\$15,623	\$15,799	\$16,115	\$16,437
Residential Collection	12.9964	\$1,213,607.00	\$1,196,280	\$1,171,337	\$1,175,683	\$1,205,075	\$1,154,145
Recycling Operations	12.1023		\$644,180	\$800,923	\$820,059	\$836,460	\$853,189
Solid Waste Initiatives - Advertising	12.9965.0003	\$18,915.00	\$18,915	\$16,225	\$16,225	\$16,550	\$16,880
Additional Costs - Organics Processing					\$29,090	\$30,003	\$30,936
TOTAL: OPERATIONS		\$2,310,562.00	\$2,713,685.00	\$2,861,010.00	\$2,973,370.27	\$3,045,513.28	\$3,038,191.39
TOTAL NET COST: OPERATIONS		\$1,406,301.00	\$1,140,947.00	\$1,265,740.80	\$1,325,032.19	\$1,357,557.59	\$1,296,284.93

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Curbside Recycling, the Next Generation:

A Model for Local Government Recycling and Waste Reduction

Overview

Curbside recycling has become as American as apple pie. More than 139 million Americans now have access to curbside collection of a myriad of recyclable materials. More Americans now recycle than vote.

California was an early leader in the tremendous growth in this sector of the recycling industry. Curbside recycling programs were developed in most communities in California after the passage of the Integrated Waste Management Act (AB 939, Sher, Chapter 1095, Statutes of 1989 as amended [IWMA]).

Hundreds of millions of dollars have been invested in recycling by both the public and private sector during the past decade. These investments include collection vehicles and processing facilities to make curbside recycling an everyday reality for most Californians. However, the programs that were developed in the late 1980s and early to mid-1990s have begun to be replaced by the next generation of curbside recycling programs.

The next generation of programs is striving to collect even more recyclable materials as efficiently as possible. That has led to a number of key developments, including the following:

- Pay-as-you-throw programs, which provide residents with incentives to recycle more and waste less.
- Larger, more sophisticated materials recovery facilities (MRF) that can process more materials with no more residues.
- Increased collection of materials, especially mixed paper, corrugated cardboard boxes, and more types of plastics (despite continuing marketing problems.)
- Commingling of recyclable materials to collect more materials more quickly.

- Co-collection of garbage, recyclables, and/or organics in the same truck, but in different compartments.
- Collection of food discards and food-soiled paper with yard trimmings.
- Automated and semi-automated collection.
- Collection from single-family, multifamily, and small businesses in one truck.

Program Characteristics

Curbside programs have grown dramatically over the last decade. *BioCycle* magazine's annual "State of Garbage in America" series shows increases of more than 278 percent in California, and more than 375 percent nationally in population served since 1990. Programs and population covered in California reached a peak in 1996.

Studies completed for the Solid Waste Association of North America (SWANA) in California and nationally (see references) have produced data from hundreds of curbside recycling programs. These SWANA studies used statistical techniques to provide reliable information on the impacts of demographics, program designs, and financial features on the performance of curbside recycling programs.

The studies provide information on the impacts of program features—separate from the demographic differences in communities (for example, income, population, urban/rural) and other program features. The impact of commingled collection effectively holds the mix of materials accepted by programs constant.

The SWANA study results summarized in Table 2 are "additive." If the community's recycling rate is already 12 percent, the effect of moving to commingled collection (using the California results) would be to add 2 to 4 percentage points

Table 1: Number of Curbside Recycling Programs and Population Served—California and National

Year	California Number of Programs	California Population Served	National Number of Programs	National Population Served
1988			1,050	
1989			1,500	
1990	254	6,475,000	2,711	37,054,300
1991	369	11,000,000	3,912	65,064,300
1992	446	15,200,000	5,404	77,603,387
1993	464	15,548,000	6,678	101,353,325
1994	496	17,850,000	7,265	108,000,000
1995	503	18,700,000	7,375	121,000,000
1996	511	20,882,000	8,817	134,630,000
1997	496	17,800,000	8,937	135,568,000
1998	511	18,000,000	9,349	139,415,000

Sources: “The State of Garbage in America,” (annual series in *BioCycle* magazine); Jim Glenn, March 1990, pp. 48–53 and April 1990, pp. 34–41; J. Glenn and David Riggle, April 1991, pp. 34–38 and May 1991, pp. 30–35; J. Glenn, April 1992, pp. 45–55 and May 1992, pp. 30–37; Robert Steuteville and Nora Goldstein, May 1993, pp. 42–50; R. Steuteville et al., June 1993, pp. 32–37; R. Steuteville, April 1994, pp. 45–52 and May 1994, pp. 30–36; R. Steuteville, April 1995, pp. 54–63 and May 1995, pp. 30–37; R. Steuteville, April 1996, pp. 54–61 and May 1996, pp. 35–41; N. Goldstein, April 1997, pp. 60–67; N. Goldstein and J. Glenn, May 1997, pp. 71–75; J. Glenn, April 1998, pp. 32–43 and May 1998, pp. 48–52; J. Glenn, April 1999, pp. 60–71.

of recycling. The new recycling total would be 14 to 16 percent. Adding multiple changes together will yield results that are close to (but not exactly) what would be expected.

The California study also examined which program features were associated with higher and lower program costs. Table 3 summarizes which program changes might be most cost-effective for a community.

Those changes that add lots of tonnage (Table 2) and decrease costs—or cost very little (Table 3)—show the most promise for cost-effective programs in communities.

The combination of these findings suggest that the best ways for communities to increase tonnage most cost effectively would be to take the following actions:

- Implement pay-as-you-throw rates.

This approach would provide the largest increase in tonnages for recycling, and the cost impacts are small. (Studies other than the referenced studies have shown no increased costs or decreases in costs when implementing pay-as-you-throw (or “variable rates” in most communities). Pay-as-

you-throw rates also increase yard waste recycling tonnages, and they encourage residents to be more careful in what they buy so they can avoid creating wastes. Preventing waste is the cheapest waste management strategy.

Communities in California usually charge double for twice the service level (“a can is a can”). A few communities in the state charge even higher premiums, which could be more than twice the 30-gallon rate for 60 gallons of service.

- Commingle collection.

Commingling results in extra recycling tonnages and lower costs. However, suitable processing facilities are required to make this work successfully.

In the early years of recycling, three-bin separated programs were quite common. Commingling was considered more problematic. Program managers encouraged customers to think of the materials as a resource, not just another garbage stream. In addition, contamination and materials quality were legitimate concerns, because processing facilities for commingled programs were generally not available.

Table 2: Estimated Impacts of Program Design Options on Recycling Diversion

Program Feature	National Estimated Recycling Impact	California Estimated Recycling Impact
Variable rates	+5 to 6% points	+3 to 4% points
Weekly recycling collection	+2 to 4% points	Not estimated
Add materials	+2 to 4% points	+3 to 5% points
Commingled collection	+1 to 3% points	+2 to 4% points
Older programs		+3 to 5% points
No separate recycling charges		+2 to 4% points
Providing bins		+1 to 2% points

Sources: Lisa Skumatz, "Nationwide Diversion Rate Study," 1996; and "Achieving 50% in California," 1999. SERA, Inc., used with permission of the author.

In large part due to the IWMA, the public and private sectors in California have invested hundreds of millions of dollars to develop much greater processing capacity. In recent years, new processing capacity has been built with the capabilities of processing commingled recyclables without increasing the amount of residue from sorting those materials at a MRF.

The biggest concern about commingling has been the concern that materials recovered would be less valuable. In some instances, that has happened. However, with aggressive marketing and market development programs, this effect can be minimized.

One of the most powerful forces in favor of commingling has been the increased number of materials curbside recycling programs are able to collect.

In addition, due in large part to concerns about worker injuries and costs of worker compensation, many communities have adopted automated collection programs. Automated commingled programs reduce costs and increase consumer convenience.

Table 3. Estimated Percentage Changes in Program Costs from Program Choices and Changes

Program Feature	Estimated Cost Impact
Commingled collection	20 to 35% lower
Less than weekly collection	20 to 40% lower
Mandatory recycling	10 to 25% lower
Older program	10 to 25% lower
Automating collection	5 to 15% higher
Adding variable rates	10 to 20% higher
Adding new materials	15 to 35% higher

Sources: Lisa Skumatz, "Nationwide Diversion Rate Study" and "Achieving 50% in California." SERA, Inc., used with permission of the author.

The combination of these factors has made commingled collection programs more attractive and cost-effective to many communities.

Commingled programs fit very well with less frequent collection. This program (potentially combined with automation) can lead to very substantial reductions in the cost of providing service.

Commingled programs are moving toward pulling out one material (either paper or glass) and setting that alongside or on top of the recycling container. This minimizes the key contamination problem from commingled collection. The City of Seattle keeps the glass separate. Most of the programs in Massachusetts pull out the paper separately.

- Every-other-week collection.

Lower frequency collection decreases costs dramatically, and it results in only small decreases in recycling tonnage. The tonnage decrease could be offset by other changes. The dramatic cost savings from this approach are due to the greater efficiency in collection. It is very inefficient for a

truck to pick up nearly empty containers every week. Instead, every other week collection means houses put out more materials and/or more containers. This approach can be used for commingled or separated programs. Frequency changes require greater promotions work with residents to ensure that they know which weeks they are to recycle in their neighborhood.

- Add materials.

Adding more eligible materials to a recycling program will result in greater tonnages. When asked about program changes, more than 20 percent of communities (in a survey of more than 600 communities across the U.S.) indicated they had added materials during the previous two years. In decreasing order of frequency, the study found communities had added the following materials:

- ▣ Mixed paper
- ▣ Plastics (a variety)
- ▣ Cardboard
- ▣ Paper
- ▣ Glass
- ▣ Metal cans

Only about 5 percent indicated they had dropped materials (most commonly mixed paper, plastics, glass, and cardboard).

The results from Table 2 on page 3 indicate that adding materials can lead to significant increases in the amount of recyclables recovered through collection programs, adding 2 to 5 percentage points. Adding materials makes programs more useful for residents and provides them additional savings on their garbage bills. However, this change can also increase program costs by 15 to 35 percent, depending on the system and material.

The types of materials added have to be carefully coordinated with collection vehicle capacities and processing capabilities. Because adding new materials to the collection program create increased costs, this approach is recommended when other changes are made that may offset the increased costs of new materials.

Automation, Blue Bag, and Wet/Dry Sorts

Recycling cost savings and efficiency improvements reflect changes in demand by local communities. These savings result from:

- Collecting more recycling materials per stop.
- Making quicker stops.
- Compiling larger loads between unloading.

Table 4: Advantages of Commingled vs. Separated Recycling Collection

Separated	Commingled
Cleaner materials to market	Less complicated trucks and collection; fewer compartments needed
Less expensive processing; don't need extensive equipment or facility to sort out materials	Faster/cheaper collection; can use automated/semi-automated collection systems
Greater consumer awareness of materials	Easier to add/subtract materials because changing containers is unnecessary, and space is available
Commingled usually separates at least one material (glass or paper)	Bin(s) not as short as separated containers; less bending for collectors
	Can use larger containers and covered containers; can collect less frequently
	More convenient for customers
	Higher tonnage of materials than separated programs
	Relatively easy to explain to customers

Certainly, commingled collection and decreasing frequency can help achieve these objectives, but other strategies are of interest. The California SWANA study examined the performance of a variety of modified collection systems for

Table 5: Comparison of Alternative Recycling Collection Systems

Technology	Advantages	Disadvantages	Outlook
Automated collection (commingled) Commingled collection of recycling carts with full automation	Improved tipping efficiency Increased load compaction Facilitates reduced collection frequency Lower labor costs	Compaction and glass breakage concerns Requires more processing or sorting for commingled recyclables Trucks have higher first costs and higher maintenance Special containers needed Automation requires a higher percentage of streets without obstacles	Potential cost savings due to decreased collection labor Can work in rural and urban areas Data collection thus far shows similar diversion and slightly higher costs than average for California communities
Split collection Carts and vehicles that simultaneously collect refuse and recycling in separate compartments	One-truck collection Eliminated vehicle routes Efficiency in rural settings	Processing and disposal sites for the two streams must be at the same location “Fixed” ratios may cause trucks to go to facility before both compartments are full Yard waste programs usually still need to be separate because of seasonal variations in volume	Potential cost savings, particularly in rural or long drive time areas, due to one-pass collection Being tested in several locations; data not very strong yet Promising results in Iowa, Olympia, Wash., and other locations reported in January 1999 <i>BioCycle</i> magazine
Blue bags version of co-collection Recyclables are placed in bags and collected with the solid waste in a traditional packer to be sorted at the transfer facility	Does not require new collection vehicles Eliminates vehicle routes Efficiency in rural settings	Increased contamination Increased sorting costs Does not allow for automated tipping unless commingled with garbage in one container If one container is used, that eliminates the possibility for variable rates	Seems to make great sense, but very limited data available Wide variation in performance (7% to 20% diversion) Field and processing experience (and costs) not promising Several programs have been discontinued
Wet/dry and three stream collection Collection of “wet” and “dry” streams; wet is compostable, dry is sorted into recyclables and landfilled materials	Good recovery rates Multiyear field experience Fewer collections per week	Initially may be confusing to residents Changes traditional recyclables collection and processing	Field data in one community with multiple years of experience shows 55% diversion and significantly lower costs than programs with multiple collections per week Promising as a technology to deliver higher recycling at lower cost

Source: Lisa Skumatz, “Achieving 50% in California.” SERA, Inc., used with permission of the author.

recycling. The study found some promising signs of increased efficiency, and in some cases they saw increased diversion from recycling collection. Program costs and diversion from these programs were compared with those from more “standard” programs in California.

Unfortunately, few of the programs around the nation are able to provide cost and diversion data for these systems. This shortage of reliable data (beyond a few case studies in the literature) makes it hard to tell if any of the technologies will offer consistent performance in delivering increased diversion and reduced costs.

Blue bag programs seem to provide strong benefits, but some communities report contamination problems and poor or volatile performance. This indicates a need for a stronger track record for blue bag programs. The exception was wet/dry collection, demonstrated in Canada. That program provided high diversion at consistent costs.

Communities that pursue automated collection should follow these procedures:

- Buy the best truck possible to minimize the amount of breakdowns and maintenance costs.
- Assume a higher percentage of “backup” trucks than average because of maintenance issues.

Advantages and disadvantages, and the projected outlook for these alternate collection systems, are summarized in Table 5 on page 5.

Costs, Economics, and Benefits

Average Costs of Curbside Recycling

The SWANA study of more than 110 California communities found an average curbside recycling cost of about \$2.40 per household per month. This information is somewhat weighted toward larger communities. Combined curbside recycling and yard waste program costs showed patterns of lower costs in communities with the following characteristics:

- Older recycling programs.
- More suburban or rural areas.
- Lower population areas.
- Areas that used mixed waste MRFs.

However, examining the services included in curbside recycling rates may not provide a clear understanding of the comparative program costs. This is because of the many different ways communities have chosen to charge for this service.

In some communities, there is no separate charge for curbside recycling. Program cost estimates provided in these instances do not necessarily equal the actual costs.

Other communities may charge for curbside recycling, but that charge may not equal the full cost of providing the service. The charges may be set based on a combination of costs and perceptions about appropriate levels for the charge (or what neighboring communities charge).

Relationship of Curbside Recycling Rates and Garbage Rates

Prices proposed by haulers as part of combined residential and commercial service often subsidize residential garbage and/or recycling rates by commercial ratepayers. The actual costs for these services are often viewed as proprietary. Therefore, how accurately the rates proposed reflect the actual cost of service is unknown.

Higher garbage rates and higher differentials in pay-as-you-throw rates continue the incentive to increase recycling and waste prevention (although rates that are twice as high do not lead to twice the recycling).

Following are two arguments for and against embedding the costs of recycling programs in garbage rates:

- Embedding recycling costs in garbage fees adds to the “costs” in the garbage rates. The differentials for additional service can be made higher, providing a stronger incentive for recycling. The California SWANA study indicates that embedded fees were associated with higher recycling rates.
- If recycling is charged separately, low disposers will have higher bills and high disposers will have lower bills than if the costs for the program were embedded in the garbage fee. Keeping a separate charge for recycling provides a signal to residents that recycling is not free. Solid waste charges vary widely across the state.

In the San Francisco Bay Area, rates in 1999 for 30 gallons of service (with other programs included) varied from just under \$7 to almost \$24 monthly for weekly collection service. The California SWANA study found an average “garbage-only” cost statewide of about \$15.40 per household per month. These costs tended to be lower in urban and high population areas where there was more competition for services.

Case Study: San Francisco Fantastic Three Program

After two and a half years of pilot programs, the City and County of San Francisco and one of its permitted haulers, Sunset Scavenger Company, have started their new Fantastic Three program. This innovative residential curbside collection program includes separate collection and composting of mixed organic materials (all food scraps, food-soiled paper, and yard trimmings). The program makes San Francisco the first large U.S. city to initiate a large-scale curbside collection program for food discards.

The impetus for the program was due in part to a 1996 waste characterization study that indicated residents were throwing away 200,000 tons of garbage every year. Thirty percent of this was food. San Francisco residents generally have smaller yards than most locations in California, so food discards are a larger percentage of their overall residential waste. The city determined that capturing residential food discards, along with yard trimmings, could be key to meeting the State’s 50 percent diversion goal.

The city began planning pilot programs with Sunset Scavenger—a subsidiary of Norcal Waste Systems—in fall 1996, and they became operational in July 1997. The programs were intended to test the feasibility of collecting a range of residential organics, from yard trimmings only to all food materials. The programs were designed to test and evaluate collection containers, vehicles, outreach needs, and processing needs. They were also comparing recycling patterns in neighborhoods with different demographics.

Eventually, more than 9,300 households were targeted for services. They received lidded wheeled carts (Toter brand) for all the organics

pilot programs, which fell into one of seven categories:

- Weekly yard trimmings only in a 32-gallon green cart.
- Weekly yard trimmings and vegetative food discards in a 32- or 64-gallon green cart.
- Biweekly yard trimmings only in a 32- or 64-gallon green cart.
- Weekly collection using a split 64-gallon cart for yard trimmings and vegetative food discards (organic materials on one side; trash on the other).
- Weekly collection using a split 64-gallon cart for yard trimmings and vegetative food discards (organic materials on one side; mixed recyclables on the other).
- Weekly collection using a split 64-gallon cart for yard trimmings, all food discards, and soiled paper (organic materials on one side; recyclables on the other).
- Fantastic Three program: yard trimmings, all food scraps, and soiled paper in one 32-gallon green cart; commingled recyclables in a second 32-gallon blue cart; and remaining trash in a third 32-gallon black cart.

The city also conducted pilot programs testing different recycling configurations.

Because the addition of food wastes was a major factor in designing these programs, this case study focuses on issues related to that addition to curbside recycling services. Organics recycling information from the pilot programs are summarized in Table 6 on page 8.

In September 1998, the city surveyed households in the pilot programs to determine resident satisfaction. The city found that the majority preferred their new collection system to that of their previous trash and blue bin recycling system. The one exception was the organics/trash split cart, which only 44 percent of participants preferred. Twenty percent rated it equal to their previous service.

Table 6: Results of San Francisco's Organics Pilot Program

Start Date	Pilot Program	Avg. Lb. Of Organics/ Drive-By	Weekly Set-Out Rate (%)	Monthly Participation Rate (%)	Compostables (% of Residential Generation, Excluding Recyclables)
7/97	Yard trimmings only	5	20	45	11
8/97	Yard trimmings & veg.* food	6	22	55	15
3/98	Biweekly yard trimmings	13 (6.5 weekly)	30 (15 weekly)	NA	11
3/98	Split yard trimmings & veg./trash	7	50	75	26
3/98	Split yard trimmings & veg./recyclables	6	40	67	13
10/98	Yard trimmings & all food	5	20	NA	NA
4/99	Fantastic Three	9**	40	60	25

*Veg.: vegetative food scraps (no meat or cooked food)

**Includes five small businesses with compostables collection. Residential only estimated at 8 lb.

Source: Jack Macy, organics recycling coordinator, San Francisco solid waste management program, 2000.

The most frequent customer complaint was about the size and handling of the 64-gallon split cart. The pilot route with the most complaints about container size was the organics/trash split route. There were very few complaints about separating food (for example, messiness or smell).

The city and Sunset Scavenger found that while all the pilot programs increased diversion, using separate dedicated carts was preferable. Dedicated carts provide the most flexibility in size (from 20 to 96 gallons). Split carts were not available in 20- or 32-gallon sizes or with unequal bisections. The split carts required more maintenance and resulted in lower resident and hauler satisfaction.

The city and Sunset Scavenger also determined that the 32-gallon cart size for collecting organics (as well as for commingled recyclables) was the most appropriate size. Only a few households

requested the larger 64-gallon size. In the pilot programs, extra organics that did not fit into the collection cart were set out less than 5 percent of the time.

The Fantastic Three program, which began as a pilot in April 1999, integrated the best elements of the previous pilots. Approximately 2,800 households were provided with three new 32-gallon carts: one blue cart for recyclables (paper, bottles, and cans) commingled together; one green cart for compostables (yard trimmings, all food scraps, and soiled paper); and one black cart for the remaining trash that is not recyclable or compostable.

In addition, residents received a 2-gallon kitchen pail to facilitate the separation of kitchen food scraps. Outreach materials encourage them to use

paper bags or newspaper to wrap their food if desired to keep the bins cleaner.

Outreach strategy and materials were similar to earlier pilot programs, since these had proven effective. Outreach materials included several trilingual (English, Chinese, and Spanish) brochures: a direct mailing, including a letter from the mayor, a detailed brochure delivered with the bins, and labels affixed to each bin with recycling do's and don'ts.

Residents were also telephoned within a week of receiving their new collection containers to make sure they received information and understood the program.

The Fantastic Three pilot included 50 small businesses that were within the residential neighborhood pilot area and that had volumes appropriate for Toter collection service. Five of these businesses are small produce stores and restaurants.

Including these businesses contributes significantly to the quantities of organics and helps buffer variations in seasonal yard trimming generation. This increases overall efficiency and diversion. Sunset Scavenger provided additional in-person outreach and training to the businesses to gain their participation. Businesses did not receive blue and green bins unless they agreed to participate in advance.

In the initial Fantastic Three pilot area, Sunset Scavenger used two vehicles with split compartments. The capacity was 29 cubic yards (60 cubic yards total), and the vehicles had dual-compartment compacting. Each used a one-person crew to collect recyclables and trash. Recyclables were deposited in the 11.6-cubic-yard compartment. Trash went in the 17.4-cubic-yard compartment.

The truck bodies are Labrie with Volvo chassis (two other makers were tested). A crew person collects compostables in a separate dedicated vehicle with a side-loading single compartment.

Once collected, organics are delivered to Norcal's composting facility at the B&J Landfill in Dixon, 65 miles northeast of San Francisco. The facility uses a horizontal grinder, a forced aerated enclosed "Ag-Bag" composting system (which involves composting for a two-month plus period),

screening down to 3/8-inch, and curing. The resulting compost is blended and marketed through a soil company, ReadyGro. The product is sold in bulk for landscaping and in bags for retail markets.

The pilot Fantastic Three program had better results overall than any of the previous pilot programs. From May through December 1999, the Fantastic Three program diverted an average of almost 46 percent from the landfill (14 percent from organics and 32 percent from recyclables).

On some days the diversion level has exceeded 50 percent. The diversion rate for the pilot neighborhood increased by more than 90 percent. Almost two-thirds of this increase was due to the new compostables collection.

A survey of residents in the program found that 73 percent liked the program more than the recycling and trash collection services they previously had.

Based on the success of the Fantastic Three pilot program and the need to increase diversion, Sunset Scavenger developed a plan, in cooperation with the city, for citywide expansion of the Fantastic Three program. Under the plan, the program will be offered to almost two-thirds of the city's households (more than 200,000 households) during the next three and a half years.

The new routes started in February 2000. The city expects to add a new five-day route approximately every three weeks. After a year and a half, the rate of expansion is projected to increase.

The city expects to divert an additional 50,000 tons per year of residential recyclables (including organics), from landfill disposal through the Fantastic Three program. Residents have demonstrated that they support collecting residential compostables, including all food. Such a program is feasible, and it has great potential for significant diversion in a cost-effective and sustainable manner.

Costs, Economics, and Benefits

Implementing the Fantastic Three program citywide will require purchasing a new fleet of dual compactor vehicles and thousands of containers. Vehicles and containers for the first months of expansion have been ordered.

Sunset Scavenger believes it can provide the expanded program at a cost similar to continuing

the original system over the long-term, given the collection efficiencies of co-collection. The company expects initial program costs to be initially higher as the company purchases new equipment. However, because Sunset Scavenger needs to replace its existing vehicle fleet in the near future, costs are likely to balance out over 10 years.

Recycling and composting service is included in the rates residents pay for trash, at no extra cost. Residents can actually save money by participating and switching to a smaller trash container (for example, 20 gallons).

Equipment costs for the pilot program are summarized in Table 7.

Table 7: Sunset Scavenger's Equipment Costs (for City of San Francisco Residential Program)

Equipment Item/Service	Unit Cost
Dual compactor vehicle	\$192,000
Organics collection vehicle	\$142,000
32-gallon container	\$35
64-gallon container	\$41
2-gallon kitchen pail	\$3.50 to \$4
Container delivery with outreach materials (\$/cart)	\$2 to \$3

Sources: Jack Macy, organics recycling coordinator, City of San Francisco; and Ken Pianin, Sunset Scavenger Company, San Francisco, 2000.

Funding Mechanisms

Sunset Scavenger's costs are funded through the rates it charges customers for trash service.

Sunset Scavenger included the cost of the pilot collection programs in its rate application submitted in September 1996 and in its rates effective March 1997.

Challenges and Opportunities in Implementation

For the initial set of pilot programs, the food collected consisted only of vegetative food (fruit and vegetable scraps, along with coffee grounds and tea bags). The available composting facilities

at the time were permitted and willing to take only vegetative material.

Under California's tiered composting regulations and the permit in place, available facilities could accept residential vegetative food but no meat. In addition, Sunset Scavenger was more comfortable starting off with collecting vegetative materials. The company believed that residents would be more receptive to separating organic material, since it might be less messy than meat or an all-food mix.

In the summer of 1998, a new permit allowed processing capacity for all food material at the B&J composting facility. Starting in October 1998, all food scraps, including meat and food-soiled paper, were added to some of the pilots. Previously, Sunset Scavenger took the compostables to the West Contra Costa Sanitary Landfill composting facility in the City of Richmond.

In the first set of pilots, participants in the yard and vegetative food scraps collection program were given a 2-gallon kitchen pail and a set of 24 cellophane-lined paper bags (from Foodcycler by Woods End Research Laboratory) to facilitate food separation and reduce potential messiness.

The use of the bags was successful, and they composted well. However, the city and Sunset Scavenger decided to try collection without paper bags, given cost and distribution concerns. Residents were then encouraged to use regular paper bags or newspaper to line their pail if desired.

One goal of the pilot programs was to assess collection vehicles and containers. Sunset Scavenger wanted to reduce worker injuries while striving to increase efficiency in collection of all materials. The pilots tested both semi- and fully-automated side-loading vehicles. Extensive street parking in most of San Francisco significantly limits the use of fully automated vehicles. Thus, the city and Sunset Scavenger settled on semi-automated side-loading vehicles for the citywide organics collection program.

Tips for Replication

- Implement pay-as-you-throw "a can is a can" garbage rates, with recycling costs included in the rate.

- Consider commingled collection if sufficient processing facilities are located in your area.
- Phase in automated or semi-automated collection vehicles if a contract is already in place, or specify them for the beginning of a new contract.
- Consider co-collection of two of the three primary materials: garbage, commingled recyclables, and/or yard wastes in the same vehicle.
- Collect food discards (all types, if possible) and soiled paper with yard trimmings, if yard trimmings are collected in rolling carts and if local composting facilities can process those materials together.
- Collect recyclables from small businesses through curbside recycling programs.
- Consider adding materials when you make other changes that improve collection efficiencies.
- Use pilot programs to test new technologies and approaches. Use focus groups and other marketing techniques to scientifically evaluate the success of those pilot programs.

References

CIWMB Publications

Many CIWMB publications are available on the Board's Web site at:
www.ciwmb.ca.gov/Publications/.

To order hard copy publications, call 1-800-CA-Waste (California only) or (916) 341-6306, or write:

California Integrated Waste Management Board
 Public Affairs Office,
 Publications Clearinghouse (MS-6)
 1001 I Street
 P.O. Box 4025 (mailing address)
 Sacramento, CA 95812-4025

Other Publications

Farrell, Molly. "Split Body Trucks Carry their Weight." *BioCycle*, January 1999, pp. 44–46.

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www.ilsr.org/recycling/.

BioCycle. JG Press, Inc., 419 State Ave., Emmaus, PA 18049. (610) 967-4135, Ext. 22,
www.jgpress.com.

Resource Recycling. P.O. Box 42270, Portland, OR, 97242-0270. (503) 233-1305, www.resource-recycling.com, info@resource-recycling.com.

MSW Management. Forester Communications Inc., P.O. Box 3100, Santa Barbara, CA, 93130. (805) 681-1300, www.forester.net/msw.html, publisher@forester.net.

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Credits and Disclaimer

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The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web site at www.ciwmb.ca.gov.