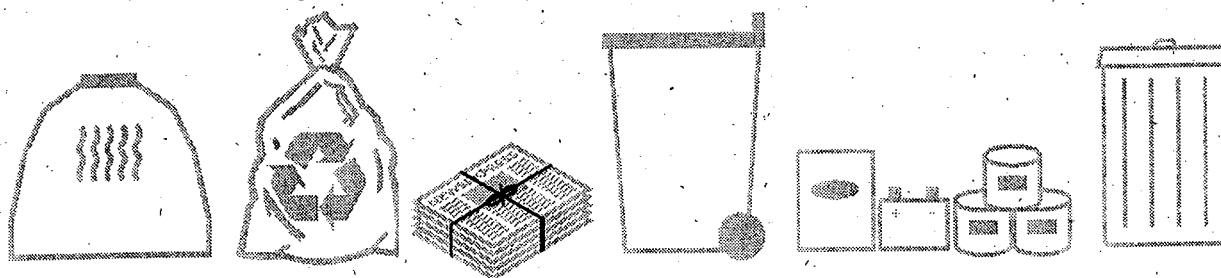


REGIONAL SOLID WASTE MANAGEMENT PROJECT

Resource
An Integrated Waste Management Strategy
for
Halifax County/Halifax/Dartmouth/Bedford

Prepared by
The Community Stakeholder Committee (CSC)
and Adopted in Principle, March 25, 1995



MISSION STATEMENT

This Integrated Waste/Resource Management Strategy (IWRMS) is designed to address the municipal solid waste stream, to achieve the maximum possible diversion of resources from disposal and to encourage citizens to adopt the necessary lifestyle changes to move from a consumer to a conserver society.

The Strategy is designed to be flexible enough to incorporate new, environmentally sustainable technologies that will move us towards our ultimate goal of "Zero Waste."

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EXECUTIVE SUMMARY

Let Us Tell You What We Have Done

Over the past five months in many meetings of the Community Stakeholder Committee (CSC), dozens of citizens from our community have met to discuss and draft a new approach to the "garbage problem." We have a solution.

We offer not a waste management system, but rather a *resource* management strategy "Waste Not Our Future." We have prepared a vision which is an essential first step in mapping out a management system for those materials which can no longer be regarded as waste, but must be turned into *resources* to benefit both our economy and our environment. We call on everyone, citizens and politicians together, to help build a truly sustainable future.

Past efforts to manage our solid waste have failed but the past is the past. The Highway 101 Landfill in Upper Sackville has damaged the local community and the environment. Costs continue to skyrocket. We can no longer afford to make the same mistakes.

"Waste Not Our Future" is a consensus statement of the CSC. Its deliberations have been open to all citizens of the Metro-region. We have met together as equals. We have studied the problem, investigated today's waste management system, debated the components of a new system, and found agreement.

We have adopted principles and goals which can best be summed up in a single word: *stewardship*. Stewardship represents a new direction in the management of our solid wastes. It places responsibility on everybody -- because we all generate material that must be managed.

We ask that this Strategy be considered as a whole. It has a coherence of vision and an integrity that requires full implementation. It is not a Strategy that can be adopted piecemeal. We do not find or suggest any other acceptable alternative strategy. If a new residuals disposal facility is to be recommended by November 1995, if the Highway 101 Landfill is to close on December 31, 1996, and if a new residuals disposal facility is to be opened on January 1, 1997, this Strategy must be reviewed and adopted in its entirety as the new solid waste/resource management system, as soon as possible.

We believe that this Strategy presents a cost-effective solution, especially when all of the present and future costs and liabilities are included.

We also believe that this Strategy is a challenge to the people of the Metro-region, and that we can meet that challenge. The Strategy is practical and workable. It is an understandable, convenient system which rewards the conserver.

Simply stated, our Strategy is based on maximizing the beneficial use of resources and on minimizing disposal. It is also important to state that the proposed system aims for "zero waste" and places emphasis on the diversion of the recyclable, toxic and organic materials that cause problems at disposal sites. The success of our Strategy will be based on separating materials at source and by collecting and processing them separately and appropriately.

Now, What is the Strategy All About?

Composting is at the heart of this Strategy. Its success depends on composting. The municipal collection system will be based on collecting compostables in specially designed containers as part of a modified system which also includes recyclables and trash collection.

Waste reduction, household hazardous waste (HHW), backyard composting, education and promotion programs are also integral to the Strategy's objectives. Source-separated materials will go to facilities for recycling, composting and HHW processing.

Several figures summarize and illustrate the Strategy:

- ▶ Reducing Wastes: Today & Tomorrow (Figure 3-1);
- ▶ Framework for Integrated Waste/Resource Management Strategy (Figure 4-1);
- ▶ Cost-Benefit Comparison: Affordable Stewardship (Chart 7-1); and
- ▶ Implementation Plan: Achievable Challenge (Figure 8-1).

All mixed waste will go to Front-End Processing Facilities to extract any remaining recyclables, compostables and hazardous substances. This will not only capitalize on their resource value but will also ensure that no material is sent for residuals disposal (landfill) without processing. This will avoid problems such as toxic leachate and emissions, odours, or the attraction of birds and/or vermin. No material will be disposed of without processing. Free of toxics and organics, materials sent for disposal will be available for reuse by future generations. This Strategy mandates that Front-End Processing Facilities will be operational before the opening of the new Residuals Disposal Facilities.

The Industrial, Commercial and Institutional (IC&I) sector can use the municipally-sponsored recycling, composting and screening facilities, or they can provide their own equivalent. User fees will encourage source-separation. Construction and Demolition (C&D) debris will be managed through reuse, recycling and permitted clean-fill sites. Existing IC&I collection systems should suffice with only slight modifications. Non-residential IC&I hazardous waste will continue to be managed separately from the municipal system.

Absolutely essential to the Strategy's success is the ongoing role of citizens and communities in the development, implementation and operation of all the components of this system. More than the advisory committee model, this Strategy includes very specific, permanent decision-making roles mandated for citizens and community groups. Without this protection, the public will not buy into a system sufficiently for it to work and it will not be possible to site Residuals Disposal Facilities.

The following components are marked for accelerated implementation as early as 1995 and 1996: centralized composting, disposal bans, source reduction, backyard composting, a permanent HHW depot, and C&D debris sites. Rapid success is necessary to build credibility with communities near potential sites that will be wise enough to know that only action now will convince them that the next system will actually be done right.

For more about the system please read our full report. More detail will be added as the components are put in place, so there is room for everyone to contribute. Any citizen of the Metro-region is welcome to join the Community Stakeholder Committee at any time. Please join the CSC in ensuring the rapid and successful implementation of our Integrated ~~Waste~~/Resource Management Strategy.

Background and Technical Summary

On October 7, 1995 the four Mayors of the Metro-region municipalities reached an important agreement: to transfer responsibility for Municipal Solid Waste (MSW) from the Metropolitan Authority to Halifax County Municipality. The agreement, to take full effect as of January 1, 1997, was reached after many years of inconclusive waste management planning by the Metropolitan Authority. Its timing is meant to coincide with the permanent closure of the existing Highway 101 Landfill operated by the Metropolitan Authority.

Once the Mayor's Agreement was signed, the Municipality embarked on an innovative and democratic planning process to develop a waste management strategy and to identify a candidate site(s) for a new modern residuals disposal facility. The planning process was initiated on October 26, 1994, and has continued with numerous meetings, workshops and the efforts of dozens of citizen volunteers. The Integrated Waste/Resource Management Strategy (IWRMS) has been written by these volunteers, and is presented for consideration and adoption by the four Metro-region municipalities: Halifax County Municipality, the Cities of Halifax and Dartmouth and the Town of Bedford.

The Strategy represents a framework, which, upon approval on a regional scale, will form the basis for detailed system planning and design. The Strategy framework also includes methods for identifying criteria for siting a new waste/resource management facilities.

The Strategy is founded on a fundamental philosophy: that materials currently considered "wastes" should be treated as "resources", and that the reduction, reuse, recycling and composting of those resources should be encouraged through broad-ranging principles of stewardship. The Strategy presents waste diversion goals which arise from this philosophy of stewardship. In the Metro-region today, less than five percent of the total municipal solid waste (MSW) stream managed by the Metro Authority is recycled. Over 95 % is landfilled.

In 1997, the new waste management system proposed in the Strategy will result in 25 % of the MSW being landfilled. Once all aspects of the new waste management system have been fully implemented and participation has reached its targets, 12 % of the MSW is expected to be landfilled. Chart 6-1 illustrates the anticipated progress toward these diversion targets.

The Strategy presents the objectives of the waste management components necessary for achieving these goals. Figure 4-1 illustrates the system which has been designed by the CSC. This system comprises new methods of waste/resource collection for both the residential and IC&I sectors. The residential collection will be enhanced with a separate organics stream. IC&I waste/resource separation will be encouraged through appropriate charge mechanisms, aimed at encouraging separation at source. For example, materials which have been sorted and delivered to allow resource recovery will be accepted at far lower charges than materials which have been delivered in a "mixed" fashion.

Source separated organics will be routed to new central composting facilities. Materials which have not been sorted, and which can be termed "mixed waste", will be sent to new screening and resource recovery facilities for processing. Materials to be landfilled will be processed, and will contain an absolute minimum of organics and economically recyclable materials.

The Strategy presents programs designed to support the new waste/resource management system. Clearly, the success of the system in meeting the diversion goals will depend upon participation. Accordingly, the importance of education and communication programs is heavily stressed. Budgets for these programs, starting immediately, are proposed in the Strategy.

The CSC has identified a mechanism for continued citizen involvement in the new waste management system. This involvement is to be sustained through the Independent Stakeholders' Audit and Review Group (ISARG). Details on the membership and role of the ISARG have been considered and are detailed in the Strategy.

The new waste/resource management system presented in this document will be more costly than today's waste management system, when strict dollar terms are considered. However, the new system represents the only clear option for the region to move towards responsible resource management, while at the same time facilitating waste diversion and ensuring that a new residuals disposal facility, which replaces the aging Highway 101 Landfill, is acceptable to local communities.

The cost of the new system has been estimated in 1996 dollars. Table 7-1 shows system cost estimates for the Integrated Waste/Resource Management Strategy compared to today's system costs (based on 1994/95 Metro Authority budget and 1995/96 proposed budget). For illustrative purposes, Table 7-3 compares the costs of the proposed system to the projected costs of the Metro-region system proposed in a 1992 report by Sound Resource Management as well as to the projected costs of the (now-rejected) Metropolitan Authority incinerator proposal. The proposed system is well within the costs envisioned by the 1992 Sound Resources Management study, and is far lower than the previous Metro Authority proposal. The proposed system is affordable and sustainable. The CSC strongly recommends that it be adopted in principle by the Metro-region municipalities.

OUR VISION¹

Fundamental Principles

The Integrated Waste/Resource Management Strategy (IWRMS) is a plan developed by the Community Stakeholder Committee (CSC) for the Metro-region, which comprises the County of Halifax, the Cities of Halifax and Dartmouth, and the Town of Bedford. This plan is based on an attainable Vision which has:

- ▶ The least possible negative impact on the natural environment;
- ▶ The most effective method of collecting, processing, recovering and reusing the material resources produced and consumed by our communities; and
- ▶ The most responsible format for minimizing the amount of inert residues which emerge as the final product of the resource management system.

To achieve this Vision, we must shift from our present focus on waste management to a focus on the conservation and appropriate use of resources. As long as we think primarily of how to deal with waste, even if our objective is to minimize waste, we will ignore the fundamental use of resources.²
(Jackson and Wallace, 1993:2)

Beyond the 3Rs

This Vision can be achieved by improving on the now well-established 3Rs approach (Reduce, Reuse and Recycle). Having initiated effective collection and recovery systems in the areas of materials reduction, reuse and recycling, our strategy proposes to introduce four further steps:

- Step 1. *Reduce or minimize the initial use of resources.* We must avoid the production of unnecessary items. We must develop production processes that require less materials. We must work to eliminate the production and use of hazardous materials. We must move away from being a consumer society to being a society of conservers.

¹ The language for this section on the fundamentals of the Resource Recovery System has been developed from the work of the members of the Vision Working Group established at the Community Stakeholder Committee (CSC) meeting at Cole Harbour Place on December 15, 1994. This Vision Working Group has met five times since that date, and has reported its ongoing results at the CSC workshops in Lakeside (January 14), Bedford (February 4) and Cole Harbour (February 18).

² We are indebted to John Jackson of the University of Waterloo and Barbara Wallace of the Ontario Citizens' Clearinghouse on Waste Management for permission to use important components of their 1993 study, "Resource Management Systems: An Alternative to Current Waste Management Systems."

- Step 2. ***Reuse used materials.*** A resource management system which does not include a recovery, repair and reproduce component which refits and returns useful appliances, tools, products and materials into our communities, is a defective "solution." To maximize long-term reuse of discarded materials constitutes a fundamental step in resource management.
- Step 3. ***Recycle materials for a longer-term use.*** Rather than simply recovering the metal, plastic and fibre from recyclables for the manufacture of the same items from which they have been recovered, we should support industries designed to produce more durable products.
- Step 4. ***Compost materials that can be beneficially reused.*** Composting is the most natural form of recycling. Composting organics diverts a problematic material from landfill disposal and converts it into a beneficial product.

We should store those resources that may be reusable or recyclable in the future. With those materials that do not show such potential at this time, we should re-examine the need for the original product or we should look for ways to recover their basic elements to be used as industrial feed stock.
(Jackson and Wallace, 1993: 3)

Community Rights and Responsibilities

To achieve the essential goals of our Vision for resource management, it is necessary to design a system which supports full public participation and stewardship, including:

- ▶ The right to have meaningful and effective community/public participation in policy formulation, component design, component procurement, system operation and overall implementation and review of our resource management system.
- ▶ The right to have access to information on all matters affecting resource management.
- ▶ The responsibility to protect natural systems from any human abuse.
- ▶ The responsibility to find solutions to resource-use problems as close to source and home as possible.
- ▶ The responsibility to exercise personal and social restraint in the consumption of resources.

In setting out our proposals for responsible resource management, all citizens and communities of the Metropolitan region will be required to work with the governments of participating municipalities to ensure that our collective action in redressing what we have historically done to generate "garbage" and to create wasteful "dumps" will provide a model resolution of these serious problems.

The Imperative to Create a Comprehensive Resource Management System

In 1992, a landmark study entitled "Review of Waste Management Systems Options" (the Sound Resource Management Report) was commissioned at the initiative of a large group of citizens representing the four municipalities in the Metro-region. This study recommended a three-stream system with source-sorted recyclables [see **Appendix A** to this document where the recommendation entitled "Option 1 - Metro Area" of the report is reprinted].

This report was the first to suggest an integrated waste management system for the Metro-region, to include a mass balance flow chart, a description of proposed facilities and a budget which estimated the system's capital and operating costs. The cost of any innovative project is usually a difficult hurdle. The wonderful irony of the aforementioned "Option 1 - Metro Area" recommendation is that the average cost per tonne for waste disposal of \$57 per tonne³ expressed in 1995 dollars is certainly less than the current system cost being incurred by the Metropolitan Authority on behalf of the commercial and residential sectors in the Metro-region. This report was one of the starting points for the CSC in defining a recommended resource management strategy for the Metro-region.

The process of developing our region's resource management system has involved the cooperative work of our CSC, the political and administrative representatives of Halifax County Municipality, the Cities of Halifax and Dartmouth and the Town of Bedford and the contributions of consultants and technical staff.

Increasing numbers of people *now* share the Vision we have outlined here. The CSC is committed to bring the Strategy into action. The CSC believes that the citizens of the Metro-region can work together to demonstrate leadership and realize the vision of the Strategy.

Because of the number of people who are now working towards these goals with wisdom, passion and determination, we are confident that we can reach our vision. (Jackson and Wallace, 1993: 4)

³ This per tonne cost does not include collection costs and many other factors. It does include the following components based on the original Metropolitan Authority waste stream projection for 1995 of 300,000 tonnes per year: household hazardous waste, recyclable materials, source reduction/private recycling, source-separated biowaste compost, front end processing/centrally separated biowaste compost, and landfill. (See Section 7 for more information on system costs.)

The Challenge to Intelligently Engage the Private Sector to Deliver Elements of the Integrated Waste/Resource Management Strategy

The new "resource management system" will be delivered primarily through the careful use of local private sector firms working together to meet public sector objectives. It is essential to put into place public-private partnerships "... that reverse the incentives so that economic success is tantamount to biological success." (Hawken, 1993: 81)⁴

Concrete Proposals of Our Vision

The implementation of the CSC's Integrated Waste/Resource Management Strategy (IWRMS), and the achievement of the processes and components recommended by this report, will result in significant changes in the way in which residents, businesses, governments and all other stakeholders of our region carry out their day-to-day activities, including:

- ▶ Reduced consumption of natural resources.
- ▶ Reduced contamination of the environment and the protection of air, water and terrestrial resources.
- ▶ Responsible land use.
- ▶ Reduced negative impact on human and ecological systems.
- ▶ Growth in economic activity and employment through the research and development of resource management technologies, and in the sale/export of environmentally beneficial products and services.
- ▶ Enhanced citizen, community and corporate commitment to the achievement of constructive resource goals.

What follows in the remaining sections of this Strategy is a systematic outline of our proposed program, together with the essential details of costs, benefits, and plan for implementation.

⁴ A major part of Paul Hawken's book entitled *The Ecology of Commerce: A Declaration of Sustainability* is devoted to making the case that only through a redirected private sector will society ever turn around the present degradation of the planet and its ecosystems.

1. INTRODUCTION

1.1 Background

To find a solution to Metro-region's waste management crisis, Halifax County Municipality launched the Regional Solid Waste Management Project (RSWMP) in October 1994⁵, to develop a strategy to manage the solid wastes generated by the four Metro-region municipalities (Halifax County Municipality, the Cities of Halifax and Dartmouth and the Town of Bedford) and to find a location acceptable to the host community for a new, residuals disposal facility to ensure that the existing landfill in Upper Sackville is closed by the December, 1996 deadline.

The RSWMP involves the development of this Integrated Waste/Resource Management Strategy for the Metro-region and the siting of a new, residuals disposal facility for Metro's solid wastes which remain after reduction, reuse, recycling and composting.

The RSWMP adopted a community-based consultation and stakeholder process that is based on the open and collaborative approach which follows the *Guiding Principles*, as outlined in *Building Consensus for a Sustainable Future*, published by the Canadian Round Tables on the Environment and Economy (August 1993).

An important part of this community-based project includes the involvement of the Community Stakeholder Committee (CSC) and the Project Steering Committee (PSC). The CSC, made up of interested citizens from the Metro-region, holds regular meetings and provides recommendations on all aspects of the RSWMP to the PSC and Halifax County Council. The PSC - comprising three citizen members from Halifax County, three staff representatives from Halifax County Municipality, one citizen member each from the Cities of Halifax and Dartmouth, and a staff representative from the Town of Bedford - assists the CSC with the development and implementation of all components of the RSWMP.

Vaughan Environmental Consultants Limited and the LURA Group were retained by Halifax County Municipality to provide technical advice, project coordination, and facilitation/secretarial services to the RSWMP process.

1.2 CSC Working Groups and Mandates

Seven Working Groups were established by the CSC to develop the Integrated Waste/Resource Management Strategy (IWRMS). These Working Groups have been meeting, developing ideas and bringing forward suggestions and concepts to the CSC. A brief summary of each group and its mandate is provided below. More detailed information prepared by the Working Groups is included in the *Background Document to the Integrated Waste/Resource Management Strategy* (under separate cover).

⁵ The RSWMP was initiated by Halifax County Municipality in accordance with the October 7, 1994 agreement between the Mayors of Halifax County Municipality, the Cities of Halifax and Dartmouth and the Town of Bedford, and the Metropolitan Authority's resolution of October 11, 1994.

Today's System Working Group: Members have examined the present solid waste management system which serves Metro residents as of late 1994/early 1995. The intention has been to gain an understanding of today's infrastructure, including its value, long-term role and liabilities. The intention has also been to develop an understanding of the waste stream, both today and as projected over the coming decades.

Management Working Group: Members of this group have developed a framework through which the CSC can pursue the tasks of developing a Strategy, developing a recommended site for a residuals disposal facility, and ensuring the continued assessment of the waste/resource management system.

"Do It Now" Working Group: Members have defined and brought forward waste/resource management and diversion actions which can be carried out as quickly as possible, and which are consistent with (and do not conflict with) long-term goals for the new Strategy. Six motions have been recommended by the "Do It Now" group. These have been adopted by the CSC and forwarded to the PSC and Halifax County Municipality. The PSC and the CSC are in the process of developing implementation plans for these "Do It Now" demonstration projects (see *Background Document to the Strategy*).

Stewardship Working Group: Members of this group adopted the objective: "To develop a material recovery system for the residential and IC&I sectors." Recognizing the important role of individual actions, and the significant potential costs of new or modified collection systems, this group evaluated different means of resource handling and brought forward recommendations for the strategy for consideration by the CSC.

Vision Working Group: This working group examined alternative long-term visions for the Strategy. Consideration was given to the fact that the system will be in place to serve future generations, and should therefore be designed to be acceptable for the next 100 years if possible. The group is aware that certain system goals and newly-proposed elements may take many years to fully implement.

Community Information Group: Recognizing that communications and education are essential to the success of the Strategy, members of this group have an ongoing role in the development and implementation of programs to communicate with, and educate, residents and businesses regarding the benefits of the new waste/resource management system.

Strategy Integration Group: Representatives from each of the six working groups described above worked together to integrate the work of the CSC towards the development of this Strategy.

1.3 Application of the Strategy Framework

The CSC has worked collectively to develop this Strategy framework. The CSC presents the framework for consideration by the broad Metro-region residential and business communities. It is emphasized that the Strategy is an integrated one, which presents a collection of components designed to work together.

2. GUIDING PRINCIPLES

The CSC has adopted the following guiding principles:

1. "That Halifax County Municipality, the Cities of Halifax and Dartmouth and the Town of Bedford, commit to the immediate implementation of significant diversion as a necessary step for the success of the new system and to demonstrate good faith to potential host communities of facilities, especially landfill."⁶
2. The Integrated Waste/Resource Management System for the Metro-region is based on the philosophy of zero adverse effect on the environment.
3. The principles of stewardship and source separation are adopted as means to achieve maximum material/resource recovery by the residential sector and the Industrial, Commercial and Institutional (IC&I) sectors.
4. In this Strategy, incineration is rejected as a means of energy recovery and residuals disposal for the Metro-region.
5. The main goal of this Strategy is to develop an effective and achievable citizen-directed waste/resource management system which is environmentally sensitive and responsible, while serving the needs of the Metro-region.

The system will comprise policies and programs which maximize resource recovery and are:

- ▶ complementary to the community by being accessible, flexible and understandable;
- ▶ environmentally responsible;
- ▶ economically feasible; and
- ▶ publicly acceptable.

This system will encourage attitudes and habits towards resource conservation and will demonstrate leadership into the 21st century.

6. The systems adopted will make use of natural biological systems wherever feasible.
7. The Strategy will be guided by citizen involvement throughout its lifetime.
8. The Strategy will equitably maximize local employment, ownership, entrepreneurship and opportunities.

⁶ Adopted by the Project Steering Committee at its Orientation Meeting of January 4, 1995, and passed by resolution of Council by the City of Dartmouth on February 7, 1995.

3. OBJECTIVES AND DIVERSION GOALS

3.1 Strategy Objectives

The following objectives guide the development and implementation of this Strategy:

- 1. Maximize the 3Rs (reduction, reuse and recycling):**
 - ▶ the hierarchy of the 3Rs -- prioritizing reduction before reuse, followed by recycling - will guide the Strategy;
 - ▶ source reduction will be encouraged through education, backyard composting programs and the adoption of the principle of "reducer saves" (a user pay system which provides incentives for waste reduction and diversion);
 - ▶ resource recovery will be achieved through the development of reuse opportunities and the adoption of a multi-stream collection and processing system; and
 - ▶ the disposal of residuals will be considered the option of last resort.
- 2. Maximize environmental sustainability and minimize costs through:**
 - ▶ the use of full cost/benefit accounting to assess both direct and indirect costs/benefits over the life of the whole system;
 - ▶ the use of natural biological systems and solutions, including composting and engineered wetlands, where economically feasible; and
 - ▶ private/public partnering where appropriate.
- 3. Foster stewardship and conserver society values through:**
 - ▶ comprehensive and ongoing education and communications programs;
 - ▶ "reducer saves" programs;
 - ▶ the adoption of a "no direct public financial compensation" philosophy to local communities;
 - ▶ the application of policies and practices which maximize benefits to local communities; and
 - ▶ monitoring effectiveness towards achieving goals, and providing timely and meaningful feedback to the community.

3.2 Diversion Goals

On January 6, 1995 the Government of Nova Scotia proclaimed the Nova Scotia Environment Act as law. Part IX of that Act addresses Waste-Resource Management. Section 93(1) states:

There is hereby adopted the Canadian target of a fifty per cent solid waste diversion goal for the year 2000.

Interim goals are not specified in Part IX. However, Section 93(2) states:

The Minister shall, after public consultation, prescribe specific waste diversion goals applicable to a prescribed class of works, undertakings, substances or events.

Further, Section 93(4) states that a waste-reduction goal ... ***may apply to all of the Province or part of the Province.***

The CSC believes that in light of this flexibility, it is important for the Metro-region strategy to pursue significant and aggressive waste diversion. Accordingly, the CSC adopts the goal of "zero waste."

Chart 3-1 illustrates the overall performance of the proposed system upon maturity. Later in the document, Chart 6-1 shows how these diversion rates can be achieved. The CSC believes that these diversion rates can be achieved within the time frames indicated.

The year 1994 is to be used as the base year for measuring waste diversion. Based on the Metropolitan Authority's December 1994 tonnage report, the base year tonnage is 247,780 tonnes (total tonnage minus recyclables). Diversion targets will be measured on a per capita basis.

CHART 3-1 "REDUCING WASTE: TODAY & TOMORROW"

METRO REGION
COMMUNITY STEWARDSHIP &
RESOURCE CONSERVATION STRATEGY

3%

Recovered
Resources

97%

Waste
Disposal



88%

Recovered
Resources

12%

Waste
Disposal

TODAY

TOMORROW

ENVIRONMENTALLY SUSTAINABLE & ECONOMICALLY ACHIEVABLE

It is important to note that the CSC is mandated to not only develop this Strategy, but also to site the new residuals disposal facility (landfill). Given the fact that the Highway 101 Landfill (Sackville) is to close on December 31, 1996 and that a new residuals disposal facility must be ready for opening on January 1, 1997, the CSC is convinced that the diversion targets must be achieved -- at least in terms of the critical organic component.

This Strategy places primary focus on the diversion of organic matter from the waste stream. Source-separated composting has been identified as the preferred and essential method. The composting projects proposed by the CSC's "Do It Now" Working Group will be phased in to accommodate all generators of organic wastes in the Metro-region. Full implementation of source-separated residential and Industrial, Commercial and Institutional (IC&I) composting will, however, take time.

To ensure the maximum diversion of organic content is achieved prior to the opening of new residuals disposal facilities, the Strategy includes front-end processing facilities to divert the remaining "third stream" mixed wastes. At these facilities, residual organic material will be separated and processed. Beginning with the approved opening of new residuals disposal facilities, these sites will operate to maximum potential and be scaled down in a planned manner as source-separated centralized composting scales up. The CSC regards this component as an essential safeguard for the process to ensure the integrity of the whole Strategy and for public acceptance of any new residuals disposal facilities by the local community.

To achieve the Strategy's waste diversion goals, the following is required:

- ▶ Encourage waste reduction at source for all sectors of society, supported by independently funded programs and personnel.
- ▶ Provide source-separated multi-stream collection and handling and a household hazardous waste (HHW) depot for all residential generators by January 1, 1997. This refers to all residential generators now served by municipally-sponsored collection contracts.
- ▶ Establish incentive-based means of achieving stewardship and source separation for all IC&I generators.
- ▶ Provide systems which manage the collected residues in a cost-effective and environmentally sustainable manner.

4. FRAMEWORK FOR THE INTEGRATED WASTE/RESOURCE MANAGEMENT STRATEGY FOR METRO-REGION

A framework for the Integrated Waste/Resource Management Strategy (IWRMS) for the Metro-region has been developed by the CSC. This framework is illustrated on Figure 4-1. The figure has been developed showing the system which applies to the residential sector (left-hand side) and the Industrial, Commercial, and Institutional (IC&I) sector (right-hand side). From top to bottom, the figure is organized as follows:

- Sector:** the sector being serviced is defined using graphic illustrations of types of buildings.
- Service:** the type/level of service for each sector is defined. Where applicable, certain types of collection devices are shown.
- Charges:** the methods of charging for the service are described.
- Destinations:** the facilities to which wastes and resources are directed are defined.

Greater detail on the entries in this figure can be found in Section 6 of this Strategy.

Certain specific types of wastes are not handled by the Strategy. Specifically, hazardous wastes arising from the IC&I sector are not part of the system. They are shown separately on the figure for illustrative purposes. As well, construction/demolition/renovating materials are shown on Figure 4-1.

It is also noted that waste reduction, education and promotion programs are identified as a range of activities which apply to all sectors.

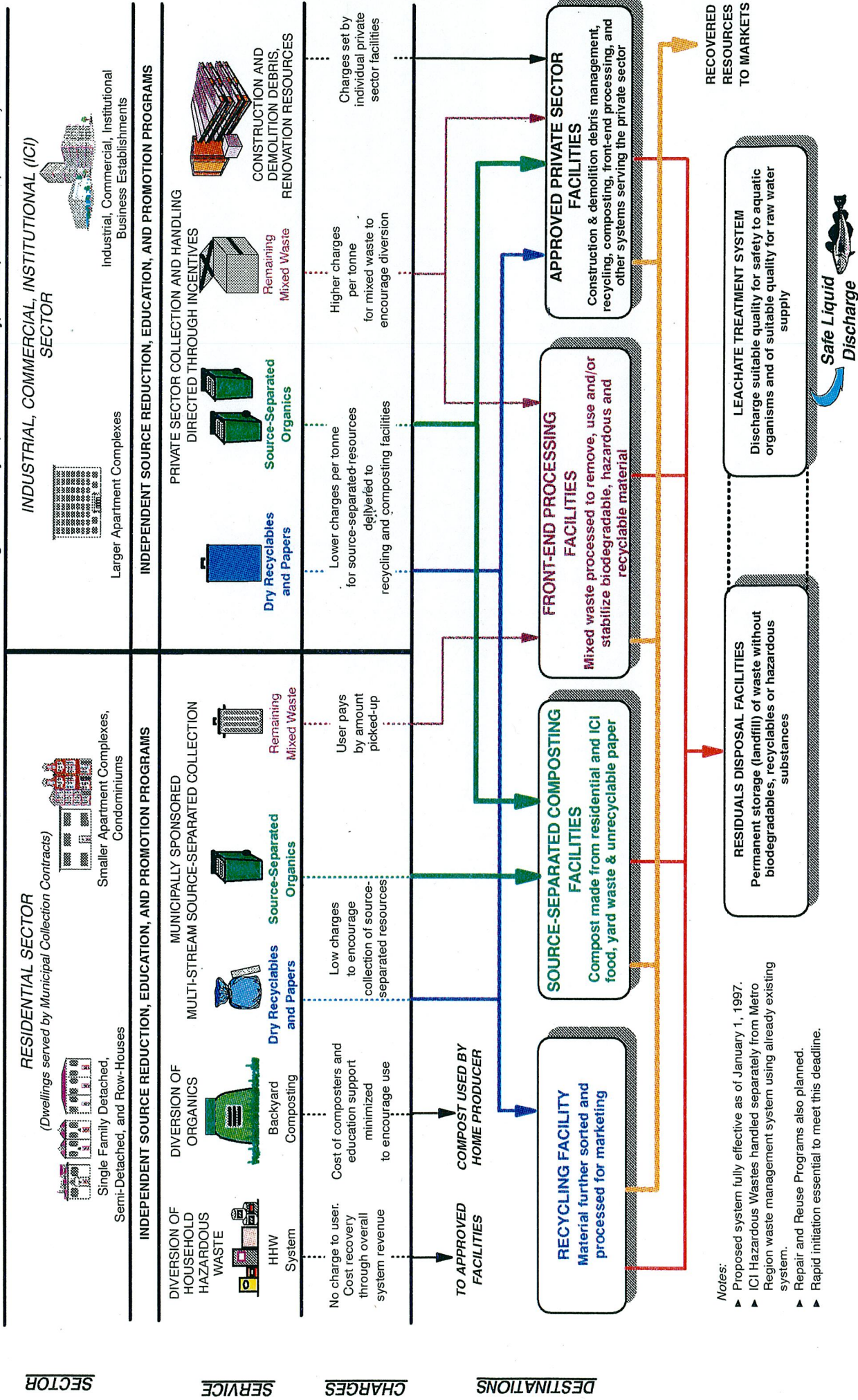
The figure illustrates how the Strategy is intended to function as of January 1, 1997.

RESOURCE

FIGURE 4-1

FRAMEWORK FOR INTEGRATED WASTE MANAGEMENT STRATEGY FOR METRO REGION: CONVENIENT AND COMPREHENSIVE

Developed by the COMMUNITY STAKEHOLDER COMMITTEE Regional Solid Waste/Resource Management Project, Halifax County/Halifax/Dartmouth/Bedford, March 1995



5. CITIZEN ROLE IN MANAGEMENT

Management of the overall RSWMP will involve a cooperative effort among the participating municipalities, the private sector, and the CSC. The Strategy includes an Independent Stakeholders' Audit and Review Group (ISARG).

5.1 Mandate of the Independent Stakeholders' Audit Review Group (ISARG)

As one component of the management structure for the Strategy, there shall be an organization called the Independent Stakeholders' Audit and Review Group (ISARG). The members of this group will undertake ongoing audit, analysis, review and evaluation of all operations of the RSWMP.

The ISARG shall act as the "eyes and ears", and the considered judgement of the CSC in order to work towards ensuring the essential components of the RSWMP are effectively implemented.

5.2 ISARG Functions and Responsibilities

The functions and responsibilities of the ISARG shall be:

- ▶ The group will operate and be staffed by members elected from the CSC as part of a continuing grassroots process involved in the development and implementation of the RSWMP.
- ▶ Membership in ISARG will not be by political appointment, but rather by direct election from the membership of the CSC.
- ▶ The goals, policies, and operational framework of the RSWMP (the "what to do" elements of the system) will be designed by the CSC through the planning process presented in this strategy. ISARG will be responsible for accomplishing independent audit, review, evaluation and report functions on the implementation of the RSWMP.
- ▶ Methods of delivery within the RSWMP (the "how to" elements of the resource recovery system) will be implemented by the relevant municipal body and the contracted operators. Through ISARG, the CSC will monitor the work of making the RSWMP operative, using the resources and advice of qualified technical staff, consultants and municipal administrators.

This task will include development of a system for putting the Strategy into operation. Among other activities, this would involve the organization and implementation of criteria for Expressions of Interest (EOIs), Requests for Proposals (RFPs), tenders and

criteria for Expressions of Interest (EOIs), Requests for Proposals (RFPs), tenders and proposals, etc., done in cooperation with Halifax County Municipality and other participating municipalities.

- ▶ The cost recovery system employed to provide funds for the overall design and implementation of the RSWMP will include funding for ISARG.
- ▶ In carrying out its functions, ISARG will be supported by the appropriate and necessary funding from Halifax County Municipality, and from other participating municipalities. ISARG shall be established through legislative action and will have standing to initiate any proceedings necessary to ensure compliance with the terms of the RSWMP, including any dispute resolution mechanism arising in the implementation of the RSWMP.
- ▶ ISARG will carry out its oversight functions on implementation of the RSWMP by holding public information and consultation meetings to report on their activities and findings. These meetings should take place twice each year --- with additional sessions as mandated by the CSC, or as requested by the local communities.

5.3 ISARG Membership

- ▶ The CSC shall determine, by consensus, the method of election of ISARG members.
- ▶ ISARG shall comprise nine members, eight of whom will be citizens elected by the CSC from among its members. Three citizen members will be elected to represent the local community hosting the residuals disposal facilities; five citizen members will be elected from other communities within the Metro-region; the ninth member of the ISARG will be the municipal councillor for the local community hosting the residuals disposal facilities.
- ▶ ISARG members will elect their own Chairperson from among their citizen members.
- ▶ ISARG members shall serve for a three-year term, with the possibility of one additional three-year term. Following completion of two consecutive three-year terms, an ISARG member must "sit out" a one-year period before standing for subsequent election to ISARG.
- ▶ Terms of the eight citizen members of ISARG shall be overlapping to ensure continuity.
- ▶ Service as a member of ISARG will be without remuneration. Only payment of legitimate, documented, and CSC-approved categories of expenses will be permitted.

6. COMPONENTS OF THE INTEGRATED WASTE/RESOURCE MANAGEMENT STRATEGY

The various components of the Strategy are defined conceptually in this section of the document. Where possible, criteria for physical facilities have been presented. The components are defined under the following headings:

- 6.1 Education and Communications Program**
- 6.2 Leadership by Example**
- 6.3 "Reducer Saves" Program (User Pay)**
- 6.4 Waste Reduction and Reuse Program**
- 6.5 Waste/Resource Audits and Waste Reduction Action Plans**
- 6.6 Disposal Bans**
- 6.7 Backyard Composting (BYC)**
- 6.8 Household Hazardous Waste (HHW) Management Program**
- 6.9 Recycling**
- 6.10 Source-Separated Composting Component**
- 6.11 Front-End Processing of Mixed Residues**
- 6.12 Inert Materials Management**
- 6.13 Residuals Disposal Facilities**

6.1 Education and Communications Program

The ability of a waste/resource management system to achieve its waste diversion goals depends on the ongoing support and participation of residents, businesses and institutions. The most effective way to achieve high levels of support and participation is to design a system that is simple to understand and convenient to use. A new system that calls for changes to the way people generate waste (e.g., activities to reduce and reuse), manage their resources (e.g., backyard composting), and source separate materials for collection, means that people must make significant lifestyle changes. To help people adopt the lifestyle changes necessary to achieve the Strategy's goals for maximum waste diversion, it is imperative that the proper tools and information are provided to all users of the system.

The waste/resource management strategy will include, *at a minimum*, the following components to provide Metro-region residents, businesses and institutions with the necessary information to build awareness and ongoing support for the new system:

- ▶ ongoing involvement of the CSC Community Information Group (See Section 1.2) in the development and implementation of programs to communicate with, and educate residents regarding the benefits of the new waste/resource management system;
- ▶ education and communications programs will be targeted to a variety of audiences: schools, business sector organizations, landlords and tenants associations, ward/district associations, public institutions (hospitals, universities, museums);
- ▶ ongoing promotion and education through the media regarding the new system and its components before, during and after system implementation;
- ▶ comprehensive and understandable "hands-on" education materials provided directly to households, businesses and institutions regarding the 3Rs, system components, collection schedules and related items, provided prior to, and throughout, system implementation;
- ▶ seasonally targeted events and educational workshops/seminars on specific system components (e.g., source separation and backyard composting);
- ▶ establishment of community networks to support the strategy; and
- ▶ provision of assistance and information on an ongoing basis (such as information lines and personal assistance as required).

All program elements will support system start-up and continue throughout system implementation.

6.2 Leadership by Example

A key component of the waste reduction initiatives in this Strategy is leadership by example. The municipalities that implement the Strategy will demonstrate their leadership in waste management by taking proactive stances on stewardship, source separation and waste reduction. Their activities in this regard will be expected to encompass waste audits, purchasing protocols, education and awareness programs, reporting and record-keeping.

6.3 "Reducer Saves" Program (User Pay)

To foster stewardship and encourage resource recovery, the philosophy of "Reducer Saves", or user pay, is adopted as an essential component of the waste/resource management strategy.

The key components of the Reducer Saves Program are:

Cost Allocation:

- ▶ To shift waste/resource management system costs from the property tax base to the generators of waste. The use of economic instruments, including mechanisms for payment for the waste stream collected (i.e., by weight, by volume, using metered containers, selling prepaid tags or stickers) will be examined. A graduated rate structure for the municipal curbside collection service for recyclables, compostables and residual wastes will be designed to encourage the 3Rs. To encourage reduction at source, payment rates for residual wastes will be significantly higher than the rates for recyclable and compostable materials.

Public Education/Awareness:

- ▶ The Education and Communications Program will play a crucial role in fostering public support for "Reducer Saves" and discouraging illegal dumping. The implementation of a comprehensive education program, beginning as soon as this strategy is adopted, is essential to the success of the program.
- ▶ One of the first steps in the education process to introduce the "reducer saves" program will be to clearly identify waste management system costs, that are currently "hidden" in the municipal tax bill, on residents' existing tax bills as a separate item. One of the key goals is to develop a *separate payment system* to implement the "Reducer Saves" program.

6.4 Waste Reduction and Reuse Program

The waste reduction and reuse program component of the Strategy is targeted by the CSC as a "Do It Now" Initiation Project for accelerated implementation.

Waste reduction and the reuse of materials are the most effective, and most overlooked, methods of diverting waste materials from disposal. By preventing the generation of "waste" in the first place, valuable resources are conserved, collection costs are reduced, landfill space is saved, and system costs are lowered. The crux of achieving waste reduction is to provide residents, businesses and institutions with the appropriately targeted information that will raise awareness and encourage waste reduction.

While waste reduction program results are very difficult to measure in terms of tonnages, their importance is recognized, and support for such programs is integral to the waste/resource management system.

The waste reduction component of the strategy will include, *at a minimum*, the following elements:

- ▶ the establishment and/or support of existing opportunities to reduce and reuse materials (i.e., "wasteless" shopping and procurement policies, composting programs, reuse centres, bulk and environmentally-friendly shops);
- ▶ facilitating/encouraging the development of new reuse and repair centres, using innovative means of support;
- ▶ a comprehensive and ongoing education and awareness program (see Section 6.1) that includes education materials that directly target waste reduction and reuse activities, and a promotional program highlighting ways to reduce and reuse materials in the Metro-region; and
- ▶ advocating improvements in packaging materials, moving towards more user-pay and deposit/refund models, and other appropriate waste reduction initiatives.

More detail is provided in the *Background Document to the Strategy*, under the title *Choosing: Not to Waste*.

6.5 Waste/Resource Audits and Waste Reduction Action Plans

The performance of the waste/resource management system in this strategy is based on a reliable understanding of the components of the waste/resource stream. As of today, however, those stream components are not fully understood. Tonnage reports are available in some detail, but the components within the waste stream have never been fully documented for the Metro-region. Therefore, audits and action plans will be necessary.

Once waste/resource audits that measure and monitor what is being generated by the residential and IC&I sectors have been completed, waste reduction action plans can then be prepared. These waste reduction action plans will work in synergy with other essential diversion components, to help achieve the targets presented in Section 3.

A commitment to waste reduction action plans will be made through appropriate staffing of the waste/resource management system. While the precise structure of the system administration is not known today, it is expected that staffing commitments will be made before the system components are fully implemented. Staffing will be dedicated, to an appropriate degree, to the actions associated with waste reduction.

The development and implementation of waste reduction action plans and other diversion components will give continuous information on the amount and type of wastes/resources within our system. The results of these audits will allow the system and component designs to be refined in an ongoing process. Flexibility in all system components will be an added benefit.

6.6 Disposal Bans

Disposal bans for leaf and yard waste, old corrugated cardboard and selected construction and demolition wastes are targeted by the CSC as a "Do It Now" Initiation Project for accelerated implementation.

Materials for which environmentally acceptable management alternatives exist will be banned from disposal at the residuals disposal facilities. Announcements regarding disposal bans will be made prior to the implementation and enforcement of the bans to ensure that generators and haulers have an opportunity to identify management alternatives. The system managers will be responsible to ensure that suitable alternatives are publicized for all banned materials. The list of banned materials will include, at a minimum, the following materials:

- ▶ organic food waste;
- ▶ leaf and yard waste;
- ▶ old corrugated cardboard (OCC);
- ▶ newspapers;
- ▶ fine paper;
- ▶ unrecyclable paper (such as boxboard and unrecyclable cardboard products);
- ▶ tires;
- ▶ construction and demolition (C&D) wastes;
- ▶ white goods (such as stoves, refrigerators);
- ▶ hazardous waste;
- ▶ aluminum;
- ▶ glass containers; and
- ▶ tin cans.

The long-term goal of the strategy is to ban from disposal all materials that are recyclable, compostable, hazardous or are construction and demolition debris.

6.7 Backyard Composting (BYC)

The BYC component of the Strategy is targeted by the CSC as a "Do It Now" Initiation Project for accelerated implementation.

Backyard Composting (BYC) is a significant part of the Integrated Waste/Resource Management Strategy. A successful BYC program reduces the amount of material delivered to the waste management system, eliminating it before it needs to be collected and processed. Accordingly, BYC is an extremely cost-effective means of waste/resource management.

BYC Program and Relationship to the Source-Separated Collection and Composting System

The CSC believes that BYC will work together with the source-separated collection and management system proposed as a part of the Strategy. The rationale includes recognition that:

- ▶ Not all residents will be willing or able to use BYC;
- ▶ BYC cannot easily or readily accommodate some portions of the waste stream which are better managed at centralized source-separated composting facilities, including certain food wastes and non-recyclable paper; and
- ▶ Many BYC settings cannot readily accommodate the large volumes of yard waste which are generated at certain times of the year.

BYC Program Delivery and Measurement of Success

The implementation of the "Do It Now" initiative for testing out a BYC demonstration project, along with results from the Town of Bedford's BYC program, will provide valuable information for developing a region-wide BYC program. (More details on the "Do It Now" Working Group initiatives are given in Section 8.)

Various models of program delivery have been discussed ranging from the delivery of free BYC units to all residents, to the provision of subsidized units, to the sole provision of educational materials. Whatever delivery system is developed, its costs should be measured against the benefits associated with avoided disposal costs for the wastes which would otherwise be delivered to the system.

As an element of auditing, the success of the BYC program should be measured using, in part, the results of user surveys.

6.8 Household Hazardous Waste (HHW) Management Program

The HHW program component of the Strategy is targeted by the CSC as a "Do It Now" Initiation Project for accelerated implementation.

While HHW is a small portion of the total waste stream, it is a significant and important element with regard to system management and environmental health protection. All modern, integrated waste/resource management systems incorporate suitable programs for the removal and appropriate disposal of HHW. The "Do It Now" Working Group¹ has developed specific recommendations for the immediate implementation of a permanent HHW service for the Metro-region.

In keeping with the goal of maximizing the 3Rs and minimizing net adverse impacts on the environment, the intent of the HHW management program is to:

- ▶ significantly reduce the volume and toxicity of wastes generated in the first place;
- ▶ then encourage the reuse and recycling of hazardous wastes; and finally,
- ▶ ensure the proper management of remaining hazardous wastes.

The Strategy recognizes that the management of dangerous goods and hazardous wastes generated by the IC&I sector is not under the jurisdictional authority of municipal government.

The Metro-region waste/resource management system will include a permanent HHW service, comprising a fixed depot for all residents, including those residences serviced by the IC&I sector. Consideration will also be given to a mobile service, which is designed to meet the needs of all residents in the Metro-region who cannot easily be serviced by a single central depot.

The details and costs of this system are under development. It is proposed that the costs of the system will be covered by the overall revenues from the other components of the waste/resource management system. The users of the HHW system will not be charged on a direct usage basis as this component is a part of the Strategy.

The HHW service will not be provided for non-residential hazardous wastes from the IC&I sector. Dangerous goods and IC&I hazardous waste cannot be administratively or jurisdictionally controlled as a part of the Strategy. However, the CSC believes that the proper management of these materials is integral to the environmental integrity of the Strategy. Accordingly, suitable methods to ensure the accountability of waste generators should be established.

6.9 Recycling

This section addresses recycling as it is broadly defined in terms of municipal components. Recycling is a significant part of the Metro-region waste/resource management strategy, ensuring that valuable resources are not disposed of as "wastes." Recycling is a way to ensure that resources which cannot be reused in their current form are "recycled" into new materials or products. The Strategy encourages private sector recycling. The management of inert materials, such as C&D debris from the IC&I sector, is addressed in Section 6.12.

Municipal recycling activities are currently promoted by the Citizens' Committee on Recycling (CCR), a community group which works with the Metropolitan Authority. The transition to the proposed waste/resource management system will include integration with the CCR concept, which represents an effective, ongoing means of encouraging recycling in the Metro-region.

Recycling will be encouraged in the residential sector through the education program and the provision of appropriate collection systems. In the IC&I sector recycling will be encouraged by ensuring that suitable charging systems are put in place at the Recycling Facility, and by continuing private sector recycling without undue controls.

Collection of Recyclables

The collection of recyclables at curbside from the residential sector is a key to the success of the recycling program. It is anticipated that the list of acceptable materials for recycling will expand as markets develop. The list will be developed in coordination with disposal bans given in Section 6.8.

Currently, all those served by residential collection contracts can place blue bags, paper fibres and old corrugated cardboard at the curb, however, the level of service varies by municipal unit. The objective of this strategy is to provide a level of service that is appropriate and which maximizes the efficient collection of recyclables.

The collection of recyclables from the IC&I sector will not be specified in the Strategy. Rather, it is intended that recyclables collection will be ensured through an appropriately-designed charging system which discourages the placement of non-source-separated wastes. Further, recyclable materials from the IC&I sector which meet the list of acceptable materials will be accepted at the Recycling Facility for a nominal or zero charge.

Processing and Marketing of Recyclables

The Recycling Facility will continue to receive, process and market municipal recyclables. Suitable charging arrangements will be made to encourage private/IC&I recyclables to be delivered to the Recycling Facility. To the extent practical, the volumes of materials processed by private sector recyclers will be documented and tracked to assist in estimating diversion.

The following points have been adopted with regard to the processing and marketing of recyclables:

- ▶ The Recycling Facility will continue to be used in its current form as the new system is implemented, however, it may be converted or modified to other uses in the future.
- ▶ The flexibility of the Recycling Facility will be maintained, such that its modification can be readily achieved as waste/resource processing technologies evolve.
- ▶ Decisions regarding the processing of recyclables will continue to focus on enhancing local employment opportunities, and enhancing/encouraging the development of local technologies.
- ▶ More material processing facilities will be developed and operated in the Metro-region if it is determined that it is more cost effective to do so, compared to the use of the single Recycling Facility.
- ▶ Modifications to the current operational contract at the Recycling Facility will be considered in the future. Opportunities for private ownership and operation will be considered.

Costs, Benefits, and Measuring the Effectiveness of Recycling

The CSC recognizes that certain materials are expensive to recycle, while others bring revenue which offsets the costs of processing. It is felt that the net costs of recycling will be recovered through the overall system costs. Further, it is felt that the benefits of recycling should be measured in a way which includes the consideration of avoided disposal costs and other spin-off social/economic benefits, such as employment and business opportunities, to the region as a whole.

6.10 Source-Separated Composting Component

The source-separated composting component of the Strategy is targeted by the CSC as a "Do It Now" Initiation Project for accelerated implementation.

Source-separated composting is a significant component of the Integrated Waste/Resource Management Strategy for the Metro-region. In fact, source-separated composting is essential to meeting or exceeding the diversion targets set out in this document, as these targets cannot be achieved with source reduction and recycling alone.

Source-separated composting is facilitated through collection systems and incentive-based charging methods. The methods of collection are defined below.

Collection of Source-Separated Compostables from the Residential Sector

Figure 4-1 shows that a key component of the Strategy is the collection of source-separated compostables from the residential sector. The figure illustrates a proposed "cart" type collection system. This intends that residential waste generators will separate their organic wastes into a separate collection stream, which will be collected as part of municipally-sponsored collection contracts. Carts of this type are a relatively recent innovation which are gaining favour for safe, effective, and cost-efficient collection of compostables separated at source. The cart system is one method of residential organics collection. The evaluation of alternative systems will be carried out in a demonstration of collection. The timing of collection pilot programs is shown in Section 8.

As noted in Section 6.3, the charging of the service will be designed to encourage the separation of waste into source-separated streams, and to discourage its placement at the curb in a mixed fashion.

The implementation of source-separated collection will be facilitated through initiation projects.

As in every aspect of this strategy, flexibility is maintained to accommodate the varying needs of diverse areas, groups and even individuals, while continuing to provide for the common good. The overriding objectives of source-separation are:

- ▶ to provide for full participation;
- ▶ to provide for universal source-separation; and
- ▶ to encourage maximum diversion.

Moreover, it is critical to the success of source-separated composting to use the proper collection container — one designed expressly for safe, odour-free storage of compostables. User-friendly, convenient, ventilated and easily-moved containers are the key to the high diversion percentages set out in this strategy.

Besides kitchen and yard organic waste, the composting system should also include the collection of unrecyclable paper. Each household generates a significant amount of used paper unsuited for recycling. Unrecyclable paper absorbs liquids and helps aerate the mix, effectively controlling odours and spills. Paper also improves the composting process and actually enhances the purity and quality of the finished product. Unrecyclable paper adds significant volume to the amount diverted to composting and to the success of waste management overall.

Such a collection container is also cost-effective. Compostables can be safely stored odour-free and outside for at least two weeks thereby permitting biweekly collection. Recyclable and residue collection can be staggered as a result. Alternating collection keeps collection costs under control and permits standardizing throughout the whole of Metro.

The right container will make residential food and yard waste and unrecyclable paper composting attractive and convenient resulting in high levels of public acceptance and participation.

Initiation projects will be carried out in both urban and rural areas. The initiation projects will serve to illustrate the methodologies to ensure public participation in the source separation of compostables. As well, they will provide a source-separated waste/resource stream to start up composting sites. The collection demonstration projects should occur in early 1995 and should be integrated with centralized composting facilities. The initiation projects will be designed to be scaled up to full operation before December 31, 1996.

Collection/Management of Source-Separated Compostables from the IC&I Sector

The Strategy anticipates that some portion of the source-separated organics from the IC&I sector can be delivered to the municipally sponsored source-separated composting facilities. The Strategy is designed to maximize the amount of material which is composted or recycled, and minimize the amount of material which is collected as mixed residue. The charging system adopted for IC&I wastes will be designed to encourage this.

The system will encourage the IC&I activities in source reduction, and will promote on-site IC&I composting. This is defined as the development of a small-scale composting system which is at the site of the industry, commercial, or institutional establishment. It is not necessary to define exactly where or how IC&I wastes will be managed, provided that those wastes are managed in an acceptable, permitted fashion compatible with the overall goals of the Strategy.

Therefore, the proportion of IC&I wastes which may become source-separated compostables, requiring management at municipally-sponsored composting facilities, is difficult to predict. It will be necessary for the system to provide sufficient additional capacity such that these compostables can be accommodated in new facilities.

Source-Separated Composting Facilities

The Strategy is designed to encourage source-separated composting, as this activity is one which ensures that the resource value in the waste stream is retained. Centralized source-separated composting is complementary to Backyard Composting (BYC), because certain types of wastes cannot be practically routed to BYC, and many residents cannot or will not compost at home.

Source-separated composting facilities must be in place to receive and process compostable materials for the residential sector. The processing of organics from the IC&I sector may or may not take place at these facilities.

As a long-term strategy, it is desired that centralized source-separated composting will increase, and that both the portion of the waste stream routed through the front-end processing facilities, and ultimately disposed of in the residuals disposal facilities, will decrease.

The following points are adopted with regard to the source-separated composting facilities:

- ▶ Flexibility should be considered in the design of the composting facilities, such that modifications can be readily achieved as waste processing technologies evolve.
- ▶ Decisions regarding source-separated composting facilities should consider opportunities to enhance local employment and to enhance/encourage the development of local technologies, skills and knowledge base.

Windrow Composting refers to the method of controlled, aerobic composting of organics in which piles of material are aligned in long rows (windrows) and turned on a regular basis by mobile equipment. Windrow composting can be conducted in buildings or out-of-doors.

In-Vessel Composting refers to the method of aerobic composting of organics which is conducted "in vessels", under cover, where the movement of air, the movement of material, and the monitoring of environmental parameters are mechanically controlled.

Capital costs for windrow composting facilities are invariably lower than for in-vessel facilities.

- ▶ Materials collected and processed will include those materials which are not readily composted in BYC programs, including for example, specific types of food and paper.
- ▶ Compost quality and the marketability of the final product will be considered as requirements are set for the facilities.
- ▶ The source-separated composting facilities will be situated exclusive of mixed residue facilities. No mixed residues will be delivered to the source-separated composting facilities.
- ▶ Multiple sites and compost operators will be encouraged. Centrally-separated compostables may be taken to a source-separated composting facility or other composting facilities provided they are composted separately.
- ▶ The lower the cost for the diversion components, especially for source-separated composting relative to the cost of disposal, the better the system will work diverting materials from disposal. The CSC recommends that the diversion components be established at as low a cost as possible consistent with operational performance.

→ With regard to siting, the facilities should be located close to the centres of generation. This will encourage residents to become familiar with composting activities and to accept composting as a key component of the system. The "Do It Now" Working Group has advanced specific recommendations for centralized, source-separated composting initiation projects. The Group recommends that such projects be carried out as quickly as possible to demonstrate that this technology is safe and acceptable.

With regard to sizing, some evidence suggests that centralized composting above a certain size can become inefficient and lead to operational problems. A number of small facilities, which could include windrow or in-vessel composting, may be designed to work synergistically, thereby creating less overall nuisance if problems arise.

It is the preferred approach of the CSC to develop source-separated composting facilities as turn-key models (design/build/own/operate), with appropriate provisions for the termination of contracts. However, such a turn-key approach will need to be based on specific operational, monitoring, maintenance and product quality criteria.

6.11 Front-End Processing Facilities for Mixed Residues

The processing of mixed residues from both the residential and IC&I sectors is required to ensure that usable and/or inappropriate materials are removed before delivery to the residuals disposal facilities. Facilities for processing mixed residues are known as "front-end processing" facilities. The primary purpose of these facilities is to remove recoverable resources (i.e., recyclable and compostable materials) from the mixed residue stream. Their secondary intention is to remove substances, such as hazardous wastes, putrescibles and other materials that are banned from disposal at the residuals disposal facilities.

Recovered recyclable materials will be processed at the front-end processing facilities and routed to markets. Compostable materials that are recovered from the mixed residue stream will be processed in composting facilities separate from the source-separated compostable materials. While compost produced in these kinds of facilities is likely to be of lower quality than from source-separated composting, it will still be a valuable and useful resource.

The following points have been adopted for consideration with regard to the front-end processing facilities:

- ▶ Flexibility should be considered in the design of the processing facilities, such that modifications can be readily achieved as waste processing technologies evolve.
- ▶ The design priority for the facilities must be a "positive sort" to remove putrescible materials (those materials that rot).
- ▶ Materials processed will be those which have not been source-separated, and thus contain materials that have the potential to produce leachate. A charging system or tipping fee will be designed to discourage the delivery of recyclable, compostable or hazardous materials to the facilities, thereby encouraging the diversion of materials to other facilities for processing.
- ▶ Compost quality and the marketability of the final product will be considered as requirements for facilities are set.
- ▶ The front-end processing facilities will be physically separate from the source-separated composting facilities.

Based on the points listed above, it is evident that the front-end processing facilities are intended to serve as a final checkpoint for materials which might otherwise be routed to the residuals disposal facilities. The long-term goal of the Strategy is to reduce the quantities of materials routed through the front-end processing facilities. A fair and suitable mechanism of charges and cost recovery will need to be designed to encourage this long-term pattern of usage. As with the development of the source-separated composting facilities, the preferred approach of the CSC is to develop the front-end processing facilities as turn-key models (design/build/own/operate).

However, such a turn-key approach will need to be based on specific operational, monitoring, maintenance and product quality criteria.

The timing of the development of the front-end processing facilities is important to this strategy. For the delivery of materials to the residuals disposal facilities to meet quality criteria, it will be necessary for the front-end processing facilities to be in place and operating first. The CSC believes that these facilities are essential for the siting process to assure potential site communities that every effort is taking place to minimize the quantities of waste requiring disposal and to keep problematic materials away from the residuals disposal facilities.

6.12 Inert Materials Management

The inert materials component of the Strategy is targeted by the CSC as a "Do It Now" Initiation Project for accelerated implementation.

Certain types of materials which are present in the waste stream are inert, do not create leachate, do not readily decompose, and do not require disposal in high-technology engineered landfills. Some of these materials can provide resources for recycling and reuse and others can be utilized for clean fill and reclamation purposes. The Strategy specifically addresses these types of materials.

The inert materials which are currently considered in this category include:

- ▶ Materials from renovation, construction and demolition (C&D). This debris from the IC&I sector, while not locally well-documented, is known to be a substantial portion of the waste stream (perhaps between 10% and 30% by weight).
- ▶ Materials of a non-organic nature which have been source-separated but cannot be recycled or reused.

There are multiple levels of waste/resource management which apply to inert materials. In terms of a hierarchy, they can be considered in the following order as applied to C&D materials:

- ▶ Pre-demolition (retrieval, reuse, resale).
- ▶ Repair (as an alternative to demolition).
- ▶ Post-demolition (processing, infilling).

Specific actions will be developed to address certain types of materials. The CSC's "Do It Now" Working Group has brought forward the following suggestions:

- ▶ Ban inert materials from landfill for which environmentally-acceptable alternatives exist.
- ▶ Wood debris from renovation, construction and demolition should be addressed as a potentially valuable resource. Whenever possible it should be separated at the site of renovation/construction/demolition. No clean wood debris should be disposed of at the residuals disposal facilities.
- ▶ White goods, car bodies, domestic oil tanks, hazardous wastes and tires should be diverted from the residuals disposal facilities.
- ▶ Contaminated soil will not be accepted at the residuals disposal facilities and should be routed to suitable, approved locations.

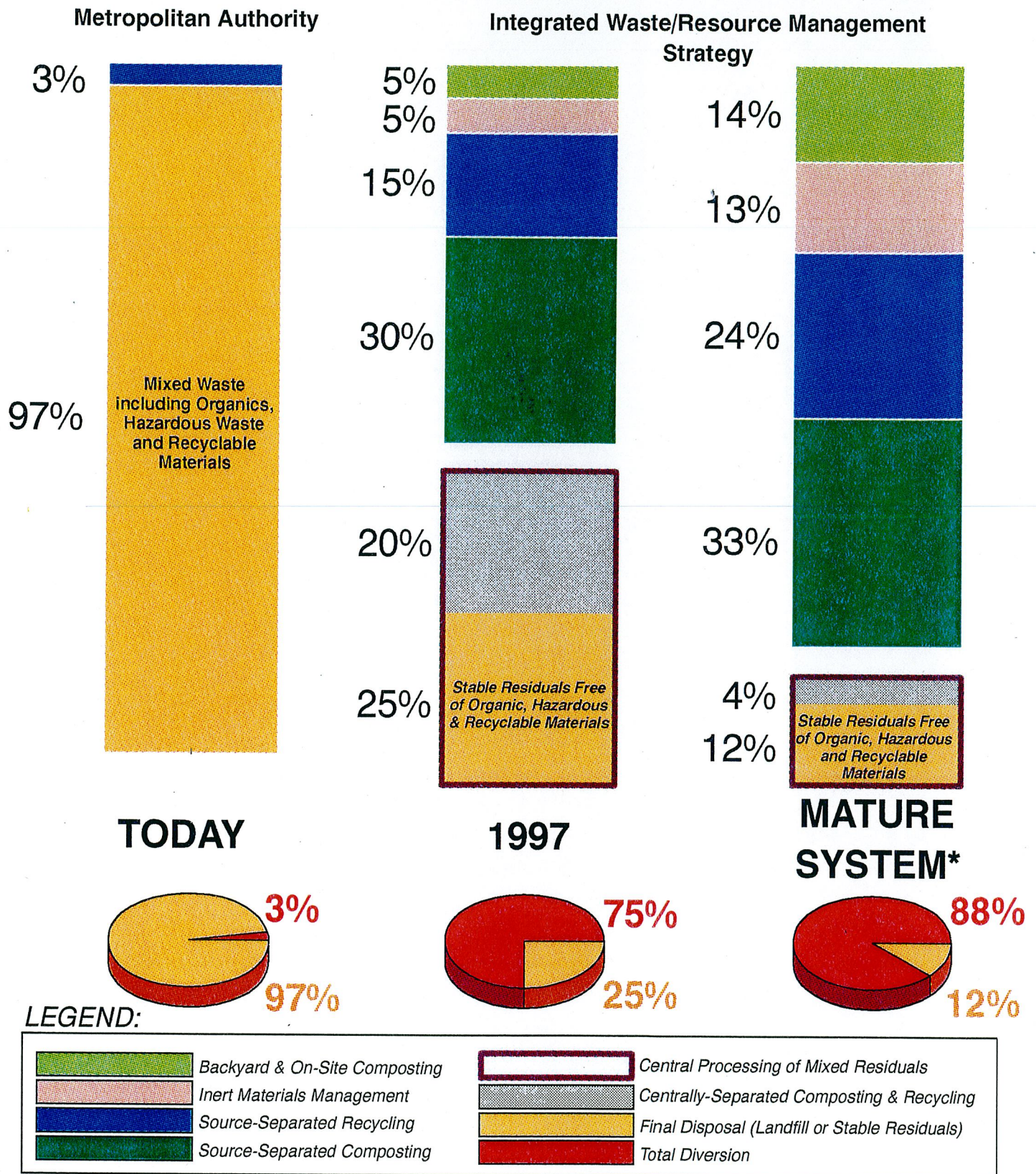
- ▶ Municipal by-laws should be evaluated and, if appropriate, modified to support the recommendations of the Strategy.
- ▶ Encourage the introduction of environmentally-acceptable alternatives for those materials for which alternatives do not currently exist.

The Strategy encourages private sector involvement in the appropriate management of these materials. Currently, a number of facilities can accept these materials; a list has been prepared and is available to the CSC and the public. Appropriate means of control, including charging systems, bans and enforcement, will be required to help ensure that the appropriate materials are diverted from disposal to beneficial reuse.

All of the previous subsections of Section 6 relate to the diversion components of the Strategy. To demonstrate that the Strategy proposed by the CSC is both achievable and effective, Chart 6-1 on the following pages compares the diversion achievements of today's waste management system with the proposed Strategy.

CHART 6-1 DIVERSION COMPARISON: ACHIEVABLE AND EFFECTIVE

1997 diversion will be achieved through early initiation projects phased-up to full participation. The CSC strategy delivers only stable, non-harmful residuals going to final disposal, necessary for siting a new landfill.



*Some members of the CSC believe a good target date for the mature system is year 2000.

**Waste/Resource System Diversion Performance Rates reflect the best information and estimates of the CSC. They are adopted from waste composition data from Metropolitan Authority, Sound Resource Management (1992), Metropolitan Toronto data, and other sources and the anticipated performance of this proposed system.

***Household Hazardous Waste Collection and other programs diverting less than 1% are not displayed here.

Integrated Waste/Resource Management Strategy. Halifax County/Halifax/Dartmouth/Bedford. March 1995.

CSC INTEGRATED WASTE/RESOURCE MANAGEMENT STRATEGY

Our Commitment

The overall effectiveness of the Community Stakeholder Committee's Integrated Waste/Resource Management Strategy depends upon striving to achieve "zero waste" and "zero discharge" principles through the implementation of *all* of the strategy components as an integrated whole.

The potential host communities for the residuals disposal facility component will require a reliable guarantee that this strategy will not put organic or hazardous material into the residuals disposal facilities, or release environmentally harmful discharge from the residuals disposal facilities. Therefore, the CSC and the PSC only support the opening of any residuals storage area or disposal facilities if and when the following steps are substantially achieved:

1. The proposed source-separated, three-stream, container-based system for collecting residential organics is in full and successful operation;
2. The collection of organic, recyclable, and non-recyclable fibre materials from the IC&I sector is in full and successful operation;
3. All residential- and IC&I-produced hazardous waste products have been removed from the waste stream and have been properly handled by an approved and effective hazardous waste facility(s); and
4. All compostable materials (including organics and soiled paper products) have been removed from the waste stream and converted to beneficial use.

The CSC urges those charged with implementing this plan to do the job right, so that all of our communities can have confidence that what is done will meet our needs in a responsible way well into the 21st century.

6.13 Residuals Disposal Facilities

The landfilling of residual materials is the disposal method proposed for the Metro-region. Incineration has been rejected as a disposal option. Thus, the final step in the waste/resource management system is that of landfilling, that is, the permanent storage of residuals after all efforts at reduction, reuse, recycling and composting are completed.

Purpose, Scope and Requirements

The residuals disposal facilities provide safe, permanent storage locations for materials which have made their way through the waste/resource management system. The facilities complement the other components of the system. In the long term, the facilities are intended to be optimally utilized since the objective of the waste/resource management system is to increase source reduction, maximize material diversion, and achieve or exceed the diversion targets. The facilities are to be constructed in accordance with current and evolving Nova Scotia Department of the Environment (NSDOE) standards for landfill design, construction, operation, maintenance, monitoring and closure.

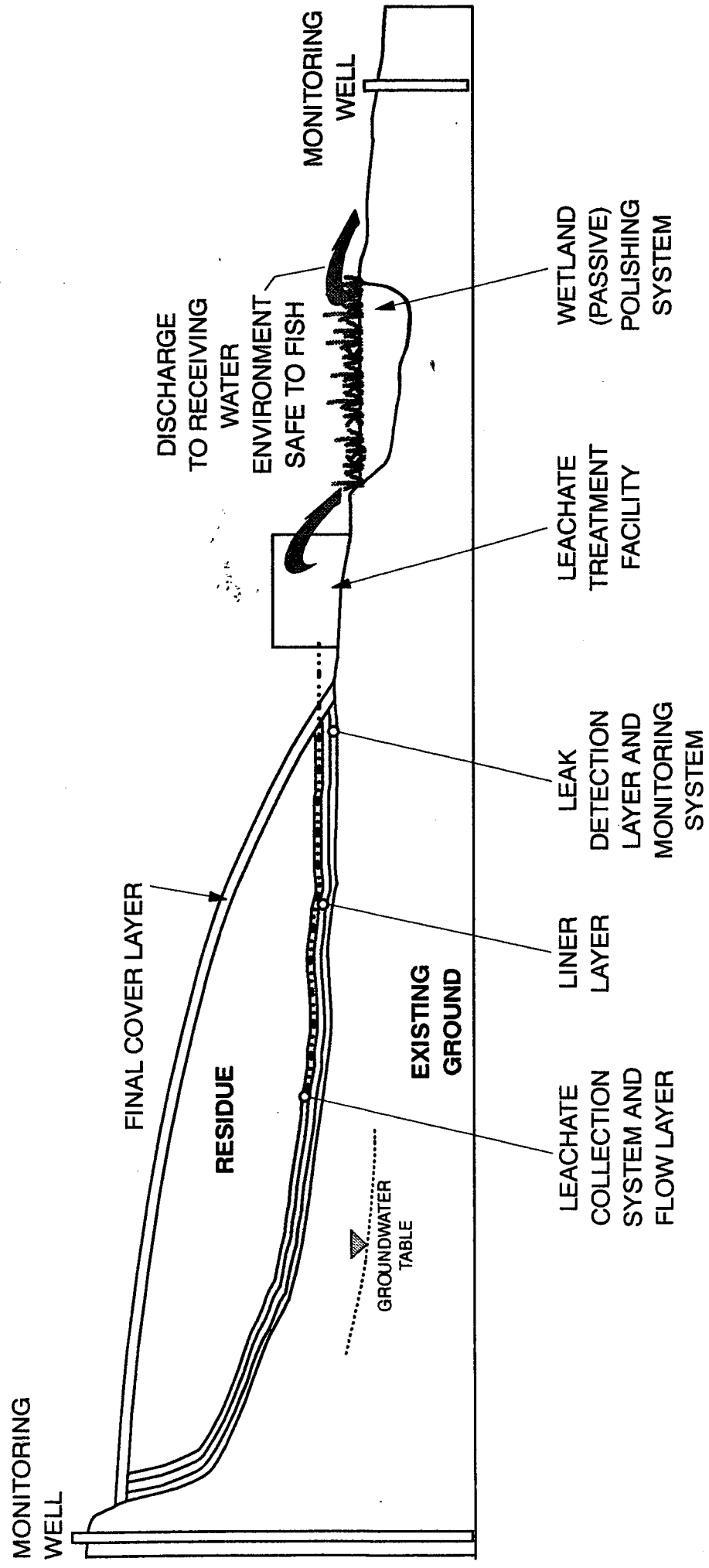
Factors to Consider in Development

The detailed design and siting of the residuals disposal facilities will be initiated by the CSC following the adoption of the Strategy. While the details have yet to be determined, the CSC has discussed some of the factors influencing the development of the residuals disposal facilities. Those factors of immediate significance include:

- ▶ The facilities will be designed/operated/monitored/maintained to meet or exceed all relevant NSDOE standards.
- ▶ The facilities will be developed in cells, with each cell encompassing a suitable time period of between one and five years.
- ▶ The facilities will be designed to have an objective of zero adverse impact on the environment when operational.
- ▶ Liquid discharges from the facilities will meet rigorous standards, will be safe to fish and humans, and will be suitable for drinking water.
- ▶ No host fee or compensation fee structure should be used for the facilities.
- ▶ There will be no "guarantee" of waste (residuals) delivery to the residuals disposal facilities.
- ▶ The standards required for development will be based on the "containment" philosophy. As the waste stream changes over time, the standards for liner and leachate collection may be modified, but only in accordance with the degree of risk posed by the materials to be disposed.
- ▶ Leak detection will be provided which allows for the location and remediation of problems.

A conceptual figure showing the containment concept is provided as Figure 6-1.

FIGURE 6-1 CONCEPTUAL SCHEMATIC OF RESIDUALS DISPOSAL FACILITY



7. SYSTEM COSTS

7.1 Overview

The system costs are a key factor to be evaluated in the Strategy. In costing this Strategy and its components, life cycle costing must be used. Given the purpose of the Strategy, the costs have been developed to a conceptual level of detail, and are not based on detailed specifications or designs for system components.

The tables presented in this section provide summary details from the cost analysis. Table 7-1 provides estimated system costs, and compares them to Metro Authority cost data. Table 7-2A and 7-2B provide more detail on cost estimates for the components of the Strategy.

The cost of the new integrated waste/resource management system has been estimated in 1996 dollars. The costs are based on two conditions: first, that which applies during 1997; and second, that which applies to a mature system. These estimates have also been compared to today's system costs based on the 1994/95 Metro Authority budget, which, according to Authority staff, is reportedly very close to actual 1994/95 expenditures, and the 1995/96 Metro Authority draft budget estimates. For illustrative purposes, Table 7-3 compares the cost of the proposed Integrated Waste/Resource Management Strategy (Mature Condition) to the projected costs of a Metro-region system proposed in a 1992 report by Sound Resource Management as well as to the projected costs of the (now-rejected) Metropolitan Authority Incinerator-based waste management strategy.

As Table 7-3 shows, the proposed system is well within the costs envisioned by the 1992 Sound Resources study, and is far lower than the previous Metro Authority proposal. **The proposed system is affordable and sustainable. The CSC strongly recommends that it be adopted in principle by the Metro-region municipalities.**

Benefits of the proposed Strategy have not been quantified in dollar terms. The Strategy presented in this document is not a "comparative" option, rather it represents the system recommended by the CSC for the Metro-region. Accordingly, this cost analysis is not dependent on direct comparisons of estimated benefits. However, the CSC believes that the many benefits of the proposed system are substantial and sustained, and that these benefits encompass resource conservation, job creation, and associated economic spin-offs. Chart 7-1 illustrates the costs of the Metro Authority system compared to the proposed Strategy as well as the decrease in waste disposal and increase in resource creation under the two systems.

7.2 Details of Assumptions used in Cost Analysis

The following subsections provide a list of costing assumptions for each major system component of the Strategy. Following the list of assumptions, Table 7-2 presents a detailed breakdown of each component including: the estimated percent of waste/resource handled, the estimated capital cost, the estimated tonnage handled, the estimated cost per tonne processed, and the estimated total component cost. It should be noted that all costing was conducted at a conceptual level of detail and is considered accurate within +/- 25%.

Administration

A figure of \$750,000 per year was adopted considering existing Metro Authority administration costs, the estimated Metro Authority administration costs of the Incinerator proposal, and anticipated administration costs of the proposed Integrated Waste/Resource Management Strategy.

This system will manage fewer total tonnes through this administration category which presently deals primarily with the residuals disposal portion. The proposed System dramatically reduces the role of this residuals disposal component.

Waste Reduction, Education and Communication Programs

A figure of \$1,000,000 per year was adopted for waste reduction, education and communication programs. This dollar amount assumes that approximately \$4 per tonne will be spent on waste reduction programs and on educating and communicating with residential and industrial, commercial, and institutional sectors. These programs are intended to be independent and sustaining throughout the life of the system. As discussed in Section 8, early start-up of these programs is recommended.

Household Hazardous Waste (HHW) Management Program

A figure of \$500,000 per year was adopted considering existing Metro Authority HHW management fees and estimates from the Metro Authority Incinerator proposal. This cost assumes a permanent depot would be established in the Metro Region. As well, it is assumed all residents will have access to the HHW depot. The depot will not service commercial establishments. Consideration will also be given to a "collection days" service for outlying areas, particularly in the start-up years for the permanent depot.

Municipal Recycling

The following assumptions were made in developing a cost estimate for the Municipal Recycling program:

- ▶ The capital debt requirement for the recycling plant is reduced to 0 by the year 1997, in accordance with present debt retirement plans of the Metro Authority.

- ▶ The net operating cost for processing materials is estimated to be approximately \$67 per tonne. This figure does not include the cost of recyclables collection. This figure was derived from the Report on Recycling Facility Operating Alternatives (Doane Raymond, 1994) and includes the offset derived from revenue from the sales of processed materials and shipping subsidies from the Resource Recovery Fund.
- ▶ Total annual costs are calculated for two proposed processing capacities: 20,000 tonnes/year (1997) and 30,000 tonnes/year (mature).
- ▶ Some capital upgrading of the Recycling Facility may be required, but this has not yet been determined or estimated.
- ▶ The Recycling Facility tonnage assumes approximately a 50/50 split for total potential recyclables derived from the residential and IC&I sector. The aforementioned processing capacities assume practically all tonnage processed at the Recycling Facility is residential in origin and is collected by the municipal collection system. Therefore, some significant percentage of materials recycled could be managed via private systems.
- ▶ Greater private involvement would be encouraged in recycling.

Backyard Composting (BYC) Program

A figure of \$150,000 per year was adopted for 1997 based on the average system cost of \$12/tonne of waste/resource diverted from the collection stream. It is upgraded in the mature system case based on the same per tonne allocation. This system cost is considered adequate to sustain various education and ongoing support programs for the backyard composting system. Any free or subsidized provision of backyard composting units is not included in this adopted figure.

Source-Separated Central Composting Facility

Conceptual level costs were developed through a review of operating compost facilities in North America, with a focus on those composting solid waste. As well, information on capital and operating costs was assembled from journal articles and personal communications with representatives at the various facilities. Current information indicates that there are 16 operating facilities in North America which process more than 10,000 tonnes of MSW per year (eleven of these facilities are in the United States and five are located in Canada). As well, many facilities in the planning stages were also considered during conceptual costing.

The following assumptions were made in developing a cost estimate for the Source-Separated Central Composting Facility:

- ▶ Reported capital cost dollar figures from the existing facilities review have been converted to 1996 dollars, thereby adjusting for inflation. Official Government of Canada inflation figures were obtained from Statistics Canada up to 1993, and were projected ahead in 1994 and 1995 at 0.5%/year.
- ▶ It is assumed for the purposes of cost estimating that the source-separated composting facility is separate from the front-end processing facility.

- ▶ Capital and operating cost estimates have been presented as a range of values to accommodate the different types of in-vessel and windrow composting technologies.
- ▶ Capital costs are amortized over the life of the facility (20 years) at an interest rate of 11%.
- ▶ The capacities for costing are 75,000 tonnes/year (1997) and 82,500 tonnes/year (mature) for the source-separated composting facility.
- ▶ The cost of acquiring land has not been included.

Front-End Processing Facility

Conceptual level costs were developed through a review of operating municipal solid waste compost facilities in North America. As well, information on capital and operating costs was assembled from journal articles and personal communications with representatives at the various facilities. Current information indicates that there are 16 operating facilities in North America which process more than 10,000 tonnes of MSW per year (eleven of these facilities are in the United States and five are located in Canada). As well, many facilities in the planning stages were also considered during conceptual costing.

The following assumptions were made in developing a cost estimate for the Front-End Processing Facility:

- ▶ Reported capital cost dollar figures from existing facilities review have been converted to 1996 dollars, thereby accounting for inflation. Official Government of Canada inflation figures were obtained from Statistics Canada to 1993, and were projected ahead in 1994 and 1995 at 0.5%/year.
- ▶ It is assumed for the purposes of cost estimating that the source-separated composting facility is separate from the front-end processing facility.
- ▶ Capital cost estimates have been presented as a range of values to accommodate the potentially different types of in-vessel and windrow composting technologies.
- ▶ Operating cost estimates have been assumed to be a single value per tonne, as the operating costs would not be expected to range as widely due to the significance of material processing equipment at the facility.
- ▶ Capital costs are amortized over the life of the facility (20 years) at an interest rate of 11%.
- ▶ The capacities for costing are 112,500 tonnes/year (1997) and 40,000 tonnes/year (mature) for the front-end processing facility.
- ▶ The cost of acquiring land has not been included.

Waste/Resources Transport

Metro Authority is currently budgeting approximately \$2 million per year in waste transfer costs. These costs primarily reflect the effort associated with transporting residues from the urban areas to the residual disposal facility. Since the new waste/resource management system will have components which have not yet been sited, it is not possible to accurately estimate waste and

resource transfer costs. However, given the significant increases in resource diversion and the reduction in waste disposal tonnages, the total transport costs will likely decrease.

Based on the anticipated reduction in tonne-kilometres of material movement by 1997, a figure of \$1,000,000 per year was adopted for the cost of waste and resource transfer. This figure is approximately 50% of that currently expended by the Metro Authority. For the mature system, the estimate adopted for waste & resources transfer is \$500,000 per year, or approximately 25% of the current Metro Authority expenditure on this item, reflecting further reduction in tonnage transported.

Residuals Disposal Facility (Landfill)

The following assumptions were made in developing a cost estimate for the Residuals Disposal Facility (Landfill):

- ▶ The capacities for costing purposes are 62,500 tonnes/year (1997) and 30,000 tonnes/year (mature system) of residual waste disposed.
- ▶ Capital costs are amortized over the life of the facility (25 years) at an interest rate of 11%.
- ▶ Cost figures include provision for the future costs of post-closure care and long-term maintenance of the facility. The assumed figure for this element is equivalent to \$2/tonne of residue disposed.
- ▶ Cost figures do not include siting, purchase of land, closure of the Highway 101 Landfill, or "host community" fees. It should be noted that "host community" fees are not recommended by this Strategy.
- ▶ The residuals disposal facility is costed to include the various components of a modern residuals disposal facility which comply with the relevant requirements from the Draft Nova Scotia Standards and Guidelines Manual for Landfills (NSDOE, 1993).
- ▶ For purposes of costing, the facility dedicated new access road is assumed to be no more than three kilometres.
- ▶ Cell construction is based on approximately three years of service per cell.
- ▶ Operating costs for the residuals disposal facility do not include the potential cost to import cover material. Using stabilized residuals for cover material may prove cost effective.

Existing Metro Authority Capital Debt Servicing

A figure of \$3,353,430 per year was provided from the Metro Authority April 1994/March 1995 budget. As well, a figure of \$4,630,000 per year was provided from the Metro Authority proposed 1995/96 operating budget. Existing debt service is not directly applicable to the system outlined in this Strategy.

Future Metro Authority Capital Debt Servicing

The figure adopted for the future Metro Authority Capital Debt Servicing was based on the previous Metro Authority Incinerator proposal. This future capital debt figure is therefore based on estimates prepared in December 1993, and may well be low.

The Mayor's agreement states that, "... [b]y accepting responsibility for solid waste management, Halifax County Municipality does not thereby accept any responsibility or liabilities related to the current Highway 101 Landfill operation. All such responsibility and liabilities will remain with the Metropolitan Authority."⁷ Therefore, future Metro Authority capital debt servicing and liability costs are not directly applied to the system outlined in this Strategy. This future value is not known and will have to be managed by the future amalgamated municipality.

Municipal Collection

As presented in Table 7-1, present municipal collection contracts (for both waste and recyclables collection from households) amount to approximately \$4 million per year. It is beyond the scope of the Strategy to prescribe specific collection system requirements, as well as to project the costs based on some assumed collection systems. Information from other areas where this type of collection has been implemented is being reviewed. As well, collection pilot studies are an integral part of the Strategy. It is expected that the municipal collection system will be developed based on system objectives of multi-stream collection at lowest practicable costs. Accordingly, the current municipal contract value of some \$4 million per year has been extended into future years as a "minimum" cost figure.

The cost of the collection container used for compostables has not been included at this stage of conceptual costing since the particular system has not been specified.

⁷ Principle (13), *Appendix A - Assumption of Responsibility for Solid Waste Management by Halifax County Municipality*, October 7, 1994 agreement between the Mayors of Halifax County Municipality, the Cities of Halifax and Dartmouth and the Town of Bedford.

Table 7-1 Annual System Cost Comparison: Affordable Solution

The CSC believes this cost comparison shows that for the same range of costs we are paying now for an objectionable system, we can have a far superior system. Future costs will go down as diversion goes up.

System Component	Metro Authority Apr. '94/Mar. '95 Budget*	Metro Authority 1995/96 Proposed Budget	Integrated Waste/Resource Management Strategy 1997 (250,000 t/yr)	Integrated Waste/Resource Management Strategy Mature Condition (250,000 t/yr)
Total System Tonnage (residential & ICI):	(250,000 t/yr)	(250,000 t/yr)	(250,000 t/yr)	
Administration	\$900,700	\$845,420	\$750,000	\$750,000
Education, Communication & Source Reduction	\$0	\$0	\$1,000,000	\$1,000,000
HHW Program	\$300,000	\$300,000	\$500,000	\$500,000
Municipal Recycling (including revenue from sale of resources)	\$1,361,800	\$1,629,800	\$1,340,000	\$2,010,000
Backyard Composting	\$0	\$0	\$150,000	\$420,000
Source-Separated Central Composting	\$0	\$0	\$2,381,000 to \$6,017,000	\$2,619,000 to \$6,619,000
Front-End Processing	\$0	\$0	\$6,514,000 to \$8,398,000	\$2,456,000 to \$3,712,000
Waste & Resources Transfer Costs	\$2,213,790	\$2,237,190	\$1,000,000	\$500,000
Residuals Disposal (Landfill) including Leachate Treatment	\$6,092,450	\$10,315,140	\$4,071,500	\$2,439,500
Existing Metro Authority Capital Debt Servicing Charges	\$3,353,430	\$4,630,000	Existing debt service and future liability costs are not directly applicable to the Integrated Waste/Resource Management Strategy. Their future value/cost is not known. They will need to be managed by the future municipality.	
Future Metro Authority Capital Debt Servicing & Management of Long Term Liabilities at Existing Landfill (estimated from 1993 MA cost tables)	\$1,600,000	\$1,600,000		
Subtotal of Above Items	\$15,822,170	\$21,557,550	\$17,706,500 to \$23,226,500	\$12,694,500 to \$17,950,500
Average Annual System Cost (\$ Per Tonne)	\$63	\$86	\$71 to \$93	\$51 to \$72
Municipal Waste & Resources Collection (all 4 units); future costs estimated based on multi-stream collection	\$4,000,000 (approximately)	\$4,000,000 (approximately)	\$4,000,000 (or potentially greater)	\$4,000,000 (or potentially greater)
Total of Above Items (Including Collection)	\$19,822,170	\$25,557,550	\$21,706,500 to \$27,226,500	\$16,694,500 to \$21,950,500
Average Annual System Cost (\$ Per Tonne) (Including Collection)	\$79	\$102	\$87 to \$109	\$67 to \$88

* Figures reflect the 1994/95 Metro Authority budget which is reportedly very close to actual 1994/95 expenditures.

- a = Based on the tonnage of household hazardous waste handled in the residential sector.
- b = Based on the tonnage of recyclables delivered primarily through the municipal collection system serving the residential sector.
- c = Based on tonnage hauled from Metro transfer stations and depots to the landfill disposal facility.
- d = Based on residential population presently serviced by existing municipal waste and resource collection programs.

Refer to Section 7 of the text for a complete list of system cost assumptions.

Table 7-2A Detailed Component Costing for the Integrated Waste/Resource Management Strategy (1997)

System Component	Estimated Per Cent of Waste Stream	Estimated Input Tonnage (1997)	Estimated Capital Cost	Estimated Operating Cost	Estimated Total Annual Cost	Estimated \$ Per Tonne Cost
Municipal Recycling (5% of Residential Tonnage) 15%	8%	20,000	Nil	\$1,340,000	\$1,340,000	\$67
Backyard Composting	5%	12,500	Nil	\$150,000	\$150,000	\$12
Source-Separated Central Composting	30%	75,000	\$10,000,000 to \$30,000,000	\$1,125,000 to \$2,250,000	\$2,381,000 to \$6,017,000	\$32 to \$80
Front-End Processing	45%	112,500	\$25,000,000 to \$40,000,000	\$3,375,000 to \$4,000,000	\$6,514,000 to \$8,398,000	\$58 to \$75
Residuals Disposal (Landfill) & Leachate Treatment	25%	62,500	\$8,591,250	\$3,051,300	\$4,071,500	\$65

Notes:

1. Does not include 5% estimated Inert Materials Debris diverted from system.
2. Of the total 45% handled at the Front-End Facility, 20% is recovered as resources and 25% is disposed as stable residual at the landfill facility.
3. All capital costs are amortized over the life of the facility at an interest rate of 11%.

Table 7-2B Detailed Component Costing for the Integrated Waste/Resource Management Strategy (Mature Condition)

System Component	Estimated Per Cent of Waste Stream	Estimated Input Tonnage (Mature Condition)	Estimated Capital Cost	Estimated Operating Cost	Estimated Total Annual Cost	Estimated \$ Per Tonne Cost
Municipal Recycling (24% of Residential Tonnage)	12%	30,000	Nil	\$2,010,000	\$2,010,000	\$67
Backyard Composting	14%	35,000	Nil	\$420,000	\$420,000	\$12
Source-Separated Central Composting	33%	82,500	\$11,000,000 to \$33,000,000	\$1,237,500 to \$2,475,000	\$2,619,000 to \$6,619,000	\$32 to \$80
Front-End Processing	16%	40,000	\$10,000,000 to \$20,000,000	\$1,200,000 to \$2,000,000	\$2,456,000 to \$3,712,000	\$61 to \$93
Residuals Disposal (Landfill) & Leachate Treatment	12%	30,000	\$6,105,600	\$1,714,500	\$2,439,500	\$81

Notes:

1. Does not include 13% estimated Inert Materials Debris diverted from system.
2. Of the total 16% handled at the Front-End Facility, 4% is recovered as resources and 12% is disposed as stable residual at the landfill facility.
3. All capital costs are amortized over the life of the facility at an interest rate of 11%.
4. Some members of the CSC suggest that the year 2000 should be adopted as the "mature condition". The achievement of the mature condition will depend on many factors, including public and business support, use of economic incentives, and performance of new system elements.

Refer to Section 7 of the text for a complete list of system cost assumptions.

Table 7-3 Annual System Cost Comparison for the Integrated Waste/Resource Management Strategy

System Component	Integrated Waste/Resource Management Strategy Mature Condition (250,000 t/yr)	Sound Resource Report (300,000 t/yr)	Metro Authority 1995/96 Proposed Budget (250,000 t/yr)	MA Incinerator Proposal (278,000 t/yr)
<i>Total System Tonnage (residential & ICI):</i>				
Administration	\$750,000	\$0	\$845,420	\$745,000
Education, Communication & Source Reduction	\$1,000,000	\$675,000	\$0	\$223,000
HHW Program <i>a</i>	\$500,000	\$1,048,000	\$300,000	\$442,000
Municipal Recycling (including revenue from sale of resources) <i>b</i>	\$2,010,000	\$2,720,000	\$1,629,800	\$4,573,000
Backyard Composting	\$420,000	\$0	\$0	\$110,000
Source-Separated Central Composting	\$2,619,000 to \$6,619,000	\$2,679,000	\$0	\$2,857,000
Front-End Processing	\$2,456,000 to \$3,712,000	\$6,710,000	\$0	\$0
Waste & Resources Transfer Costs <i>c</i>	\$500,000	\$0	\$2,237,190	\$1,295,000
Incineration (Including Baling)	N/A	N/A	N/A	\$17,679,000
Residuals Disposal (Landfill) including Leachate Treatment	\$2,439,500	\$3,321,000	\$10,315,140	\$7,880,050
Existing Metro Authority Capital Debt Servicing Charges	Not applicable to the Integrated Waste/Resource Management Strategy.	Not Applicable to this system.	\$4,630,000	\$2,205,000
Future Metro Authority Capital Debt Servicing & Management of Long Term Liabilities at Existing Landfill (estimated from 1993 MA cost tables)			\$1,600,000	\$2,508,000
Subtotal of Above Items			\$21,557,550	\$40,517,050
Average Annual System Cost (\$ Per Tonne)			\$86	\$146
Municipal Waste & Resources Collection (all 4 units); future costs estimated based on multi-stream collection <i>d</i>	\$1,000,000 (or potentially greater)	\$10,400,000	\$4,000,000	\$4,000,000
Total of Above Items (Including Collection)	\$16,694,500 to \$21,950,500	\$27,553,000	\$25,557,550 (approximately)	\$44,517,050
Average Annual System Cost (\$ Per Tonne) (Including Collection)	\$67 to \$88	\$92	\$102	\$160

a = Based on the tonnage of household hazardous waste handled in the residential sector.

b = Based on the tonnage of recyclables delivered primarily through the municipal collection system serving the residential sector.

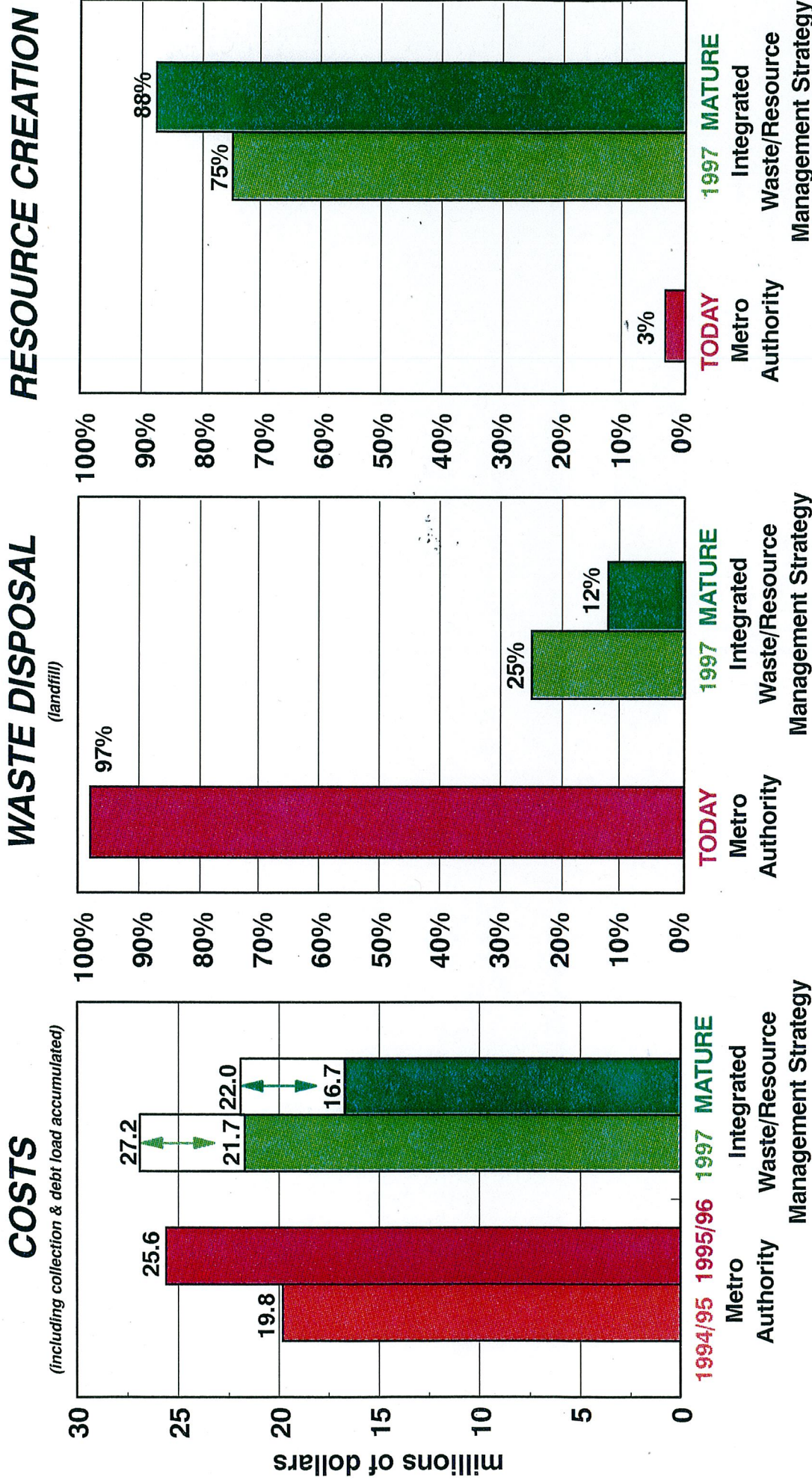
c = Based on tonnage hauled from Metro transfer stations and depots to the landfill disposal facility.

d = Based on residential population presently serviced by existing municipal waste and resource collection programs.

N/A = Not applicable

Refer to Section 7 of the text for a complete list of system cost assumptions.

CHART 7-1 COST-BENEFIT COMPARISON: AFFORDABLE STEWARDSHIP



For the same range of costs we are paying now for an objectionable system, we can have a far superior system. Future costs will go down and diversion will go up.

Integrated ~~Waste~~/Resource Management Strategy. Halifax County/Halifax/Dartmouth/Bedford. March 1995.

8. IMPLEMENTATION PLAN

The Strategy framework sets out an integrated series of programs, policies, collection systems, waste/resource management components, and a management system. The source-separated compost facilities and the front-end processing facilities will be fully operational before the residuals disposal facilities are opened. However, full optimization of these facilities will occur in stages. The construction of the components of the waste management system will take place through open, fair, competitive bidding from qualified companies in a process which actively encourages private sector bidders to bring forward effective and innovative technologies.

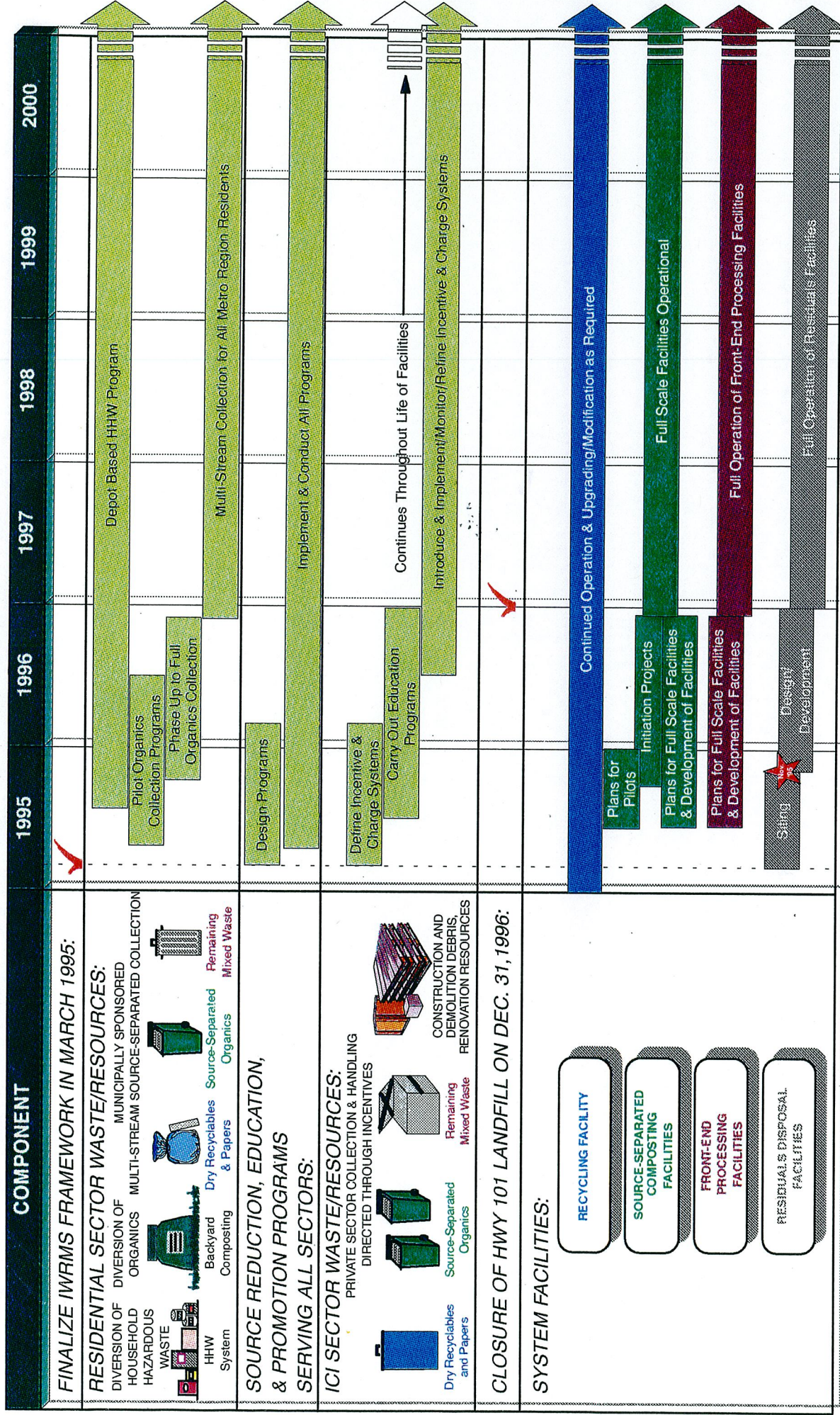
The CSC believes that early implementation of the education, promotion and diversion-related components of the Strategy is essential to achieve the success of the integrated system. Accordingly, a substantial implementation-related budget is proposed. A figure of \$1,800,000 is budgeted for the system implementation between May 1995 and December 1996. This figure was pro-rated over a period of 20 months from the Education, Communications and Source Reduction component (located in Table 7-1, IWRMS 1997).

A draft implementation schedule is provided on Figure 8-1. The schedule shows that the "Do It Now" Working Group recommendations are to take place as quickly as possible in 1995 and 1996. Other actions will occur over a longer period.

The CSC is concerned that one owner/operator may attain a monopoly on waste/resource collection, source-separated composting, front-end processing and/or residuals disposal. The CSC believes that issues associated with a potential monopoly should be taken into full consideration by all stakeholders involved in implementation.

The CSC has determined that there should be more than one front-end processing facility and more than one source-separated composting facility to ensure that the Strategy works as an integrated whole, and to provide reliable back-up capacity should any one facility experience operational problems. This will also ensure that no organics, hazardous wastes or recyclable materials are disposed of in the new residual disposal facilities. In comparison to one large facility, the CSC believes that several smaller facilities are more easily managed and operated, have lower overall system costs and are more readily achievable within the Strategy's implementation timetable. In addition, experience from other jurisdictions indicates that there appears to be a practical, optimal size for the successful operation of composting facilities. The Lunenburg regional facility is an example of a facility that meets these criteria.

FIGURE 8-1 IMPLEMENTATION PLAN: ACHIEVABLE CHALLENGE



Source-separated composting and front-end processing facilities will be fully operational before the residuals disposal facility is opened.

9. GLOSSARY OF TERMS

Backyard Composting (BYC) - The transformation of organic kitchen and yard waste into a beneficial soil amendment on the property of the generating resident. Traditionally, backyard composting has been undertaken by allowing a pile of organic wastes to naturally degrade. However, backyard compost units are now commercially available.

Biostabilization - A process used to force the biological degradation of organic materials in a controlled manner to a stable condition, usually to ensure that materials will not degrade in a disposal facility in a less controlled environment.

Capital Amortization - The distribution of payment over a period of time which pays for an initial capital amount.

Cart Collection System - A system of collecting residential waste/resources where householders place their materials in a wheeled cart and transport the cart to the curb for collection.

Centralized Composting - The composting of organic wastes such as yard, garden, unrecyclable paper and food waste at a centralized facility. Composting at a central facility is generally done through one of three types of processes: windrows (turned or static), aerated static pile or in-vessel.

Compostables - Materials that can undergo microbiological decomposition, resulting in a humus-like end product which is primarily used for soil conditioning.

Construction & Demolition (C&D) Debris - Waste materials from the construction and/or demolition of buildings, usually including wood and metal scrap, brick, block and concrete rubble, wire and packaging.

Dangerous Goods - Materials that may cause a threat to human health or the environment.

Disposal Ban - Refusal to accept specifically stated materials in a disposal facility. Generally, these are materials which can be diverted from the landfill by recycling or composting. Organics, hazardous wastes and corrugated cardboard are examples of materials which are often banned from waste disposal sites.

Economic Instruments (or) Economic Incentives - Policies that alter the prices paid by producers and consumers. By adjusting prices to encourage behaviour that reduces solid waste, economic instruments can be used to encourage the reduction, reuse and recycling of waste/resources. Although economic instruments are often discussed as alternatives to "regulation", they require supporting legislation and/or regulations. They are a less direct form of regulation which encourages initiative on the part of the persons regulated and can provide financial rewards for those who exceed the minimum standards.

Expression of Interest (EOI) - A proposal submitted to express an interest in undertaking a specific project, usually solicited by a government department or crown corporation.

Front-End Processing Facility - A facility where waste materials are processed or modified prior to disposal. Sorting and bio-stabilization are examples of front-end processing described in this Strategy.

Full cost/benefit accounting - A method of accounting which takes into consideration all the costs and benefits, including the following costs pertaining to a waste management system: start-up costs, resources (e.g., human resources, equipment, supplies, training costs, health and safety, environmental costs, quality assurance/control, closure and monitoring costs).

Hazardous Waste - Waste materials that may cause a threat to human health or the environment; handling and disposal of dangerous goods are regulated by federal and provincial laws.

Household Hazardous Waste (HHW) - Materials commonly found in the home which may cause harm to human health or the environment. These materials are commonly banned from municipal waste disposal facilities.

Humus - Inert material produced by the biological decay of plant or animal matter.

Industrial, Commercial and Institutional (IC&I) Sector - Includes industries (e.g., manufacturing), businesses and institutions such as schools and hospitals. Municipal waste is often categorized according to whether it is generated by the IC&I sector or the residential sector.

Inert Materials - Solid material which is not expected to undergo physical, chemical and/or biological changes in a landfill to an extent that would produce substances which may have a negative impact on the environment.

Leachate - Liquid that has been contaminated by dissolved or suspended contaminants due to contact with solid waste.

Materials Recovery Facility (MRF) - A facility where materials are processed to separate and recover recyclable materials from the in the waste stream.

Mixed Waste (or) Mixed Residue - Discarded materials and products which have not been source-separated and therefore may contain compostable or recyclable materials which can be recovered for beneficial use.

Multi-Stream Collection - A collection program where various categories of resources and waste are collected separately (e.g., mixed waste, compostable, fibre and dry recyclable streams) providing these materials have been separated at the curb.

Municipal Solid Waste (MSW) - Commonly referred to as garbage, this material is handled by municipal collection and/or disposal services. It includes two main types of solid waste: residential or domestic waste, and industrial, commercial and institutional waste. Also known as garbage, refuse, rubbish and trash.

Organics - Carbon-and hydrogen-based materials which can be transformed into humus-like materials through microbiological processes.

Public/Private Partnering - A process whereby the public sector and the private sector work together to finance and operate a project or program.

Putrescibles - Materials that can become putrid or rot.

Recyclables - Materials that can be separated from municipal solid waste and reprocessed into new products.

Request for Proposal (RFP) - A document requesting interested parties to submit a proposal describing how they would accomplish a specific project that an organization wishes to contract out.

Residential Sector - Householders, including those who live in detached dwellings, row housing, condominiums and apartments.

Residuals Disposal Facility - A facility which safely stores materials which cannot be recovered for further use through processes such as composting and recycling.

Source Separation - Classifying and segregating waste/resource materials by category, usually separating various classes of recyclable vs. non-recyclables items, usually done at the collection or pick-up point (e.g., residences, offices or commercial facilities).

Source-Separated Composting Facility - A facility which accepts materials for composting, which have previously been separated from those materials which cannot be composted

Waste Audit - A method of assessing the amount and type of waste generated by a specific organization or sector.

Waste Diversion - A term used to refer to the diversion of wastes from disposal. Diversion depends on the 3Rs of waste management as part of a strategy to divert used materials from disposal.

Waste Reduction Action Plan - A plan for developing and implementing strategies to reduce the amount of waste a generator produces by maximizing the 3Rs.

White Goods - Large, bulky metal items, usually durable household appliances such as refrigerators, stoves, washing machines and dryers.

Yard Waste - Discarded materials from residential yards and gardens, such as lawn clippings, leaves and prunings. These materials are primarily compostable and have been banned from disposal facilities in many North American jurisdictions.

Zero Discharge - When no byproducts are produced as a result of a specific process.

Zero Waste - No waste is produced or disposed of at a residuals disposal facility. All materials are reused, recycled or composted.

10. BIBLIOGRAPHY

10.1 Background Document to the Integrated Waste/Resource Management Strategy

The following materials are available under separate cover in the *Background Document to the Integrated Waste Resource Management Strategy* for Halifax County/Halifax/Dartmouth/Bedford:

- ▶ Project Steering Committee - Terms of Reference
- ▶ Community Stakeholder Committee - Terms of Reference
- ▶ Community Stakeholder Committee Consensus Positions and Motions
- ▶ Metropolitan Authority Tonnage Reports
- ▶ Waste Stream Composition Data
- ▶ *Choosing: Not To Waste*
- ▶ Vision Working Group Report
 - *Resource Management Systems: An Alternative to Current Waste Management Systems*, prepared by John Jackson and Barbara Wallace, March 1993.
 - "Option 1 - Metro Area" in *Review of Waste Management Systems Options* [Sound Resource Management Report], 1992.
- ▶ Today's System Working Group Report (Site Visit Report)
- ▶ "Do It Now" Initiation Projects Working Group Report
 - "Do It Now" Motions & Implementation Plans
 - *Components for Success of Comprehensive Waste/Resource Programs*
- ▶ Stewardship Working Group Report (option spreadsheet)
- ▶ Management Working Group Report
- ▶ Community Information Working Group Report

10.2 RSWMP Resource Centre

In addition, the following relevant documents are available at the Regional Solid Waste Management Project's Resource Centre:

Jackson, John and Wallace, Barbara. *Resource Management Systems: An Alternative to Current Waste Management Systems*. (March 1993).

Hawken, Paul. *The Ecology of Commerce: A Declaration of Sustainability*. (Harper Business: 1993).

Rathje, Bill. *Rubbish: The Archeology of Garbage*. (New York: Harper Collins, 1992).

APPENDIX A

THREE-STREAM COLLECTION WITH SOURCE-SORTED RECYCLABLES

Reprinted from (pp. 46-50)
"Review of Waste Management System Options"
March 1992

by

Sound Resource Management Group, Inc.

5.1. Option 1—Three Stream Collection with Source-Sorted Recyclables

The flow of materials and the estimated volume of waste for the Metropolitan Area and the City of Halifax for this option stream are shown in Figures 5.1.A and 5.1.B.

5.1.1. Material Collection

Material is collected separately in three streams:

Recyclable materials are separated at the source and collected separately from refuse. In addition to being *source-separated*, in this option recyclable materials are *source-sorted* into three separate groups: containers (glass, metal, plastic), newspaper, and mixed paper with other recyclable materials. The sorted materials are kept separate using a multi-compartment truck or separate dumpsters as they are delivered for processing.

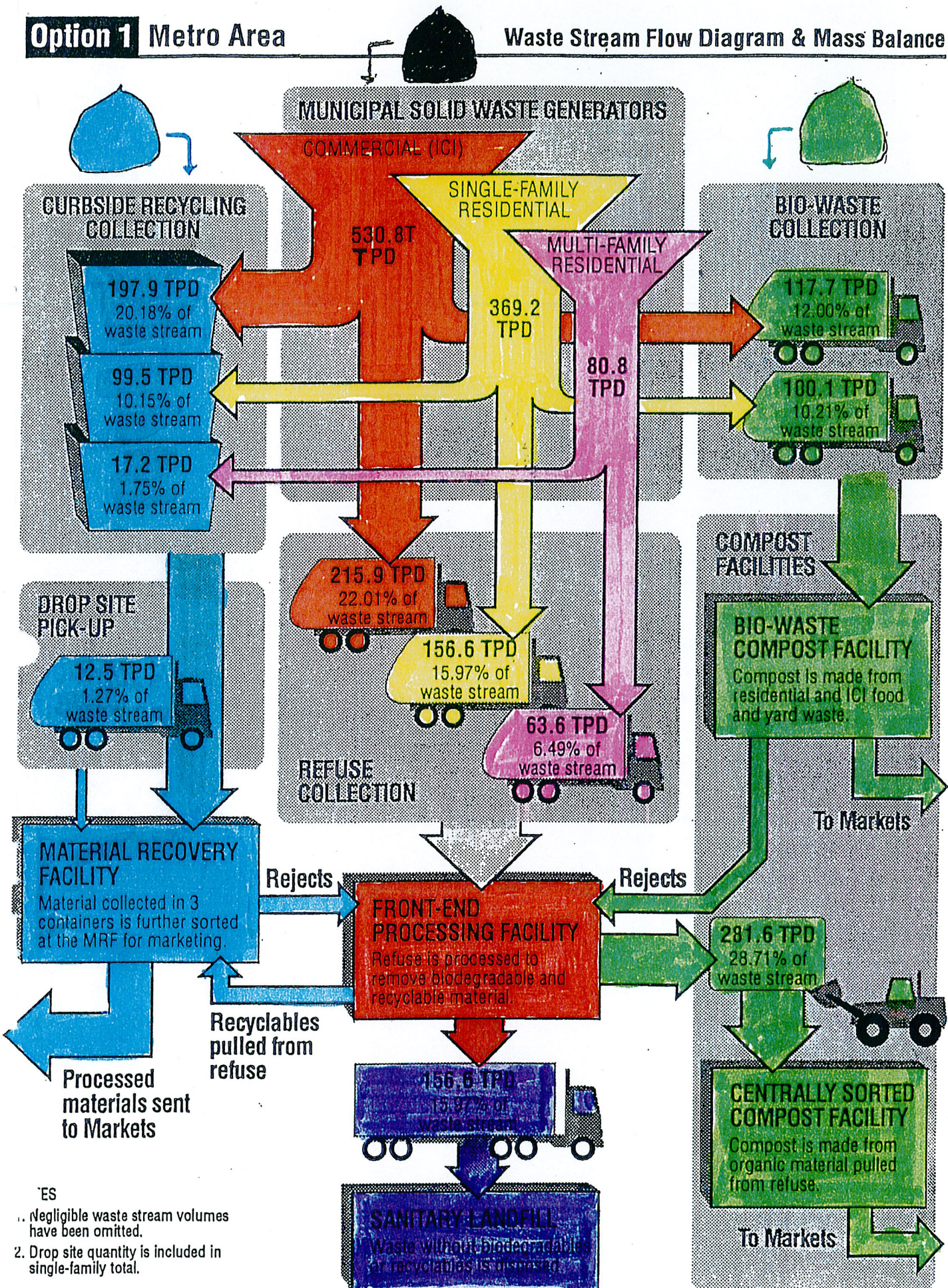
Biodegradable wastes include all food and yard waste. These are separated at the source and collected separately from refuse.

Refuse includes all materials except those targeted for recycling and biodegradable wastes.

The collection systems differ for different types of waste generators. This analysis assumes the following collection parameters for each of the major waste generator groups.

Option 1 Metro Area

Waste Stream Flow Diagram & Mass Balance



Sound Resource Report, 1992

General

Material can be delivered to drop sites by any type of waste generator.

Single-Family (up to six residential units per building):

Weekly curbside collection of recyclables :

- Container for commingled glass, plastic, and metal.
- Container for mixed paper.
- Container for newspaper.

Bi-weekly collection commingled biodegradables (yard waste and green food waste).

Weekly collection via a regular user-provided bag or can for set out.

Multi-Family:

Collection by haulers using:

- Separate containers for dry recyclables consistent with source-sorted collection described above.
- Dumpster for refuse.

Commercial:

Collection by haulers using:

- Separate containers for dry recyclables consistent with source-sorted collection described above.
- Containers for food waste at hotels, bars, restaurants, and other food/lodging establishments.
- Dumpster for refuse.
- Drop sites for yard and wood waste from landscaping and construction businesses.
- Special collection containers for single materials for selected types of businesses (e.g., OCC for retail businesses, glass from bars and restaurants).

5.1.2. Costs

Figure 5.2.A shows the waste management system cost estimates for this option which were developed for the single family residential sectors, both rural and urban, in the Halifax Metropolitan area. Figure 5.2.B shows the system cost estimates for the City of Halifax only. Like the figures given for the Metropolitan Authority Incineration Waste Management System, and the Best Available Technology Incineration Waste Management System, these figures include all capital amortization costs for facilities and equipment, as well as operation and maintenance costs. As noted, these figure do not include collection costs.

Figure 5.2.A —Halifax Metropolitan Area Costs

**Halifax Metropolitan Area
Non-Incineration Waste Management Option 1**

Costs Do Not Include Collection Costs

Component	Estimated Per Cent of Waste	Estimated Capital Cost	Estimated 1995 Tonnage	Estimated 1995 Cost per Tonne	Estimated 1995 Total Cost
Household Hazardous Waste	1.00%	\$1,313,000	3,000	\$349	\$1,048,000
Recyclable Materials	28.00%	\$6,950,000	85,000	\$32	\$2,720,000
Source Reduction/Private Recycling	15.00%	\$2,000,000	45,000	\$15	\$675,000
Source Separated Blowaste Compost	19.00%	\$17,375,000	57,000	\$47	\$2,679,000
Front End Processing/Centrally Separated Blowaste Compost	37.00%	\$45,000,000	110,000	\$61	\$6,710,000
Landfill	14.00%	\$30,567,000	41,000	\$81	\$3,321,000
	100.00%	\$103,205,000	300,000		\$17,153,000

Average cost per tonne: \$57

Notes:

1. All financial data are in 1995 dollars.
2. Capital costs are based on supplier quotations and consultant team estimates
3. Capital debt charges are based on a 20 year period at a 6% real interest rate
(6% = net of 11% nominal rate and 5% inflation rate)
4. Cost per tonne and total cost based on Metropolitan Authority projected 1995 tonnage.
5. Estimated cost for recycling assumes \$10/tonne revenue in 1995; estimated cost for composting assumes no revenue from compost.