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TABLE RONDE NATIONALE SUR L'ENVIRONNEMENT ET L'ÉCONOMIE

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"Information for Sound Decisions"

DRAFT

SOLID WASTE REDUCTION

STRATEGIC ELEMENTS FOR A PROGRAM OF ACTION

**A background study for the
Waste Reduction Committee of the
National Roundtable on the Environment and the Economy**

Brian Hull

The Conference Board of Canada

February 20, 1991

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PREFACE

In November 1990, The Conference Board undertook a study on behalf of the Waste Reduction Committee of the National Round Table on the Environment and Economy.

The study was the first step of a larger project contemplated by the committee "to identify the likely consequences of current and, under realistic scenarios, future solid waste reduction activities in Canada".

The work of The Conference Board on behalf of this larger study was to provide an initial framework paper.

Topics to be addressed included:

(i) the issue, indicating precisely what it is we are seeking answers to;

(ii) a conceptual framework displaying the relationships among the parameters of the issue;

(iii) the methodology with alternate approaches if appropriate, outlining how the main study would be performed;

(iv) the information base for the study - including what is at hand and what may have to be developed;

(v) timing and costs for the main study, including any alternatives.

This framework paper clarifies the issues and the measureable objectives and developes a conceptual framework to aid in the fulfillment of a project of national waste minimization. It delineates the various distinct material components to the issue of waste minimization and identifies the minimum additional statistics which will be required to track whether or not the Green Plan goal of a 50 per cent reduction in solid waste is being achieved. It also identifies why existing economic methods of projection, based on stable structural relationships, are of limited use in attempts at forecasting under circumstances where a major outcome of a successful project is to alter the structural relationships themselves. The paper includes a series of appendices which draw together relevant materials and statistics as a guide to further work in the area.

INTRODUCTION

In recent years there has been growing attention to solid waste minimization. Waste minimization takes many forms. It includes recycling products for reuse and reducing the volume of material required to produce a service - the classic three Rs of reduce, reuse and recycle. It includes reducing the volume and making more benign the composition of refuse dumped in landfill sites. It also includes the redesign of products and goods so that they do more with less, separate easily into component parts when their lives are done, and cause no damage as waste products. Waste minimization may take place in the home, in industry and in the processing, sorting and reusing of waste prior to final disposal or reuse.

Many firms are finding ways to reduce waste volume generated in-house. Steps to this end include modifications in the production process form the purchasing of raw materials, product design and the ease of disposal and reuse of both the product itself and the waste stream. Waste is now being divided into distinct streams of smaller volume. Each stream is collected separately and put to a special use. This is a major shift from the days when all waste was gathered in a uniform mass for disposal.

Households are taking major actions to minimize waste. Curbside recycling, the Blue Box, was pioneered by Laidlaw Inc. in the early 1980's. This system now serves about 670 thousand households (Laidlaw estimate) or 11 million household (Resource Integration, p.33) in Canada and the United States.

The Blue Box movement, separating such recyclable solids as newsprint, glass, metal and plastic materials at the household level, was spurred by the consumer environmental ethic as well as escalating collection and disposal costs. Disposal costs can be expected to continue to increase. The forces behind these increases - overflowing landfills and the absence of new sites close by to the need - will probably become even more pressing.

Curbside recycling builds on the willingness of households to pre-sort their garbage. In most communities sorting is still into just two streams - wet garbage and such dry items as paper, glass and cans. Some communities have also begun to collect hazardous household wastes separately. These efforts, begun as community projects with the support commercial waste haulers, are likely to spread and become a routine dimension of household waste management.

The recycling movement is proving exceptionally successful. The supply of recycled paper, bottles and cans exceeds the demand to make use of the accumulated resource.

Major projects are now in progress in Canada to recycle and reuse:

- newsprint
- other paper products
- plastic
- rubber
- glass
- gypsum board from construction
- wood debris - construction materials, chips and sawdust

It was comparatively recently, only about twenty years ago, that the business of providing technologies and services for getting rid of wastes solid became a distinct and specialized. Before that those who were involved in disposing of solid municipal waste required little more than ownership of a truck and access to a tipping site in many jurisdictions. During recent years legislative and regulatory requirements have become much stiffer. They promise to get stiffer still. The solid waste disposal industry has responded by consolidation into larger enterprises with more elaborate technologies and greater operational and organizational skills. Technical barriers to entry have encouraged further consolidation of the industry.

This paper displays the elements of the waste minimization process and identifies interventions which could assist in reaching the 50 per cent reduction in solid waste by the year 2000 which is the goal of the federal Green Plan and the Canadian Council of Ministers of the Environment.

1. CLARIFYING THE ISSUES AND THE GOALS

The Goal

The Brundtland Mission for Waste Reduction
The Brundtland Report of 1987 has addressed the mission of waste reduction in the following general terms:

"In general, industries and industrial operations should be encouraged that are more efficient in terms of resource use, that generate less pollution and waste, that are based on the use of renewable rather than non-renewable resources, and that minimize irreversible adverse impacts on human health and the environment."[Our Common Future, p.213]

The necessity of setting clear goals and milestones was addressed as part of the process of launching an effective course of action:

"In dealing with industrial pollution and resource degradation, it is essential that industry, government, and the public have clear benchmarks. Where the workforce and financial resources permit, national governments should establish clear environmental goals and enforce environmental laws, regulations, incentives, and standards on industrial enterprises. In formulating such policies, they should give priority to public health problems associated with industrial pollution and hazardous wastes. And they must improve their environmental statistics and data base relating to industrial activities." [Our Common Future, p. 219]

Waste management was recognized as one of the areas requiring such a complex of benchmarks, regulatory frameworks and incentive structures. Regulatory and incentive structures are capable of complementing one another as elements of the solution, it was asserted.

The Report endorsed the 1972 position of OECD member countries that the Polluter Pays Principle should form the basis for environmental policies. The object of such policies is to have industry pay for costs imposed on the environment by those activities which otherwise reduce the prosperity of the community.

Product redesign and technological innovation were identified as important dimensions of the efforts by industry to reduce damaging effects. Actions by industry provide the pathway to waste reduction, just as it was industry which was largely the source of the problem. Government may be part of the cause of environmental degradation, just as it may be part of the solution. For example, subsidies by the state may produce economic distortions, promoting activities which do great damage to the environment and undermining long run prospects for prosperity. [Ibid. p.221,222] To reduce

waste, governments will have to review their incentives and subsidies, reducing some and increasing others. Subsidies to industries which damage the environment may have to be reduced. Assistance may need to be extended to other industries, particularly the smaller enterprises, to help them to retool, retrain and otherwise adopt sounder environmental practices. [Ibid.p. 223]

The Context for Waste Reduction in the Brundtland Report
"The overriding policy objective must be to reduce the amount of waste generated and to transform an increasing amount into resources for use and reuse. This will reduce the volume that otherwise must be treated or disposed of through incineration, land disposal or dumping at sea." [Ibid.p. 227]

Since that time, governments in Canada have begun to define the project for waste reduction. In October 1989, the Canadian Council of Ministers of the Environment adopted as its goal the reduction of wastes in Canada by 50 per cent by the year 2000. In April 1990, the Canadian Council of Ministers of the Environment endorsed specific goals and milestones for the reduction of packaging materials by 50 per cent by the year 2000. According to the Green Plan, "Packaging accounts for 50 per cent of the waste stream and constitutes the largest single component."(Green Plan, p. 58) In December 1990, the federal government re-affirmed these goals in the Green Plan.

Canadian Council of Ministers of the Environment
The Canadian Council of Ministers of the Environment at their March, 1990 meeting in Vancouver endorsed a National Packaging Protocol. In the protocol, the Ministers undertook to support the reduction of packaging by 50% by the year 2000.

As a first step, ministers established an interim national target of 20% by 1992 as compared to 1988 levels. Savings in annual waste collection and disposal costs, if that goal is met, are estimated to exceed $50 million a year.

This protocol is the work of a 30-member multi-stakeholder National Task Force on Packaging which was established by the CCME in April, 1989.

The Green Plan
The Green Plan re-affirmed the 50% reduction in Canada's generation of waste by the year 2000. The Plan outlines a timetable for the adoption of specific standards, regulations and interventions which will provide a framework for accomplishing the waste reduction objective. The specific proposals of the green Plan may be found, for convenience, in Appendix 1.

Clarifying the Measurable Objectives

Selecting the Objectives and Milestones

A well-structured project to estimate the costs and implications of reaching the goals for solid waste reduction requires, as a first step, that the goals be both clear and sufficient in relationship to the mission. This is an essential step and identified as a project in the Green Plan.

One part of the goal setting process is defining the scope of the issue.

Ontario's Ministry of the Environment calls the waste stream from residential and industrial/commercial activities "municipal solid waste"(MSW). It distinguishes this from "hazardous and liquid industrial waste" which it takes to be those substances defined in more detail in Ontario's Regulation 309. For purposes of this paper we shall focus primarily on waste issues which fit the Ontario definition of "municipal solid waste".

Municipal solid waste is composed of eight general categories of refuse: paper products, plastic, wood, food waste, metal, glass, yard waste & miscellaneous. Rubber and leather products are also present, though not generally distinguished in methods of categorization and measurement.

The waste mix varies from place to place and from time to time. So do the estimates. Two sets of estimates are provided in Appendix A.1 One is of interest for its wide circulation as an insert to garbage bags in Canada. The source of the data is not identified - and needs to be. The second set is from a specialist firm. It is also not very satisfactory. What merit the two sets of data have is that they are close in their estimates. Both estimates underscore what most surveys and sources say: namely that paper products and yard waste are the two largest sources of MSW by percentage volume. For the 50% reduction target to be reached these two sources must be reduced by 50% or more.

Reviewing the Instruments and Points of Intervention

Some instruments for reducing MSW will operate on volume alone, operating without regard to the source of the waste. For example, higher tipping fees on a volume basis, if passed along to homeowners and industries, will provide economic incentives to reduce waste volume and find cheaper alternatives to disposal. Measures taken in response to such price increases will include more material efficient operations, separation and resale for other use, and product redesign. Tipping fees in Toronto's Golden Horseshoe area are expected to double from the present level of $80-$85 over the next few years. This prospect is already providing a powerful incentive to waste reduction and recycling.

Market forces will be important. More important will be those mechanisms to reduce MSW which are specific to each waste stream. Different technical

and market circumstances will apply to different materials. Market pressures will also vary widely depending on geographical location.

One method of reducing waste is to reduce the level of economic activity and prosperity without any alteration to production designs, techniques or practices. During periods of slackening economic activity and recession, the volume of MSW going to landfills drops at least proportionately to the fall in economic activity. However, sustainable development means allowing for greater economic prosperity today so long as opportunities for such prosperity in the future are at least no lower than they are today. It also includes providing better opportunities for the poorest and most disadvantaged in the global community to share in that prosperity both now and in the future.

Efforts to reduce municipal solid waste may occur at any point through the product life-cycle. At the heart of the matter is the issue of devising ways to better enhance human prosperity while using fewer resources to do so. There are several key points and key types of intervention in the product cycle.

Waste Reduction - { Waste Abatement
{
{ Waste Minimization

Waste Reuse

Waste Recycle

Waste Treatment

Waste Disposal

These terms are explained in laymans terms in a lexicon in Appendix Table 5.

By themselves, these terms evoke very little of the variety and ingenuity of the activities which they describe. Some examples which follow will make the meanings of the terms more real and vivid for the reader. Examples are from a paper by Bob Laughlin and Linda Varangu of ORTECH International. They are intended to be illustrative and may, by no means, be the most important examples. Most relate to substances which, in the form mentioned, would be hazardous wastes but which, translated into elements of products, would eventually find themselves in the municipal waste stream.

Waste Abatement

- replace sulphuric acid in steel pickling with hydrochloric acid
- replacement of liquid paints by powder coatings

- replacement of solvent based adhesives with water based adhesives

Waste Minimization

- separation of waste streams to permit recovery
- fixing leaky taps and nozzles
- application of countercurrent rinsing to minimize volume discharge
- neutralization of wastes and precipitation of smaller volume sludges

Waste Reuse

- reuse of surplus or salvage chemicals
- use of blast furnace slag as aggregate
- use of solvents from electronics industry in paints manufacture
- use of refinery spent-caustic in pulping wood
- use of oil sludges in asphalt manufacturing
- use of electronic circuit manufacturing plating baths in regular plating shops

Waste Recycle

- oil re-refining
- solvent distillation
- recovery of iron salts from pickle liquor
- recovery and reuse of spent foundry sands
- recovery of scrap metal
- landfarming of organic wastes
- regeneration and reuse of activated carbon

- recycling of grease and fats to renderers
- granulerization of plastic, rubber & glass for other uses

Waste Treatment

- composting of wastes either as low volume/high quality landfill or, at higher grade, as fertilizer

Identifying Waste Minimization Opportunities: the Waste Audit
How do firms go about identifying ways to intervene in the waste reduction cycle? The waste audit may be the first step. However, the ingenuity of production personnel, when encouraged by senior management, will always be the principal source of change. Waste audits may be a part of a more general corporate environmental audit or may stand alone. They are a device to raise corporate environmental consciousness and keep it high.

A number of the ways in which waste reduction is already in motion will be detailed below. All could be said to involve either improving the working of the market or creating new markets where none existed before. An example of a new market with an enormous potential to grow in usefulness is the waste exchange.

Better Working of the Marketplace
The waste exchange has been introduced to improve the market for reuse and recycling. Matching the supply of waste with possible uses for it, the waste exchange becomes a place to register offers and requests. Such matching activities produce major economies of communication and are the essence of what constitutes a market.

The Canadian Waste Exchange supplements the high level of expertise for recycling which exists now within many industries. A waste exchange also serves as a clearing house of information on all types of waste. In particular, suppliers are given information which could help them make their bi-products more saleable. A U.S. National Academy of Sciences Study on Waste Reduction corroborated Canadian experience, concluding that a major barrier to industrial waste reduction was insufficient information on available options.

The Canadian Waste Exchange was established in 1978. Since 1984, four regional exchanges have been formed to work within the Canadian Waste Exchange. They are in B.C. Alberta, Manitoba and Ontario. In Ontario, fourteen municipalities or regional governments operate industrial waste reduction programs.

The market value of exchanges each year is estimated to be about $12.5 million in Canada. By volume, the largest category of products exchanged are oils, fats and waxes. Wood and paper products are next most important. More information on the waste exchange option is contained in Appendix 8.

2. BUILDING STRUCTURES FOR FULFILLMENT

Voter Goals and the Public Vision

Public support for the goal of waste reduction is clearly demonstrated by the success of the Blue Box movement in Canada and the United States. Laidlaw Inc., for example, provides Blue Box service to about 670 thousand households of the two million households in North America estimated to receive Blue Box service. Pre-sorting of wastes, whether by households or industry, is a major component to a successful waste reduction program. At the household level it depends on voluntary support.

The household contribution to waste reduction will depend on:

- Expanding coverage among municipalities and types of dwellings. In particular, developing a Blue Box arrangement for apartment-type dwellings which work.

- Increasing the number of pre-sorted streams. In general, sorting now is into "wet" garbage and "dry" which includes, paper, glass and plastic. Experiments with a third stream, household toxic waste has begun in cooperation between waste-haulers and community groups. Only one municipality in Canada (Guelph? check) has institutionalized a three stream household sort system.

NEED TO KNOW: Which municipalities have and which do not have Blue Box systems in Canada.

ACTION WHICH COULD BE TAKEN WITH THIS KNOWLEDGE: This information would be necessary to launch a project aimed to introduce the Blue Box into municipalities which do not yet have it. It would also give us a better idea of what it would mean if all municipalities had Blue Boxes. We could begin to estimate what reduction in solid waste this could produce and what volume of recycling and reprocessing would be necessary.

The biggest obstacle to the future success of the Blue Box movement is the accumulation of re-usable waste for which markets have not developed. Warehouses and collection points are filling up or overflowing. New markets will be a function of both product and process innovations aimed to use scrap materials - such as the de-inking plants being built by the pulp and paper industry - plus higher prices of "virgin" materials in relationship to scrap. How the relative prices of scrap and "virgin" materials may be changed is a question for another place in this paper.

Government Initiatives: Framing a Viable Pathway

Effective government action in Canada requires the cooperation of three levels of government. Municipalities are closest to the practical issues of dealing with waste materials but the pressure is on the federal government to develop agreed upon goals and standards which will prevail uniformally across the country, or at least uniformally within well-defined sub-set divisions, like urban-rural; large cities-small villages, etc.

NEED TO KNOW: The sources of data on municipal waste disposal across the country. This data will include tipping fees by site, volume by site, distance from source (or principal source) by site, composition of waste which is deposited. As interest in the safety of landfills increases it will also involve data on the different practices among sites. This information may be available now at the municipal level. It could usefully be compiled in a Geographically-based Information System (G.I.S.) as distances, transportation costs and relative locations figure very prominently in the design of future waste disposal policy.

ACTION WHICH COULD BE TAKEN WITH THIS KNOWLEDGE: A G.I.S. based system will allow accurate tracking of waste volumes and permit an assessment of the gap between the waste reduction target and what is actually happening. Such an information system would facilitate managing by exception, pin-pointing those areas where progress is not happening and little is being said about it. The press is an insufficient signalling device for monitoring. Often press stories relate to issues of a level far removed from average practice or worse. There is much attention to Toronto's problems, but much less to what still needs to be done with landfills on crown land in undeveloped areas. The Federation of Canadian Municipalities, assisted by the corresponding provincial and territorial bodies, could undertake to gather the necessary data.

Market Initiative and Corporate Innovation

Market incentives supported by legislation and regulation have the potential to make the largest single contribution.

Newsprint Recycling and the Pulp and Paper Industry
The switch of the pulp and paper to using used newsprint is an important case. Less newsprint in landfill sites will mean a substantial further reduction to the waste stream. By 1992, as eight more de-inking plants open, in addition to the two now in operation, there will be a large demand in Canada for old newsprint. Because 70 per cent of Canadian newsprint is exported, used Canadian newsprint from domestic sources will soon be insufficient to meet domestic demand.

Many jurisdictions in the U.S. now require newspapers to be published using paper with recycled content. By 1995, all newspapers published in the United States are expected to include recycled newsprint. (More on this in Appendix 4)

The switch to newsprint with recycled content promises to reduce the demand for virgin timber and related jobs in the forests. It also offers the prospect of creating even more jobs than are lost. There are new jobs associated with the manufacture and installation of new capital equipment. These jobs are of relatively short duration. More importantly, are the new permanent jobs for de-inking plants and other activities occasioned by the switch to using recycled pulp for a significant part of Canada's paper production. There will be new jobs in gathering and trucking waste paper to de-inking plants, new jobs in running the plants and maintaining the equipment, and new jobs in processing and discarding the non-reusable residue (whose volume will increase as recycled paper is itself recycled).

It may be necessary for some people to relocate as older paper mills are shut down and forest activity declines. This may not be a bad thing. There is a case to be made for saying that governments have perversely subsidized the pulp forest industry as a way of maintaining otherwise unviable communities.

In general, the switch to waste minimization practices in pulp and paper, as in other industries, will involve both job loss effects and job creation effects. The transition may accelerate the relocation of economic activity. The balance of the effects can only be estimated on a case-by-case basis. Investment in new capital equipment may raise productivity sufficiently to compensate for increased costs from the collection and processing of old newsprint. All of these effects are still unknown and are difficult to estimate in advance.

Other Examples of Recycling and Reuse

There are major successful corporations in Canada which convert waste products to reusable material. This is so for plastic, rubber, wood, gypsum board, and pulp and paper products.

Details about opportunities to recycle plastic and rubber are contained in Appendix 5. Opportunities for the recycling of old wood and gypsum board are contained in Appendix 6.

Composting of wet materials in advance of deposit in landfill sites is also a way to reduce landill volume. It is an option well on its way to successful commercialization. Twelve per cent of Canadian municipalities now use composting facilities in conjunction with landfills, recycling and incineration. (See Appendix Table 3) Composting reduces the volume and toxicity of wet wastes. If used consistently, it would reduce the long term risks of water table

pollution from leachite. More background information on the composting option is contained in Appendix 7.

NEED TO KNOW: More about successful recycling firms: the volume of waste handled, applications, corporate viability, opportunities for expansion etc.

ACTION WHICH COULD BE TAKEN WITH THIS KNOWLEDGE: It could open up awareness of new opportunities to those in the business and prospective new entrants. It could assist steps to better match raw material with uses. It could give public officials a better handle on the contribution of such enterprises to the achievement of the overall goal.

Global Context of Sustainable Development

Many of the technologies for recycling and reusing waste materials have even more market relevance in Third World countries than they do in Canada. The value of potential energy savings using recycled materials is higher as energy costs are a relatively larger part of the whole. Waste reduction in advanced country such as Canada, however noble, is only a gesture (and a self-satisfied one at that) if not coupled with as successful ventures in the Third World. In the Third World the potential contribution of waste management to sustainable development viewed in global terms is very high. The technologies of many firms active now in Canada in recycling a variety of products are also applicable in the Third World.

NEED TO KNOW: The commercial potential of waste treatment technologies for use in the Third World. Commercialization opportunities of such technologies will be an important theme for the United Nations Conference on Environment and Development in Brazil in 1992.

ACTIONS WHICH COULD BE TAKEN WITH THIS KNOWLEDGE: This would assist the NRTEE and the Government of Canada in building an authentic strategy for presentation at Brazil '92.

3. PATHWAYS OF ACTION

Elements of a Strategic Framework

The conventional wisdom connected with macro-economic policy says that the economy may be regulated using monetary and fiscal policy. Such macro levers of control do not exist with respect to waste minimization. Apart from the normal, albeit slow, operation of market forces guided by government goals and supporting regulations, there are no all pervasive instruments in the field of waste management which, if adjusted by a specific amount could be predicted to produce a response in the economy.

It is true that a lower level of economic activity produces less waste. It also produces a lower level of prosperity. The challenge of sustainable development is to maintain or increase prosperity, especially for the poorest, while sustaining the capacity of the environment to provide at least as much opportunity for future generations.

Doing more with less is what waste reduction is about within the context of sustainable development. Incentives to innovate to this end may be provided by sticks or carrots. Taxes, such as those aimed to alter the relative prices of "virgin" and recycled materials are one mild form of stick. We have evidence from Japan that when raw material prices are high, recycling booms, when they drop, recycling drops, even though the facilities are there.

What we don't know and don't have any basis of historical data that might provide a basis for prediction, is what sort of increase of relative prices would it take to yield what sort of waste management response. Looking at the Japanese experience might provide some indication of the fastest response which could be expected. However, corporate reaction times tend to be slower in Canada's larger companies though possibly just as fast in the smaller, more competitive ones.

Input output models tell us what will happen to demand for an industry's products given such and such a shift in consumption presuming production relationships (or co-efficients) are unchanged. The entire purpose of initiatives designed to reduce waste is to alter these production relationships. This is called technical change or productivity improvements. In most economic analysis this is taken as a given from outside the system.

There have been academic efforts made to disaggregate the sources of productivity growth. Out of this work it can be seen that productivity improvements come from many directions. These include level of education and composition of the labour force, rate and volume of new investment and the changing relative importance of industries with different historic patterns of productivity growth.

The changes that occur are an amalgam of all of these structural, social and organizational shifts. The leverage is through effecting each of the components. Such will also be the case for efforts to produce results in reducing solid waste. It will take a lot of small, strategic interventions designed to accelerate the learning curve and the rate of new investment in technologies appropriate to the task.

TABLE
General Methods for Reducing Solid Waste
Mandatary Actions - Legislation and Regulations
e.g. mandatory source separation by industry
Technological Innovations
e.g. simple ones like source separation and sale of waste production complex ones like ways to recycle materials
Responses to Various Economic Stimuli
e.g. tipping fees going from almost nothing to $100/tonne discourages volume
Improved Communication of Knowledge & Information
e.g. accelerate consumer and industry learning curve for new practices

Filling the Critical Gaps in Knowledge

Useful information for a project of waste minimization is unlikely to be a bi-product of efforts to adapt the National Accounts with satellite accounts to include the environment. These will be prepared at a very aggregated level. What is needed is disaggregated data. The most useful data will be geographically dispersed and held in a G.I.S. system. Much of the most interesting information will be generated in the process of moving toward the waste-reduction goal and will become available as the goal is being reached.

Communicating for Consensus, Enablement and Adaptation

Much of the most useful knowledge necessary to accelerate the process of waste reduction is already known to the expert community and other citizens interested in the issue, such as members of the NTREE. However, the body of people who know this information is still too small to have a critical impact on the course of events. Much of the most useful information generation work which can be done to enable the meeting of the waste management goal

is to have what is known to a few communicated to a much larger body, who, with such information, could take the effective innovative action needed to produce the result.

As with the unification of Germany, estimates of the impact of the process do not exist before the event. In the case of Germany, had the process been delayed while guesses were made (with structural shifts, by definition they are guesses not predictions from the past), unification probably would not have happened for the critical opening would have been missed, not to appear again.

4. PROPOSED NEXT STEPS

1. **NEED TO KNOW**: Which municipalities have and which do not have Blue Box systems in Canada.

   ACTION WHICH COULD BE TAKEN WITH THIS KNOWLEDGE: This information would be necessary to launch a project aimed to introduce the Blue Box into municipalities which do not yet have it. It would also give us a better idea of what it would mean if all municipalities had Blue Boxes. We could begin to estimate what reduction in solid waste this could produce and what volume of recycling and reprocessing would be necessary.

2. **NEED TO KNOW**: The sources of data on municipal waste disposal across the country. This data will include tipping fees by site, volume by site, distance from source (or principal source) by site, composition of waste which is deposited. As interest in the safety of landfills increases it will also involve data on the different practices among sites. This information may be available now at the municipal level. It could usefully be compiled in a Geographically-based Information System (G.I.S.) as distances, transportation costs and relative locations figure very prominently in the design of future waste disposal policy.

   ACTION WHICH COULD BE TAKEN WITH THIS KNOWLEDGE: A G.I.S. based system will allow accurate tracking of waste volumes and permit an assessment of the gap between the waste reduction target and what is actually happening. Such an information system would facilitate managing by exception, pin-pointing those areas where progress is not happening and little is being said about it. The press is an insufficient signalling device for monitoring. Often press stories relate to issues of a level far removed from average practice or worse. There is much attention to Toronto's problems, but much less to what still needs to be done with landfills on crown land in undeveloped areas. The Federation of Canadian Municipalities, assisted by the corresponding provincial and territorial bodies, could undertake to gather the necessary data.

3 **NEED TO KNOW**: More about successful recycling firms: the volume of waste handled, applications, corporate viability, opportunities for expansion etc.

   ACTION WHICH COULD BE TAKEN WITH THIS KNOWLEDGE: It could open up awareness of new opportunities to those in the business and prospective new entrants. It could assist steps to better match raw

material with uses. It could give public officials a better handle on the contribution of such enterprises to the achievement of the overall goal.

APPENDICES & TABLES

Appendices

Tables

Appendix 1

The Green Plan Proposals for Cutting Waste

GOAL:

A 50% reduction in Canada's generation of waste by the year 2000.

INITIATIVES:

- Establish by 1993 national standards and regulations to cut packaging waste;
- Establish by 1994 national standards, codes, policies and regulations for the reduction, re-use and recycling of their wastes;
- Increase support over the next five years for new waste reduction, recycling and re-use technologies;
- Cut federal government waste by 50% by the year 2000.
- Expand the National Waste Exchange Program with a goal of making it self-sufficient by the year 2000;
- Expand the National Waste Exchange Program with a goal of making it self-sufficient by the year 2000;
- Establish an Office of Waste management to co-ordinate federal programs;
- Develop by 1992 a computerized tracking system to monitor movements of hazardous wastes into and out of Canada;
- By 1996, destroy all PCBs in federal jurisdiction and establish mobile incinerators in the Atlantic Provinces, Quebec and Ontario;
- Complete with the provinces by 1996 regulations and guidelines for the safe management of hazardous waste, including reduction, re-use, recovery, recycling, transportation, storage and disposal;
- Over the next five years, extend support for new technology to destroy, reduce, recycle and re-use hazardous waste;
- In 1991, complete federal-provincial agreements to implement the $250-million National Contaminated Sites Remediation Program;

- By 1995, clean up 30 high-risk abandoned hazardous waste sites and support the new technologies required;

- In 1991, issue regulations to implement the provisions of the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

Source: News Release for "Canada's Green Plan." Dec. 1990

Notes: The items are listed above in the order in which they appear in the document. Solid waste reduction and hazardous waste management items are addressed together.

Appendix 2

A State of the Environment Report:

A Report on Canada's Progress Towards a National Set of Environmental Standards - January 1991
Environment Canada

Topic: Solid Waste Management

- Estimate of Canadian municipal solid waste generated annually: 16 m. tonnes. (Note: MacLaren Engineers, in a 1989 survey, estimated solid waste generated in Canada at 30 m. tonnes. This may either represent an apples and oranges comparison, for example, estimates of MSW not including construction debris landfills, or it may be an indication of how little we know of what is actually occurring.)[1]

- Municipal solid waste per person: 1.7 kilograms

Tracking the Volume of Municipal Solid Waste:

"From an indicator perspective, it is difficult to gather information on solid waste. Because waste management has come into prominence as an issue only in the last few years, there are few accurate historical data on municipal solid waste. In addition, the large number of landfill sites has made it difficult to establish comprehensive monitoring systems to gather hard data on waste generation and composition. Other barriers, such as municipal budget constraints and lack of data collection systems in some communities, make the development of national level solid waste indicators problematic." p.66

Target Reduction in Municipal Solid Waste: Canadian Council of Ministers of the Environment: 50% reduction in national waste generation by the year 2000.

Estimates of Canadian municipal solid waste are based on disposal statistics supplied by seven major cities: Halifax, Ottawa, Toronto, Winnipeg, Regina, Calgary and Edmonton.

In the seven cities surveyed there has been about a 10% decrease in municipal solid waste over the last decade. This is attributed to such factors as lower economic activity in the centres, adoption of of resource saving waste management practices including composting and recycling. p. 67

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1 Royal Bank Reporter, "To Conserve and Protect: The Environment Issue" Spring, 1990 p. 16

Appendix 3

A Profile of Ontario's Municipal Solid Waste (MSW) Situation

- In 1987, Ontario generated about 10 million tonnes of waste.
- Ontario generated more than one tonne of waste per person.
- Almost one half of this waste is from residential sources. The residential - industrial proportion varies by community.
- In urban areas municipal solid waste has increased by 25% per capita over the past decade.
- In the Toronto area, landfills are accepting 80% more garbage than 10 years ago.
- About 160 landfill sites in Ontario have less than two year's life.
- There are about 1,400 active waste disposal sites and five energy-from-waste (EFW) plants for their incineration of waste in Ontario.
- Since 1971, all waste disposal sites in Ontario require approval under Part V of the Environmental Protection Act.
- A possible new site for Toronto's garbage at Whitevale, Durham County (known as the P1 site) could take up to eight years to pass the scrutiny of the province's Environmental Assessment Act. There has been political pressure to subject the site to the less rigorous rules under the Environmental Protection Act. (G&M, p.A4, Nov. 9/90)
- Ontario's new NDP Environment Minister is proposing to introduce mandatory waste-reduction targets for major users of packaging. (G&M, p.A1, Nov. 22/90)
- Companies may be required to conduct waste audits in Ontario. (G&M, p.A1, Nov.22/90)
- New regulations under the EPA will force industrial commercial and institutional operations to separate at source. (G&M, p.A1, Nov.22/90)
- Dumping of otherwise usable materials such as wood and cardboard in landfill sites will be prohibited. (G&M, p.A1, Nov.22/90)
- Ontario will establish a new public sector authority to discover a disposal site for the greater Toronto area. (G&M, p.A1, Nov.22/90)

Source: Environment Ontario, "Towards A Sustainable Waste Management System" (Toronto: Queen's Printer for Ontario, 1990) or as indicated.

Appendix 4

Reducing Newsprint Volume[1]

Old newsprint comprises between 6 and 12 per cent of a municipalities solid waste stream by volume or about a quarter of all paper in a typical landfill. Other sources place the volume of newsprint as high as 18 per cent of total landfill volume (William L. Rathje, Atlantic Monthly, Dec. 1989). Paper from all sources is between 37 and 41 per cent of municipal solid waste volume.

Canada supplies about one third of world demand for paper, 57 per cent of the United States market. Pulp and paper companies are beginning to recycle much more newsprint in Canada and the United States. Capacity to do this will expand rapidly in the next few years. Recycling newsprint is a process with several stages. Newsprint must be separated from the waste stream, gathered at a central point and then shipped to a mill capable of recycling.

Most of Canada's newsprint is exported. At some point in the future, domestic supplies of used newsprint will need to be supplemented with used newsprint gathered in the United States and shipped back to Canada. Canada consumes only 30% of the paper it produces. If only half of that were recovered, this would limit the recycled content to 15% from domestic supplies. Canadian demand for waste paper is estimated to increase by 66% between 1989 and 1993.

Several companies in Canada are building facilities which will allow them to use recycled newsprint as a material for making new newsprint. A necessary step in using recycled newsprint is removal of the printing ink. Canada so far has two plants in operation which can use recycled newsprint - Quebec and Ontario Paper Co. Ltd, Thorold, Ont and the Atlantic Newsprint Co. Ltd. of Whitby, Ont.

Eight more de-inking plants will be on stream by the end of 1992. In 1989 Canada was able to use 195 thousand tonnes of recycled newsprint. By 1993 this is expected to reach 1.4 million tonnes - a seven fold increase. With this new capacity in operation, Canada will recycle 52 per cent of the paper it consumes. This will be about the same proportion of paper recycled as in Japan and Europe.

Newsprint recycling capacity is also increasing in the United States. In 1989, U.S. de-inking capacity was 1.4 million tonnes and is expected to reach 2.4 million tonnes by 1993. Although Canadian newsprint capacity is far larger

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1 Brian McClay, "Our Forests and Recycling - A Natural Combination" Director, Trade Affairs, Canadian Pulp and Paper Association, January, 1991

than the U.S., 10 million tonnes compared with 5.7 million tonnes in 1989, the U.S. will have 70 per cent more recycled paper capacity than Canada by 1993. By the end of 1991, one half of all newsprint sold in the U.S. will have some recycled content, compared to only 25 per cent of Canadian output.

In addition to using more recycled newsprint, the Canadian pulp and paper industry is also much more efficient in its use of wood. In 1989, over 50% of the wood destined for pulp mills consisted of waste material from sawmills (wood chips and sawdust). In the 1950's and 1960's, most of this material was burnt, not to recover energy, but as a crude method of disposal.

Newsprint just one of the paper products manufactured in Canada. Looking at papermaking overall, over 50 of the paper industry's 110 mills use waste paper for all or part of their finish. Waste paper products are used to produce boxboard, tissue paper, containerboard, and modest volumes of newsprint and printing and writing papers (about 2% of the finished product). Low usage of waste paper in newsprint and fine papers, which are high volume products, reduces overall dependency of the industry on waste paper to about 10%.

	Percentage Weight of Waste Paper in Final Product
Boxboard	93.2
Sanitary tissue	40.0
Newsprint, printing & writing	2.0

Source: Brian McClay, "Our Forests and Recycling - A Natural Combination" Canadian Pulp and Paper Association.

Canada has been recycling other types of paper for 50 years. According to estimates of the Canadian Pulp and Paper Association, Canada recycles about one third of the paper it consumes. Waste paper does not just go into newsprint, although this is the most recent application. It also goes into tissue paper, cardboard, and egg cartons. So far, only a small amount of total waste paper used goes into newsprint.

Emery International Developments Ltd. of Markham, Ont. is one of the companies which takes waste paper and turns it into such products as cartons for eggs, packaging for grocery products, fresh fruit and other types of

container. The simplicity of this technology makes it particularly adaptable to Third World applications.

De-inking of old newsprint produces a sludge which must also be disposed of. With present technology this is between 8 to 15 per cent of dry volume. For every 10 tonnes of old newsprint, by dry volume, up to 5 tonnes of wet sludge will need to be disposed. According to the Ontario Ministry of the Environment, the sludge is non-toxic. Currently, it is treated biologically and used as a soil conditioner in rural areas.

Recycled content is also increasing in the printing and writing paper grades. In 1988, one fine paper maker produced a recycled product. Now 6 of 11 mills produce at least some recycled content.

By reducing the weight of newsprint, major volume savings are possible. Paper weight could be reduced substantially, yielding a volume reduction of up to 8 per cent and an average weight of paper still above that normal in Japan.

Use of old newsprint is raising Canadian production costs relative to the U.S. It is estimated to cost Canadian producers $485US to make one tonne of paper and $407US in the southern United States. Higher waste paper costs play a large part in this - $35 a tonne in the U.S. compared to $65 a tonne in Canada.[2]

The growing demand for newsprint with recycled content is a function both of publishers wishing to be part of the environmental solution and a body of legislation, particularly in the United States. At present, there is considerable inconsistency among U.S. states relating to legislated time frames, product definition and usage targets. This makes planning the transition difficult and risky.

A California law which will come into effect in 1991 requires that recylced content be a minimum of 40 per cent. Many mills in Canada will not be able to reach this 40% minimum - for a variety of reasons, access to supply being among them.

Cheaper recycled paper in the U.S., a larger proportion of U.S. paper with recycled content, and restrictions on the capacity of Canadian mills to reach the 40 per cent minimum recycled content rule will mean significant differences in future operating capacity between the two countries. Capacity is projected to be 90 per cent in Canada versus 99 per cent in the U.S. between now and 1994. By 1995, U.S. publishers plan to use only recycled paper. Canadian companies hope to replace lost U.S. market with exports to other

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2 John Duncanson, report for Sanwa McCarthy Securities, as reported in the Globe and Mail of December 13, 1990.

countries which prefer virgin paper. Changing market conditions and the high capital costs these entail for re-tooling have reduced the DBRS credit rating of four major eastern Canadian companies. Many remote and old Canadian mills could be closed. Using empty rail cars dedicated to newsprint exports for backhauling recycled paper may reduce old newsprint costs in Canada and reduce Canada's present competitive disadvantage.

In the first nine months of 1990, Canadian wood pulp production fell by 10 per cent. (Globe & Mail editorial)

The transition to recycled newsprint in the North American economy is placing major adjustment costs on the Canadian pulp and paper industry. In a best possible scenario, the Canadian industry will retain its current volume of output, shifting markets from the U.S. to other foreign markets. In a less desirable scenario, volume sold will decline. This will preserve forests, and energy, but it will reduce jobs. Although the environment wins, the economy losses. This is not sustainable development in a steady state framework. Such a scenario could include relocating both jobs and communities. It has both potential savings to the environment and other prospective costs to the environment. No one has yet explored for the location of the balance in this adjustment process.

Appendix 5

Recycling Plastic and Rubber

Plastic products and old rubber are elements of the solid waste stream which may be separated at source within the household and the firm.

Turning these waste products into a raw material to be used for other purposes is the job of Custom Cryogenic Grinding Corp. of Waterford, Ont. Waste material is ground into smaller chunks and these are frozen at extremely low temperatures (-196 C.) and then pulverized. The resulting product is used for automobile parts, construction materials, moulded rubber products and compounds to be used in tires.

Other methods are being developed to use old plastics.

- Scientific research is being done in France to enable different types of plastic to be joined through emulsifying or compatible agents. (Ecole Nationale Superieure de Chimie de Montpellier, p.111)

- In Italy, experiments have been done to use unsorted recycled plastic in street paving material (bituminous conglomerate). These have proven sufficiently successful for commercial production to have begun. (Azienda Municipalizzata di Igiene Urbana, p.109)

- Tetra Pak juice books are now being separated from the waste stream in over 150 schools in Ontario's York Region and in over 350 schools in Newfoundland. In Newfoundland, juice boxes are collected by Nova Recycling of Corner Brook and granulated. Boxes of flaked material are shipped to Superwood Ontario Ltd. to be formed into plastic lumber, and waterproof replacements for wood in a variety of outdoor and industrial applications. Research is underway for other uses of this flaked material including pressed board manufacture and repulping. The CEO of Tetra Pak Inc. has said, "While recycling is a major part of the Tetra Pak story, we shouldn't lose sight of the total environmental impact of packaging. Juice boxes provide other environmental advantages in terms of reduced waste, reduced energy consumption and reduced usage of raw materials." (The Planet Today, Feb. 1991/18)

- Retico Rubber of Ayr, Ont. takes recycled rubber reduces it to granules and markets the raw material to other companies while also manufacturing a variety of rubber floor coverings and mats.

Accelerating the rate at which plastics decompose is important for those plastics which remains in the waste stream all the way to the landfill site. Designing plastics with a higher rate of decomposition is a priority for both

scientists and manufacturers. What biodegradeable means for a landfill site is still controversial, however. Bailey Condrey Jr. at the Committee for Solid Waste Solutions, a program of the Society for the Plastics Industry has said: "Whatever is buried in a landfill is essentially put in a mummification chamber. Unless [organic] waste is going to a compost, biodegradeable plastic won't do anything to reduce the waste." (Christian Science Monitor, Dec. 7-13, 1990. p. 12)

- Work is in progress to design true biodegradeable plastic. A biodegradeable plastic is one which breaks down into carbon and water in a short time. Polycaprolactone (PCL) is one of a few petroleum-based plastics which is completely biogradeable. Manufactured by Union Carbide, the plastic film will completely disappear within three months when buried. It is already being used for shoe components, diaper backsheets and other products. (Christian Science Monitor, Dec. 7-13. 1990, p. 12)

- Canada's National Research Council is using PCL to make polysytrene and polyethylene biodegradeable. The combination changes the structure of the plastic. (Christian Science Monitor, Dec. 7-13, 1990, p. 12)

- A "natural" plastic made by microbes is being perfected in industry. Known as PHA, at plastic bag thickness, this plastic biodegrades within six weeks when placed in sewage exposed to air. In soil not exposed to air it breaks down in 75 weeks into water and carbon (R.C. Fuller and Robert W. Lenz, University of Mass. at Amherst). The Wella Corporation is beginning to use PHA plastic for shampoo bottles. Other uses include diapers, containers for fertilizers, implantable drug delivery systems and wound dressings. The Warner Lambert Company expects to make a plastic by 1992 that is between 85 and 95 starch - early starch-based plastics were about six per cent starch. The new plastic, called Novon, is made from corn, potato and rice starch (Christian Science Monitor, Dec. 7-13, 1990, p. 12)

- In January, 1991, the American Society for Testing and Materials released standards for biodegradeable plastics. These standards are approved by the United States Protection Agency, the Federal Trade Commission and the National Association of Attorneys General. (Christian Science Monitor, Dec. 7-13, 1990, p. 12)

Appendix 6

Recycling Old Wood and Gypsum Board

Waste materials such as old wood and gypsum board are now being sorted at source, collected and processed for use in other ways.

Urban wood waste, estimated to be as much as 10% of total municipal solid waste going to landfill sites, is collected and reprocessed by WCI Waste Conversion Inc. of Brampton, Ont. This firm processes about 140 tonnes a day of all types of waste wood. Wood is sorted, sized and subjected to magnetic separation. Such applications are limited today to a few centres. Opportunities for undertaking similar ventures are likely to be already available in many other places.

Appendix 7

Composting for Landfills and Fertilizer

Another way to alleviate the burden of high volumes of garbage in municipal land files is to take the wet garbage - food scraps and the like and composte it. There are two types of compost from household . One type, with low levels of impurities may be used as fertilizer. Another type, with perhaps even more potential, is the manufacture of compost which, while not useable as fertilizer, reduces the volume of waste to be dumped in landfills. Transforming liquid or wet waste into compost also reduces the potential toxicity of liquids or leachite which collect in the bottom of landfills.

Addressing the need for high quality compost, Airite Environmental Industries Inc. of Richmond Hill, Ont. have developed an operating pilot project in Powell River, B.C. for high rate in-vessel composting of municipal solid wastes. The goal is to develop a compost which is free of contamination so that it may be used for fertilizer. McLaren Engineering Incorporated of Willowdale, Ont. is familiar with state-of -the-art operational methods and is seeking business opportunities for new commercial applications.

Among many other initiatives, ORTECH International of Willowdale, Ont. is exploring the potential environmental impacts of composting. ORTECH is a research corporation committed to supporting clients in finding solutions to technical products and the development and commercialization of new technologies. Environmental technologies is one of the three main thrusts of its services.

Appendix 8

Recycling Materials through the Waste Exchange

Among the activites of ORTECH in the environmental field is the operation of the Ontario Waste Exchange. Co-sponsored by Ontario's Ministry of the Environment and the Ontario Waste Management Corporation, the purpose of the waste exchange is to facilitate the reuse and recycling of material wastes by matching potential users with those who generate waste.

Ontario's waste exchange is linked to similar ventures in B.C., Alberta and Manitoba through the Canadian Waste Materials Exchange (CWMA). Initially sponsored by Environment Canada, CWMA is a joint venture between the public and private sectors. Commercial activities now fund between 30% and 40% of activities. So far 3,500 Canadian companies participate in the exchange. Numbers of firms in the U.S., Japan, India and the Philippines also are involved in the Canadian program.

These examples illustrate the high levels of technical and scientific skill which have been united with entrepreneurial know-how to launch and operate an extraordinary diversity of enterprises involved in reducing, reusing and recycling solid wastes. They display an industry on the move, pushing forward the frontiers of science and technology and seizing opportunities to expand commercial activity.

Appendix 9

Toronto's Garbage

Metro Toronto has a thirteen point plan to reduce solid waste.

Elements of the plan include:

- Mandatory recycling for homes, apartments, schools and institutions which now get municipal pick-up. This will be effective March 1.
- Once a week pick-up for all of Metro by July.
- A limit on the number of bags or cans of garbage a resident may dispose of in a week.
- Special collection days for compost material and a ban on putting yard wastes - leaves, brush, hedge and grass clippings in landfill sites.
- Voluntary no junk mail stickers
- A public education plan to cost $2 million a year between 1992 and 1994, in addition to 2.6 million already budgeted. (Ottawa citizen)

Disposing of Toronto's Garbage

The National Research Council is helping Toronto find ways to ship its garbage north to Kirkland Lake. It is investigating the consequences of freezing on the ease of trans-shipping garbage. Special cars will need to be designed which can be cleared easily even when the contents are frozen. At Kirkland Lake garbage would be taken to a recycling plant for salvaging reuseable materials.

The plan is to put 1.5 million tonnes a year in an abandonned mine shaft at the Adams mine.

This plan has not yet cleared a hearing under the Ontario Environmental Assessment Act. It is opposed by some citizen's groups. (Ottawa Citizen, Dec. 27, 1990, p. A5)

Appendix 10

Optimum Waste - the Life Cycle Approach

What is the optimum physical composition of waste from the perspective of the impact on the environment of a product throughout its lifecycle? Is a product more environmentally friendly if it decomposes more quickly. Or is it more environmentaly friendly if it may be recycled with little or no reduction in the applications to which it may be used.

Even where a material may be remolded into identical products to the virgin material, entropy still enters the process. Energy must be added to the salvaged material to collect it, sort and clean it, process it into the correct form for reuse and manufacture it into a new final product. One question is: does it take more or less energy to salvage the recycled material to the raw material stage than to take the virgin raw material to the same stage?

The controversy about which is most environmentally friendly has been fiercest in connection with paper versus polystyrene foam cups.

Many in the environmental movement hold that paper cups are more environmentally friendly because they are made from a renewable resource.

The University of Victoria has compared the paper and the foam cup from an environmental lifecyle perspective. The work was done by Martin Hocking, an associate professor, and published in the current issue of Science magazine. A condensed version is published in the Globe & Mail of February 16, 1991. Here is what he found.

Where they are the same:

- Both foam and paper cups are made from hydrocarbons. Foam is made from oil and gas. Paper cups are made from bleached pulp which comes from wood chips. Oil and gas, supplemented by burning wood chips, is needed to supply the energy for paper-making.

Where they differ:

1. In favour of foam:

- Non-recycled chemicals from paper-making amount to 1.8 grams per paper.

- Foam cups use one-sixth the material of paper. The chemical processes for foam are simpler than for paper because inherent catalysts move

the process along. Foam cups require about .05 grams of chemical per cup. This is much less than for paper.

- A paper cup uses 12 times as much steam; 36 times as much electricity; and twice as much cooling water as a foam cup.as a

2. In favour of paper:

- Air emissions for bleached pulp are 22.7 kilograms per metric ton. They are about 53 kilograms per metric ton of polystyrene. On a per cup basis, this is 0.23 grams for paper versus 0.08 grams for polyfoam.

3. Other considerations shaping the comparison:

- Pentane used as the blowing agent for the cups - 43 kilograms per metric ton of cups - is the largest emission from the two technologies. Atmospheric lifetime for pentane is seven years or less. Pentane would increase ozone concentration both at ground level and in the upper atmosphere.

- Methane losses to the atmosphere will be larger for the decay of paper cups than for the decay of foam.

- For recycling polystyrene foam requires washing and re-granulation. This is followed by hot-air drying and re-extrusion of the resin for re-use. The recycled resin may be used in insulation, flotation billets, patio furniture and drainage tiles. It may not be used again for food for sanitary reasons.

- Paper cups are excluded from paper recycling because the adhesive resin cannot be removed during the repulping. Plastic or wax coatings also cannot be removed during recycling.

- Both paper and foam in landfills are relatively inert.

The conclusion of this research:

- Poystyrene cups are at least no worse than paper cups and may be better from an environmental perspective.

Appendix 11

The Recycling Controversy: Background to the Issue in the U.S.A.

What is now in effect:

- 40 states now have some form of recycling law.
- Some of these have banned specific products, e.g. certain plastics and disposable diapers. Maine has banned the aseptic package (Tetra Pak) because it cannot be recycled.
- Some states have instituted deposit fees.

What is in prospect:

- California is exploring a "deposit fee" to be paid on all products at the point of purchase.
- The federal government is considering new solid waste legislation. Among the policies will be proposals for the states to reach specified recycling levels.
- Regulations will restrict the interstate transfer of solid waste.

What is the issue?

- Is it waste reduction?
- Is it efficient use of natural resources?
- Where these conflict, which takes priority?

Examples:

- In water short communities in California, washable diapers place a larger strain on the environment than disposable diapers because of the extra use of scarce water.
- For most municipalities, recycling costs exceed landfill disposal costs, even municipalities where landfill is most expensive. For example, one New Jersey study showed recycling programs cost $200 per ton. This exceeds New Jersey's highest landfill fees.

The issue is that savings from using less landfill - judged by physical volume or by cost of preparing a filled landfill site to some benign long-term standard

- may be exceeded by extra energy and emission costs generated by efforts to recycle.

Problems:

1. Specific product bans may undermine efforts to devise ways to find the solution which is most resource efficient. Competition between producers of steel and aluminum soda pop containers has led to more efficient ways to produce both. Both products are now lighter and easier to recycle. Today it takes 35 lbs of aluminum to make a thousand pop cans. In the sixties it took 164 lbs.

2. Tetra Paks (aseptic containers) are much more energy efficient than glass containers. This is true both with respect to shipping the empty package and the full one. "For a given beverage volume it takes 15 times as many trucks to transport empty glass bottles than aseptic boxes."

3. Polystyrene food packaging has been banned by several cities. Among these are Portland Oregon and Newark, New Jersey. Research by Franklin Associates shows that a polystyrene hamburger clamshell compared to a paperboard alternative:

- uses 30% less energy than paperboard;
- results in 46% less air pollution;
- 42% less water pollution

Appendix 12

The Environmentally Friendly Consumer Durable

Consumer durables are now being designed with eventual disassembly and separation of the component materials in mind.

The Environmentally Friendly Car

An account of what can be expected in the Green Car for the 1990's was published in the Globe & Mail Auto Show section of February 13, 1991.

"The car of the 1990's will be environmentally friendly - lighter, smaller, fuel-efficient, non-polluting, fully recyclable and equipped with a 'smart traffic intelligence' that communicates with road systems." Chrysler's concept car, the Neon, is a prototype of such a vehicle.

- By 1995, plastic bumpers will be commonplace.
- By 1995, 30% of vertical body panels will be plastic.
- By 1996, plastic engines will be commercially available.
- By 1995, U.S. cars will average 300 - 400 lbs of plastic.
- Ceramics can push fuel efficiency to 60 and 70 miles a gallon
- Mercedes-Benz has developed a model that uses recycled material as well as scraps from the manufacturing process.

Appendix Table 1

Composition of Municipal Waste by Type of Material

Per Cent

	A.	B.
	%	%
Paper Products	37	41.0
Plastic	7	6.5
Wood	4	w. paper
Miscellaneous	6	6.0
Food waste	8	7.9
Metal	10	8.7
Glass	10	8.2
Yard Waste	18	17.9
Rubber & Leather	n.a.	8.1

Source: Col. A. The Manufacturers of Glad Garbage Bags. Their source: to be determined. Col B. ORTECH

Appendix Table 2

Composition of Solid Waste by Source

Per Cent

	%
Residential	33
Construction	30
Commercial	22
Industrial	15
	100

Source: MacLaren Engineers 1989 Survey in Royal Bank Reporter, Spring 1990, "To Conserve and Protect: The Environment Issue"

Appendix Table 3

Waste Management Methods used by Canadian Municipalities

Per Cent

	%
Landfill only	35
Landfill plus recycling	26
Landfill plus recycling plus incineration	14
Landfill plus incineration	13
Landfill plus recycling plus composting	10
Landfill plus composting plus incineration	2
	100

Source: Federation of Canadian Municipalities as published in Environment Canada, "A Report on Canada's Progress Towards a National Set of Environmental Indicators" January 1991 p. 67

Note: It is not clear from the notes in the Environment Canada presentation of this table whether the unit is number of municipalities using a particular combination of techniques or volume of solid waste processed with that combination. It is more likely the former, for, were it the latter we would have a much better estimate of the volume of municipal solid waste than we do.

Appendix Table 4

Comparison of Waste Generation Rates Among Selected Nations

(kg/person/day)

Canada	1.7
Australia	1.6
United State	1.6
Germany (west)	1.4
Switzerland	1.3
Netherlands	1.1
UK	0.9
Japan	0.9
Sweden	0.8
China	0.5

Source: Washington Analysis Corp. 1989 and Environment Ontario, "Towards A Sustainable Waste Management System" (Toronto: Queen's Printer for Ontario, 1990) p. 7

Appendix Table 5

Waste Management Hierarchy - A Lexicon for the Novice

Waste Abatement	Don't make it
Waste Minimization	If you have to make it, minimize its volume and toxicity, design for re-use
Waste Reuse	See if someone else can use it. Best if re-use designed in the first place
Waste Recycle	If it can't be used as is, reclaim as much as possible that is useful
Waste Treatment	Treat what can't be reclaimed to render it safe
Waste Disposal	Dispose of residues to air, water or land

Source: Bob Laughlin & Linda Varangu, "The role of waste exchange in waste minimization" ORTECH International Feb. 1, 1990 plus update.

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