

COMPETITION BETWEEN RECYCLING AND INCINERATION

Prepared for

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September 30, 1996

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This report was prepared by Jeffrey Morris, Ph.D. - Economics, Sound Resource Management, on the basis of a request earlier in September, 1996, from David Estrin, Gowling, Strathy & Henderson, on behalf of the City of Toronto. Sound Resource Management was retained to provide a short overview summarizing some of the case studies that have been conducted on the impact of energy-from-waste/incineration facilities on existing and proposed 3Rs programs.

I. Introduction

Modern day recycling is a rapidly developing, yet still infant, industry. Best practices for separating and diverting dry recyclables and wet compostable organics from residual waste continue to be debated. Recycling and organics collections that are cost and convenience competitive with garbage collection are not available to all institutions, businesses and households that have garbage service, especially small and medium size businesses and residents of larger multi-family dwellings. Diversion from waste that is self-hauled by households and businesses to transfer or disposal facilities also lags substantially behind recovery levels achieved from universal recycling collection.

Thus, although there is ongoing progress in the 3Rs(reduction, reuse & recycling) in North America, attainable diversion levels are hotly debated. In the US, 12 states have set 50% reduction/recycling goals, while New York, New Jersey, and Rhode Island have diversion goals in the 60% to 70% range. The state of Washington's Future of Recycling Task Force currently is considering an inspirational goal of zero waste by 2020.

Having attained a national average of 25% diversion, the US Environmental Protection Agency is pondering a more aggressive national rate and date goal. However, J. Winston Porter, former EPA Assistant Administrator for Solid Waste, claims that diversion beyond 25% would be difficult and costly.¹

In Canada, Ontario's diversion goal is 50% by the year 2000. Metropolitan Toronto's goal is 60% diversion by 2000, 70% by 2010, and 90% by 2030.² At the same time, Ontario's previous provincial government pursued development of landfill capacity to accept 50% of the Greater Toronto Area's solid waste through the year 2015.

Diversity of opinion regarding attainable diversion is caused in part by disagreement and uncertainty about:

- Best practices for diverting waste from disposal;
- Costs of diversion versus costs of disposal; and
- Economic and environmental benefits from resource and energy savings and pollution reductions yielded by substituting recycled materials for virgin feedstocks in manufacturing new products.

In this context, development of incineration capacity for disposal of Toronto's residual waste will inevitably compete with recycling for waste materials, financing and operating moneys, and governmental agency planning, regulatory oversight, permits approval and ongoing

¹Porter, J. Winston, "Recycling in America: 25% and Beyond," *Solid Waste Technologies*, May/June 1996.

²Metropolitan Toronto Works and Legal Departments, *Executive Summary of the Draft Solid Waste Management Master Plan Strategy (1991 to 2030)*, September 1991.

support. The remainder of this briefing paper outlines major elements of this conflict between recycling and incineration, with examples from various North American communities.

II. Competition for Waste Flow

Paper and paperboard materials, as well as yard debris, dominate the recycling stream currently diverted from households, businesses and institutions. Glass, metals and plastics are also collected in most recycling programs. In addition, woodwaste and concrete/masonry materials are typically diverted from construction, demolition and landclearing activities.

Paper and paperboard, wood and plastics also comprise most of the burnable portion of solid waste. Without combustible waste materials to supply heating value, solid waste incineration requires consumption of substantial amounts of auxiliary fuel and generation of steam or electrical energy is impossible. When the combustible portion of incinerated waste declines, net operating costs escalate -- both because marketable energy, and consequently revenues, decline, and because costs for auxiliary fuel increase

At present, even the most successful programs do not divert 100% of materials targeted for recycling or composting. However, many provincial, state and local governments are considering methods to drive diversion of targeted materials well beyond current levels. For example, in the US nearly half the states, as well as many local communities, have banned disposal of yard debris. Wisconsin has banned disposal of newspapers; cardboard & other paperboard; office & computer paper; and glass, plastic, steel & aluminum containers. Massachusetts has banned disposal of recyclable paper, glass & metal containers, and single polymer plastics.³

In Canada, Nova Scotia has banned the disposal of newspapers, cardboard, virtually all non-alcoholic beverage containers, leaf & yard waste, scrap tires, and lead-acid batteries. By mid-1997 the province will also ban disposal of compostable organics by industrial, commercial and institutional generators; beginning April 1998 glass and metal food containers, low-density polyethylene bags and all high-density polyethylene plastics will be banned from disposal.⁴ Within Nova Scotia, Halifax Regional Municipality imposes double tipping fees on construction, demolition and renovation waste loads that contain clean woodwaste, scrap metals or masonry/concrete/asphalt/dirt.

Increased diversion rates and potential declines in quantity or heating value of disposed waste pose significant threats to the economic viability of incineration facilities. For example, the Quinte, Ontario, Blue Box 2000 diversion system has reduced annual residential waste disposal from over 900 kilograms to about 320 kg, while reducing the portion of burnables in waste disposal from 56% to 47%. At system maturity waste disposal is projected to be just 257 kg per year, and burnables are expected to comprise just 33% of this disposed waste.⁵

At the same time that there are risks from insufficient waste quantities and too few burnables, there also are significant economies of scale for EFW facilities. Further, incinerator vendors profit more when building larger facilities. For these reasons incineration facilities may be sized based on relatively pessimistic projections for potential diversion levels.

³ Steuteville, Robert, "The State of Garbage in America, Part II," *BioCycle*, May 1996, Table 3, p. 39.

⁴ Nova Scotia Department of the Environment, *Solid Waste Resource-Management: A Strategy for Nova Scotia*, October 1995.

⁵ Robert Argue, REIC Ltd., "3Rs Diversion Potential," presentation at Recycling Council of Ontario's Forum on Energy from Waste: Understanding the Issues, May 4, 1995.

Privately-owned incinerators typically shield themselves from risks of inadequate waste flow by requiring host communities disposing of waste at the incinerator to pay substantial fixed annual fees or to guarantee that certain quantities of waste will be delivered for disposal (so called “put-or-pay” contracts). Whether publicly or privately owned, incinerator capacity may prove to be too large relative to attainable diversion levels. When this occurs, businesses and households end up paying for idle incineration disposal capacity, having feasible and cost-effective diversion programs postponed until population increases or economic growth result in additional waste generation, and/or in the worst case having existing recycling programs canceled or curtailed.

Norwich, Connecticut

All four EFW facilities developed by the Connecticut Resources Recovery Authority (CRRA) have experienced difficulty meeting committed tonnage. Waste streams were overestimated, recycling underestimated and the impact of an economic downturn not anticipated. Norwich, for example, has a mandatory recycling program and has paid annual penalties exceeding \$300,000 for failing to deliver its contracted minimum waste quantity of 25,000 tons to CRRA’s plant in Preston.⁶

Springfield, Massachusetts

The City of Springfield contracted with a privately-owned EFW plant to handle up to 58,000 tons per year at a fixed annual fee of \$2,600,000. Trash disposal in the city then declined by 12,000 tons due to recycling and composting, with no reduction in the annual incineration fee. The average \$100 per ton cost of these diversion programs was cheaper than the cost of garbage collection and incineration. But the diversion program reduced disposal tonnage below the 58,000 guarantee, and resulted in Springfield paying several hundred thousand dollars to the EFW facility for waste it recycled and didn’t need to have incinerated.⁷

La Crosse County, Wisconsin

La Crosse County filed a successful lawsuit against its consultants, Black and Veatch, and Gershman, Brickner and Bratton, because the firms overestimated the capacity that would be needed at an EFW plant opened in 1988. The County only used half the facility’s capacity, and had to join with other EFW facility host communities to obtain an exemption, both from Wisconsin’s state law requiring adoption of volume-base garbage collection fees wherever a 25% diversion goal was not met, and from Wisconsin’s disposal bans.⁸

Smithtown, New York

To protect its EFW facility the Town of Smithtown filed a lawsuit against a local hauler, USA Recycling Inc., to prevent the firm from sorting out paper, metal and wood from commercial waste before taking the residue to the Town’s EFW plant. This despite that fact that New York state has a 60% diversion goal.⁹

III. Competition for Solid Waste Management Funds

Whether recycling and disposal services are provided by the private or public sector, or a combination thereof, each community’s solid waste must be handled within some sort of budgetary

⁶ Apotheker, Steve, “Waste-to-energy and recycling: Tango or tangle?”, *Resource Recycling*, September 1994, p72.

⁷ *Ibid*, p. 72.

⁸ *Ibid*, p. 73.

⁹ *Ibid*, p. 73.

constraint. Taxes of various kinds, user fees, and sales of recovered materials and/or energy provide the revenues to pay for solid waste management programs and services. It is apparent that the public is best served by a solid waste management system that minimizes long-run costs and maximizes long-run economic and environmental benefits from chosen solid waste management alternatives.

A proposal to construct an EFW facility will always entail commitment of governmental resources. The permitting process alone requires substantial expenditure of governmental agency labor and budget. In addition, most EFW ventures involve local governmental commitments of funds or credit to support construction and/or operations. When EFW ventures are publicly owned, funds used to construct an EFW facility cannot be spent to support present or future 3Rs programs. Diversion of waste by 3Rs cannot recoup any of these sunk (fixed) costs.

When EFW facilities are privately owned, local government is often called upon to commit to fixed annual fees or guaranteed disposal quantities in return for the right to deliver waste to the facility. This assures plant owners a return on funds they have sunk into EFW facility construction.

A. Competition Between Recycling and Publicly-Owned Incineration Facilities

In the case of public ownership of EFW facilities, the competition between recycling and incineration for public funds is direct and should be evaluated in terms of long-run costs and environmental benefits before deciding to invest in EFW. Two well-known instances of such a recycling versus incineration cost and diversion assessment were conducted by the City of Seattle and the City of Halifax.

Seattle, Washington

In Seattle a fast-track proposal was initiated in the mid-1980s to site one large or several smaller EFW facilities. In response to citizen concerns about environmental impacts of incineration and the substantial expenditure of City funds required to site and construct EFW capacity, Seattle's City Council instructed the Engineering Department's Solid Waste Utility to look at how much waste reduction and recycling (WRR) could be achieved if similar amounts were spent on diversion instead of incineration. The resultant Environmental Impact Statement compared the WRR alternative to several incineration alternatives and found WRR preferable in terms of overall economic and environmental (including energy, air pollution, water pollution, mining waste and water use) impacts.¹⁰

After rejecting incineration in favor of aggressive WRR strategies, Seattle selected long-haul landfilling to manage the shrinking portion of waste not diverted by WRR programs throughout the twenty-five year planning period.¹¹ A competitive proposal process then led Seattle to negotiate a contract with WMX that specifies a per ton cost for landfilled waste. Thus, Seattle has no fixed landfill disposal costs and every ton that 3Rs programs divert from disposal saves the

¹⁰ Seattle Solid Waste Utility, *Final Environmental Impact Statement - Volume 1: Programmatic Alternatives, Volume II: Recycling Potential Assessment and Waste Stream Forecast, Volume III: Seattle Waste-to-Energy Plant Alternatives, Appendix A: Waste-to-Energy Project Description, Appendix B: Air Emissions Factors, Appendix C: Air Quality/Odor/Noise, Appendix D: Health Risk Assessment, Appendix E: Recycling Potential Assessment and Waste Stream Forecast, Appendix F: Economic Analysis, and Appendix G: Ecology and Water Quality*, prepared by a variety of engineering and consulting firms including Gershman, Brickner & Bratton, SCS Engineers, Resource Conservation Consultants, CCA, Fernandes Associates, and Sound Resource Management Group, July 1988.

¹¹ Seattle's vision for its integrated waste management system is described in *On the Road to Recovery: Seattle's Integrated Solid Waste Management Plan*, August 1989.

City and its ratepayers the entire per ton charge that WMX would otherwise get for landfilling that ton of waste.

Halifax, Nova Scotia

In 1990 Halifax's Metropolitan Authority (a public corporation governed by elected representatives from the City of Halifax, the County of Halifax, and two smaller municipalities in Halifax County - the City of Dartmouth and the Town of Bedford) determined that "incineration would be a sound environmental choice and provide dependable waste management for the Region."¹² Upon reviewing the Metropolitan Authority's rationale, the City of Halifax became concerned about the cost and environmental impacts of incineration, and established the City of Halifax Waste Management Task Force to review waste management options. The resultant study concluded that 3Rs alternatives were cheaper than incineration, had better long-term economic and employment impacts, conserved energy, and did not entail the public health risks associated with the incineration option.¹³

With respect to this last point it is important to note that the Task Force's study also concluded that the incineration technology proposed by the Metropolitan Authority did not represent Best Available Technology (BAT). Upgrading to BAT for controlling emissions was estimated to nearly double construction costs for the proposed facility.¹⁴

After lengthy hearings Nova Scotia's Minister of the Environment ruled on July 15, 1994, against the Metropolitan Authority's incineration proposal. The recently formed Halifax Regional Municipality is now implementing a maximum source separation recycling strategy in which residual waste will be stabilized before being landfilled at a Residual Disposal Facility that has been sited in the Region.

B. Competition Between Recycling and Privately-Owned Incineration Facilities

In the case of privately-owned incineration ventures, the competition between recycling and incineration for public funding also may be overt, as in the case of local government guarantees to pay a fixed annual fee or to arrange for the delivery of a specified amount of waste for disposal. Such guarantees mean that none of these moneys are available to fund 3Rs programs, even though additional diversion may be cheaper on a per ton basis than continued incineration. The Springfield, Massachusetts case described in Section II provides a typical example.

Whenever governmental guarantees of any kind are required for a privately-owned EFW venture, a diversion potential and impacts assessment needs to be conducted to evaluate current or likely future conflicts between recycling and incineration for waste flows and public funds. Even when an EFW venture is privately owned and financed, and no governmental guarantees are proposed, the public sector may still find itself involved at some later date to protect public health and the environment. Or a local government may depend on disposal surcharges to finance recycling programs. In either case, diversion potential may be sacrificed as a result.

Bellingham, Washington

¹² Memorandum to Chairman and Members of the Metropolitan Authority from R. Mort Jackson, Executive Director of the Metropolitan Authority, regarding Solid Waste Master Plan Recommended Solid Waste Management System, dated December 31, 1990.

¹³ The City of Halifax Waste Management Task Force, *Review of Waste Management System Options*, prepared by Sound Resource Management Group, Inc. in association with Angus Environmental Limited, March 1992.

¹⁴ *Ibid*, pp. 35-50 and Figures 4.6, 4.7 and 4.8.

In 1985 the City of Bellingham negotiated an agreement to deliver garbage to a 100 ton-per-day modular EFW facility financed by a local company and constructed to include an electrostatic precipitator (ESP) for air emissions control. The negotiated contract set a \$36.50 per ton disposal fee for fiscal 1986-87, and included no guarantee on tonnage. However, the contract did specify that waste recycling programs were restricted to materials source separated by households and businesses. This prevented, for example, the separation of cardboard from collected commercial waste, a common practice when cardboard has a strong market price.

Once the facility was in operation, its ESP failed to meet evolving air emissions standards. Variances had to be obtained from Northwest Air Pollution Agency and the Whatcom County Health Department until an acid-gas scrubber and baghouse could be installed.

Bellingham's incineration disposal contract contained a standard clause that exempted the privately-owned EFW facility from liability for new or changed environmental regulations and standards.¹⁵ The City, thus, was forced to amend its incineration disposal contract. While the new contract did not specify minimum levels on delivery of waste for disposal, it did require that the City guarantee a fixed increase in tipping fee revenues to cover costs of upgrading the EFW facility to meet new air emissions standards. These costs more than doubled the tipping fee. Furthermore, the revenue guarantee meant that increased diversion would increase tipping fees even further and cause any new diversion program to be unacceptable to the public.

Washington, DC

Curbside recycling in Washington, DC has been entirely funded through a recycling surcharge paid by commercial waste haulers delivering waste to the Lorton incinerator in Virginia. Because of the Lorton incinerator's high tipping fee, commercial haulers have been diverting waste away from that facility, decreasing Washington's recycling surcharge revenues. As a result the City has attempted to decrease or suspend its curbside recycling program on several occasions during the past few years.

IV. Competition for Government Support

Garbage collection and disposal is supported by numerous governmental regulations, including in some communities anti-littering laws, bans on outdoor burning or mandatory garbage collection. The extraction of virgin materials such as petroleum, bauxite, iron ore, or pulping wood, and their processing into feedstocks useful for manufacturing new products, was developed in North America through extensive governmental support, such as land and mining grants, oil depletion allowances, and subsidized access to resources on publicly-owned lands. Virgin-content manufacturing continues to be supported by numerous governmental regulations and practices, for example, virgin-content requirements in governmental purchasing specifications.¹⁶

¹⁵ According to Nova Scotia's Ecology Action Centre (EAC), standard incinerator contract clauses can require the contracting public sector entity to be responsible for costs of upgrades to pollution control systems, costs of ash haulage and disposal, penalties imposed by energy purchasers if there is a significant reduction in electrical output, and liability for decommissioning costs. See *EAC Policy Papers: Halifax Metro Incineration Hearings, Submission to the Environmental Control Council of Nova Scotia*, January 1994.

¹⁶ See US Environmental Protection Agency, *Federal Disincentives: A Study of Federal Tax Subsidies and Other Programs Affecting Virgin Industries and Recycling*, EPA 230-R-94-005, August 1994, and Roland Hwang, *Money Down the Pipeline: Uncovering the Hidden Subsidies to the Oil Industry*, Union of Concerned Scientists, September 12, 1995, for analyses of some of these subsidies in the US.

Regulatory and institutionalized supports for garbage collection and disposal, and for continued acquisition of virgin materials to replace resources that are wasted in garbage, are being modified to reflect the shift to a resource conservation rather than resource exploitation ethic. But the pace of these modifications is slow and uneven relative to developing opportunities for recycling.

Governmental and institutionalized supports for virgin materials extraction and processing result in virgin materials being sold to manufacturers at prices lower than would prevail in the absence of these supports. At the same time, recycled materials in general cannot be sold for more than the virgin materials with which they compete. Therefore, there is, and will continue to be, a need for governmental support for collection, processing and marketing of recyclable and compostable materials to ensure that recycling can compete on an equal and fair basis with garbage collection and disposal and the concomitant continued acquisition of virgin materials.

Efforts to site new EFW capacity, whether initiated by the public or private sector, serve to impede governmental support for recycling, and raise concerns among manufacturing users of recycled feedstocks about competition from disposal facilities for the recycled materials required to manufacture recycled-content products.

Delays in Implementing or Expanding Diversion Programs

Given public concerns about incineration, a proposal to site an EFW facility almost always involves governmental agencies in a protracted, expensive environmental impact analysis and permitting process. For example, Seattle's consultants for the fast-track EFW proposal discussed in Section III were reportedly paid well over a million dollars to prepare environmental impact assessments and conduct public meetings.¹⁷ The public debate and decision process required several years. In Halifax implementation of expanded recycling and composting programs was delayed by about five years as a result of the Metropolitan Authority's attempt to obtain approval for an EFW facility.

Competition with Manufacturers' Need for Recycled Feedstocks

Paper and paperboard manufacturers in North America have committed billions of dollars over the past ten years to construct recycled-content manufacturing capacity, and plan to continue this trend by spending similarly large amounts in the next ten years. A speech by Norm Pridham from the Canadian pulp and paper producer QUNO discussed Ontario paper industry concerns regarding competition between recycling and incineration as it affects Canadian manufacturers in this new era for recycled-content manufacturing.

Pridham detailed how increased demand for recycled-content newsprint in the US resulted in rapid development of recycled-content capacity by US newsprint producers, such that US-produced newsprint is closing in on 50% utilization of secondary fiber versus Canadian usage at about one-third that level. As a result US mills ran at full capacity for a three-year period while Canadian newsprint mills operated below 90% capacity. To expand production of recycled-content newsprint Canada now has had to become the world's largest importer of recycled paper, because domestic consumption of newsprint is only slightly more than 10% as large as domestic newsprint production.

As an important supplement to Pridham's remarks one should note that the recycled paper market price surge from mid-1994 through mid-1995 demonstrated the impacts that a global economic expansion combined with competitive inventory building at paper mills can have on markets that cannot quickly increase supply when demand surges. Thus, it would be highly

¹⁷ Paul and Ellen Connett, *If the Answer is Incineration, Someone Asked the Wrong Question*, prepared for Pollution Probe - Toronto, Ontario, January 1993, p. 3.

dubious to attempt to reduce Canadian dependence on imports of recycled paper by pushing paper recycling to maximum levels in Canada, while at the same time constructing new solid waste incineration capacity that needs to have a substantial amount of paper thrown out in garbage in order to operate efficiently.