

FINAL REPORT

The Feasibility of Establishing a Materials Exchange in the Pearson Eco-Business Zone

February 22, 2010

Prepared for:

**Toronto and Region Conservation Authority
& Partners in Project Green**

Prepared by:

The Emerald Group and Birett & Associates

February 22, 2010

Chris Rickett
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Dear Mr. Rickett:

Re: PPG Resource Reutilization Study

The Emerald Group and Birett & Associates are pleased to submit our final report on the feasibility of establishing a materials exchange within the Pearson Eco-Business Zone. The study was completed in accordance with your request for proposal dated March 25, 2009 and our response of April 15, 2009.

The report summarizes research into the development of a regional resource reutilization network, or materials exchange, for the Greater Toronto Airport Area and Pearson Eco-Business Zone. The research includes the results of an initial 'scan' of several hundred materials exchanges in operation around the world completed over the summer of 2009, a detailed analysis of the operations and business model of a short listed group of ten exchange services, identification of conditions necessary and recommendations for the successful operation of a materials exchange.

We thank Partners in Projects Green for allowing us to conduct this study on your behalf. Please feel free to contact us should you require any further information regarding our research or recommendations.

Sincerely,

The Emerald Group

Gary Everett

Chief Operating Officer

Birett and Associates

Mike Birett

Managing Partner

Executive Summary

This report summarizes research conducted in the summer of 2009, which examined a representative sampling of material exchanges and resource reutilization initiatives operating throughout the world. Moreover, it endeavours to identify necessary conditions and make recommendations for the successful operation of a materials exchange, or regional resource reutilization network, for the Greater Toronto Airports Area and Pearson Eco-Business Zone.

When considering the recommendations of this report, the reader is cautioned that every potential material exchange will be focussed on a target market with a unique set of characteristics and inherent challenges. Businesses and communities differ by age, size, location, proximity to other businesses and cities, type of industry, diversity, culture, sense of community, business associations, leadership, relationship with local governments, history of environmental issues, and propensity for change. These variables will factor heavily into determining the most effective approach and chance of success for each material exchange.

The research conducted for this project has revealed the following factors that the authors consider relevant to the feasibility of opening a material exchange in the Pearson Eco-Business Zone and Greater Toronto Area:

- ✓ Areas with large manufacturers, packagers and distributors of goods are considered ideal for the operation of an exchange. The ideal catchment area should have a high concentration and variety of manufacturers, import/exporters, packagers and distributors from different industry sectors. In practise, industries of any sector generating large quantities of simple raw materials or finished goods are ideal.
- ✓ A decision about the operating model of a proposed exchange service is required at the outset, i.e. whether the exchange service exists to service a community or to generate a profit for the operators. A traditional exchange service, one set up to service the needs of all businesses within a set district, typically cannot generate more than 30% of the revenue necessary to cover its costs. By comparison, brokerage services are often profitable operations.
- ✓ Secure and continuous funding is critical to ensure operational stability of any materials exchange. Two to three years of stable funding is considered necessary for the successful start up of an exchange.
- ✓ Government grants remain the major source of operating funds for exchanges reviewed for this study and it is realistic to expect that subsidization will be necessary if an exchange is to be more than a simple, passive listing service.
- ✓ A dedicated and diverse Technical Advisory Committee was also identified as an important component of promoting the service and facilitating exchanges.

- ✓ Research clearly indicates that passive websites alone are not sufficient for a materials exchange to be successful. A staff compliment of two full time operators (i.e., an exchange manager and an outreach worker) supported by an administrative assistant was found to be a workable model for launching an exchange with the number of outreach workers growing as warranted.
- ✓ Approximately six months are required to organize and launch a material exchange or similar initiative during which time the number of exchanges will not be significant.
- ✓ Governance is typically not a key factor in the successful operation of an exchange. Most private services, however, report to a board of directors representing key stakeholders and sponsors.
- ✓ Legislation is considered by the authors to be an important driver of exchange services. This assertion is believed to be particularly valid where legislation encourages businesses to engage in waste diversion or where legislation impacts local disposal fees.
- ✓ Active involvement of stakeholders and sponsors is considered critical to promoting and supporting the efforts of exchange services and resource reutilization initiatives.
- ✓ Ongoing and aggressive outreach remains a key component of an effective marketing strategy for a materials exchange. Notwithstanding this comment, effective web sites are now considered equally important to successful service delivery and profile development.
- ✓ While commissions can be levied against waste generators or receivers for services provided by the exchange, this approach to funding is not recommended due to the administrative and potential legal implications involved.

With the above factors in mind, it is reasonable to conclude that the Pearson Eco-Business Zone, with over 12,500 businesses, (currently diverting about 12% of generated waste; *Environment Minister's Report on the Waste Diversion Act 2002 Review, October 2009*), has a sufficiently high enough concentration and variety of generating potential to support a materials exchange.

The success of the Partners in Project Green (PPG) initiative suggests that there is ample interest within this community to participate in, and support, such an initiative. Through the development of PPG, the business community ranked resource reutilization and turning waste into new revenues as their number one issue of concern.

Assuming a not-for-profit, active exchange operating model is adopted, suitable funding will be required to sustain the service. Given the recently announced changes proposed by the Province to improve IC&I waste diversion, the authors believe that financial support may be available from several levels of government to provide sustainable funding. Support from PPG partners/members/sponsors to secure in-kind contributions, assist with promotion and marketing efforts, facilitate exchanges and participate on the proposed exchange's board and technical committee may also be possible.

The legislative changes proposed by the Province are also expected to create a favourable environment within which a waste exchange could prosper. Therefore, it is the conclusion of the authors that a materials exchange could be maintained sustainably within the Pearson Eco-Business Zone under the specified conditions.

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Notwithstanding this support, the views expressed are the views of the author(s), and the TRCA accepts no responsibility for these views.

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Disclaimer

This report is provided as opinion for discussion only and is **not** designed to replace qualified engineering, architectural or legal advice in any way. Readers are cautioned to obtain qualified advice and certified/approved drawings and plans prior to undertaking or adopting any recommendations that may affect their programs or facilities.

Background

Partners in Project Green is a growing community of businesses working together to ‘green’ their bottom line and to create an internationally recognized ‘eco-business zone’ by re-branding the industrial area around Toronto Pearson International Airport as the Pearson Eco-Business Zone.

Through new forms of business-to-business collaboration, Partners in Project Green delivers programming that helps businesses reduce energy and resource costs, uncover new business opportunities, and address everyday operational challenges in a green and cost-effective manner.

Through the development of Partners in Project Green the development of a resource reutilization network was identified as the most important priority for the business community, with 2/3rds of survey respondents interested in ways to reduce their waste and realize new revenue opportunities. The opportunities identified through consultation included utilizing food waste energy and composting, cleaning waste water for washing trucks, and general waste exchanges. The number of businesses interested in exploring these options and their willingness to be involved suggests the potential for reductions and financial savings could be large.

To respond to this demand and scope the opportunity further, early in 2009 the Toronto and Region Conservation Authority (TRCA) issued a Request for Proposals to secure a qualified respondent to assist Partners in Project Green in researching the feasibility of a regional resource reutilization network, or materials exchange, for the Greater Toronto Area (GTA) and the Pearson Eco-Business Zone. The intention of this feasibility study was to review other regional resource reutilization networks globally to identify their conditions for success and then to research locally whether those conditions exist in the GTA. This report presents the findings of that research.

Introduction

In the late 1980's and early 1990's generators of hazardous and non-hazardous materials witnessed a combination of sharply rising disposal and regulatory costs. Alternatives to disposal such as waste reduction, reuse and recycling became prevalent concepts amongst Canadian and US industrial, commercial and institutional (IC&I) businesses. Private and publicly operated materials exchange services quickly gained popularity as a means of dealing with costly hazardous or off spec products and production waste streams. At their peak, over 50 exchanges were known to be operating across North America.

Prior to the turn of the century, materials exchanges played an important role in assisting waste generators and others in identifying waste minimization opportunities. As government funding for IC&I waste reduction programs was eliminated, domestic economic conditions forced manufacturing overseas and cheap landfill space was identified in Michigan and other states, the number of exchanges dwindled over time.

Despite the changing economic and business environment, materials exchanges have continued to evolve and provide a vital service to the business community. In many instances, this has required them to expand their mandate from dealing primarily with hazardous waste to a broad range of waste management issues. Similarly, their services have expanded to include sophisticated electronic information delivery systems, industry networking and promotional activities, provision of legal and regulatory services, delivery of conferences/workshops and more.

Historically, materials exchanges have taken two primary forms loosely defined as "active" and "passive" exchanges. Passive exchanges are typified by early examples such as the Canadian Waste Materials Exchange operated by ORTECH International in the early 1990s. Passive exchanges normally function as a stand-alone service providing listings of materials available or wanted. However, they are not supported by personal contact or follow-up by exchange staff.

Active exchanges, by comparison, function as an active broker between material generators and consumers. They differentiate themselves from their passive cousins through personal contact and follow up by exchange staff and the generator and potential consumers of the material. Active exchange staff often solicit listings of materials from local businesses as part of a range of outreach services offered to their clients. On occasion, they will even take possession of the material and perform whatever functions (e.g., reprocessing, de-packaging, blending) are required in order to market the material.

Active exchanges often function as "for profit" organizations and can include individual brokers. Passive exchanges, by comparison, typically operate as "not for profit" government supported services. In addition to the three most obvious parties involved in exchanges (i.e., generators, consumers and brokers), local government and industry leaders and service suppliers all play a key role in ensuring the longevity of an exchange.

Review of Selected Materials Exchanges and Related Services

A series of 27 private and government operated exchanges currently functioning around the world, listed below, were reviewed as part of this study. Information was collected on their governance, business and financial models, types of material handled, sectors served, policy and regulatory framework under which they operate, marketing strategies, stakeholders, performance benchmarks, future direction and more in an effort to determine what conditions are necessary for the successful operation of a materials exchange.

American

Northeast Recycling Council - Vermont MEX
Arkansas Wood Waste & Materials
CalMax Materials Exchange
RENEW
Tennessee Materials Exchange
National Industrial Symbiosis Programme
Southern Waste Information eXchange Inc
The Free Market

Canadian

Calgary Materials Exchange
The Cariboo Regional District Waste Exchange
Recycling Council of BC Materials Exchange
Cdn. Env. Reg & Compliance News
Ontario Waste Materials Exchange
IWasteNot Systems
Dalhousie/Burnside Eco-Industrial Park
FABR Residential Exchange
RecycleNet Corporation

Australia/ New Zealand

Terranova Waste Exchanges
Wastepro Australia
Waste MINZ

Europe

Waste Matchers (UK)
Lancaster County SWA Waste Exchange (UK)
Eastex National Materials Exchange (UK)
TradeBoss (Hungary)
Der Grüne Punkt DSD GmbH (Germany)
Kalundborg Symbiosis (Denmark)

Africa

Integrated Waste Exchange (South Africa)

Methodology

Phase One – Preliminary Analysis:

An initial list of several dozen exchanges and related resource reutilization initiatives was compiled from internet sources and the personal knowledge of the authors and PPG Resource Reutilization Project Team members. This compilation of exchanges was scoped down to 30 potential research targets based on information criteria outlined in the terms of reference. Twenty initiatives were subsequently selected for review by the subcommittee in accordance with the terms of reference of the study. A total of 27 exchanges and related services were ultimately researched to ensure inclusivity of the initial phase of the study.

Information on the selected exchanges and initiatives was collected through a combination of direct contact, written correspondence, literature and web site review. Data was assembled in tabular form for ease of comparison in brief one-page summaries (Appendix 5).

Phase Two – Detailed Analysis:

After review of the preliminary data by the Resource Reutilization Project Team, a ‘short list’ of 10 exchanges and initiatives was selected for further review to fill in data gaps, re-affirm the initial findings and analyse the potential transferability of their success to the Pearson Eco-Business Zone. A two page summary report was developed for each of the selected initiatives (Appendix 6).

Discussion

Evolution of Exchanges

Resource reutilization is an age-old concept. Companies and individuals have been exchanging surplus or unusable resources for as long as communities have existed. Recognizing that waste is inherently a commodity material, the potential to divert it is typically limited only by the lowest cost alternative. In most instances, this is the cost to transport and dispose of the material by traditional means.

The provision of reutilization options for industrial by-products, off-spec, stale dated and surplus products or “waste” was a natural extension of the services traditionally offered to the manufacturing sector by the many scrap dealers operating in local communities. Complimented by the internal efforts of production staff to reduce operating costs in their respective facilities, these efforts grew in popularity as manufacturing sectors matured and became more cost sensitive. If sufficient gross profit existed to cover the cost of diverting a given material, then an opportunity for reutilization existed. As the potential for sustainable profits from waste diversion became apparent, activities such as de-packaging, blending, reprocessing, refining, direct reuse, recycling and more became common place in the private sector.

Much of the work to redirect materials from generators to potential receivers was historically done by independent brokers, with specialized knowledge of industry sectors or materials, through informal networks and relations. While privately operated exchanges have been in operation for decades, it wasn't until governments adopted the concept of the 3R's that material exchanges became broadly institutionalized as a means of promoting “reuse”. Even then, the development of active exchanges was based largely on the networks developed by these independent brokers.

Passive vs. Active Exchanges

Resource or materials exchange services have evolved significantly since their introduction several decades ago. In their infancy, the potential application of both passive and active exchanges was being explored with equal enthusiasm. Privately operated exchanges normally followed an “active” exchange delivery model whereas government services trended toward “passive” systems. This difference was largely due to differing priorities when considering operating costs and mandates. In most instances, the delivery of exchange services by governments was largely due to a recognized need to reduce the impact of local manufacturers on municipal landfill consumption or a political need to offer the service to local residents and businesses.

Passive exchanges required minimal staff to promote and maintain the service and were a logical choice of service model for government agencies more concerned with being seen to be acting to address the issue than actual performance. Private sector operators, by comparison, quickly

adopted the model of active exchanges as a logical extension of their existing brokerage services due to their better success rate in achieving diversion and potential for profitability.

Numerous examples of passive and active exchanges can still be found today. Of the 27 services examined as part of this study, 55% were operating as passive exchanges and 45% were operating as active systems. It is clear, however, from the case studies that those agencies operating passive systems were doing so primarily as an obligatory government service with minimal performance expectations due to limited resources. By comparison, the agencies operating active exchanges tended to be profit driven, private sector operations or government agencies with strong mandates to maximize diversion supported by adequate resources.

While exchanges still operate today in much the same way as they did twenty years ago, the development of the internet has revolutionized the delivery of their primary services. In the past, exchanges were limited in their ability to communicate potential exchange opportunities through direct contact, phone, fax and hard copy listings or catalogues distributed either manually or by postal service. Unlike active exchanges, passive exchanges did not typically facilitate exchanges through direct contact, but instead relied on distribution of printed listings. Their inability to facilitate exchanges in a timely manner proved to be a significant barrier to their success. By comparison, direct contact allowed active exchanges to respond with sufficient speed to meet the needs of clients who would otherwise be unwilling to store materials on site for extended periods. Moreover, their ongoing direct contact with customers served as an important reminder to material generators of the opportunity to divert their materials and allowed them to resolve unanticipated issues that commonly prevent exchanges from being completed.

While modern exchanges continue to promote their services through direct contact and the use of print media, the availability of the internet has become the primary means of promoting and listing exchange services and available materials. This option has made passive exchanges viable again. One unanticipated challenge associated with the advent of internet based services has been the proliferation of private sector passive exchanges focused loosely on residential materials. Some of the better known examples of these services include eBay, Craig's List and Kijiji. Many of the exchange operators contacted as part of this study identified these services as taking business away from their own exchanges.

The success of these systems is instructive in that it demonstrates the potential applicability of low cost passive systems where large numbers of potential clients are available and motivated to post or divert their materials. This latter point typically comes in the form of the potential to sell their unwanted materials for a fee. This factor, typically, is not the case with industrial clients who in most instances simply wish to get rid of their materials by the most expedient means possible. Under the best of circumstances, informed manufacturers will make a 'business' decision to participate in an exchange based, primarily, on whether the time invested and cost to do so is less than the cost of disposal. Often, however, they will pay incrementally more to simply dispose of their materials rather than lose time to the "hassles" associated with exchange services. Active exchanges are more appropriately suited to these situations because experienced operators can play a significant role in facilitating the exchange process. Their specialized knowledge of the client's material stream(s), diversion options, associated transfer costs,

regulatory obligations are all elements of a potential exchange that a manufacturer would otherwise spend excessive amounts of time and effort on incorrectly leading them to believe an exchange would not be worth pursuing. In other words, an active exchange adds value to the services offered to business users.

Social and Economic Factors Affecting Material Exchange Viability

As discussed previously, waste is a commodity and as such, material exchanges are particularly susceptible to economic pressures from competing alternatives such as landfill disposal fees. Local disposal fees must be sufficiently high enough to provide reasonable margins to cover the costs associated with facilitating exchanges and to serve as an incentive to businesses to warrant the time required to participate in an exchange. Those services operating in the American and Canadian mid west, where landfill disposal costs are very low, found this issue to be particularly challenging to deal with.

Other social or demographic factors cited by operators that impacted the viability of resource reutilization initiatives included the need to operate within areas of critical mass of both potential generators and end users of material. This factor is based primarily on minimizing the cost of transportation associated with exchanging materials but is also grounded in the need to have sufficient exchanges occurring to build interest within the community. Areas with large manufacturers, packagers and distributors of goods are also considered ideal for the operation of an exchange.

Exchange operators noted that while smaller manufacturers often generate more by-product materials per unit of production than their established counterparts, they tend to be too focused on growing their business to pursue opportunities to minimize or optimize operating costs. Larger and more established businesses were found to have the staff and resources to pursue alternatives such as waste reduction and generate sufficient volumes to warrant the time and effort involved in diverting ongoing production by-product materials.

Ironically, prosperous economic conditions have been reported by some exchanges to work against their efforts. Presumably, these observations are due to the fact that when the economy is 'booming' businesses are focused on maximizing growth and gross revenue generation. By comparison, they tend to pay more attention to net profits and cost cutting during 'tough times'.

Regulatory and Legal Environment

While virtually none of the material exchanges contacted indicated that legislation played a significant role in supporting their efforts or driving their success, this is largely because its impact is often taken for granted. By comparison, several mentioned the need to be cognizant of the legal and regulatory obligations involved in transferring materials as discussed in the recommendations section of this report.

In Ontario, passage of O.Reg 347 (General – Waste Management), previously O.Reg 307 in 1990 required that generators of hazardous and liquid industrial wastes register and dispose properly of subject wastes. This sweeping regulation triggered sustained growth in the field of waste exchanges for almost a decade. The high cost of disposal of hazardous waste and the fact that many industrial waste streams were caught under this legislation was a key driver for generators to seek alternatives.

In 1994, passage of O.Reg 103, had a similar impact on the recycling industry in Ontario. This regulation required that manufacturers and businesses of certain sizes conduct assessments of their waste generation activities and develop waste diversion plans. Introduction of the “3R’s regulations” triggered a flurry of activity that sustained the growth of many local material exchanges until it became apparent that the Ministry was not enforcing the regulations.

The recent release of the Minister’s report on the Waste Diversion Act 2002 review suggests that the current Provincial government is prepared to take action to improve IC&I diversion and move the Province towards a full Extended Producer Responsibility (EPR) based waste management system. Both actions have the potential to create a viable regulatory platform from which to launch a material exchange in Ontario by bringing focus to the issue of industrial waste generation and alternatives for its diversion.

Numerous pieces of Federal, Provincial and Municipal legislation, regulations and bylaws apply to business activities that may affect the environment. A search of the Ontario electronic legislation index, (<http://www.search.e-laws.gov.on.ca/en/search>) for the key word “environment” returned 1,195 references in 250 documents. Additionally, over twenty related statutes may apply to specific Ontario businesses with the potential to affect the environment (See related legislation in Appendix 2). Obviously, it is not practical to undertake a detailed review of all related legislation as much of it references specific industries, sectors, and business activities. Noteworthy however, is the fact that a search for the reference “waste exchange” found 0 hits in 0 documents.

The top layer of environmental legislation in Ontario is the Environmental Protection Act, R.S.O. 1990, c. E.19. Section 6. (1) sets out the general prohibition against contamination;

“No person shall discharge into the natural environment any contaminant, and no person responsible for a source of contaminant shall permit the discharge into the natural environment of any contaminant from the source of contaminant, in an amount, concentration or level in excess of that prescribed by the regulations.”

These ever increasing layers of environmental legislation/regulation lead to the conclusion that it is logical to anticipate that future enforcement is likely to become stricter. Therefore, businesses participating in diversion through an exchange may obtain an added benefit of building some proof of any due diligence requirements expressed or implied in the legislation.

Diversion Programs

The Waste Diversion Act empowers the Minister to designate a material for which a waste diversion program is to be established.

Once the Minister has designated a material through a regulation under the Waste Diversion Act, the Minister asks Waste Diversion Ontario, working co-operatively with product stewards, to develop a diversion program.

Waste Diversion Ontario (WDO) is a non-crown corporation created under the Waste Diversion Act (WDA) on June 27, 2002. WDO was established to develop, implement and operate waste diversion programs for a wide range of materials. The Minister of the Environment has designated Blue Box Waste, Used Tires, Used Oil Material, Waste Electrical and Electronic Equipment and Municipal Hazardous or Special Waste under the WDA. (In April 2006, the Minister set aside the designation of Used Oil Material.)

In his remarks at the Recycling Council of Ontario's kick-off of Waste Reduction Week 2009 on October 19, Environment Minister John Gerretsen, announced Ontario's new approach to extended producer responsibility (EPR). Gerretsen said he would release his "Report on the Waste Diversion Act Review" within a few weeks. Promising consultation on the various components of the review, he outlined what stakeholders can expect to see in the new waste diversion strategy, including:

100% Extended Producer Responsibility (EPR)

- The new waste diversion strategy will be based on 100% EPR and will identify the materials, progressive targets and timelines to meet the targets.
- Individual producers will be responsible for diverting the waste resulting from the sale of their products.
- Producers will be given flexibility in how they meet their responsibilities. Flexibility will not be "one size fits all" but rather will offer the option of developing a plan to collect and manage their own waste, joining with a group of producers to meet obligations or hiring a service provider.
- Producers will be required to report regularly. Accountability measures, such as penalties, will be put in place for those who fail to meet the requirements.
- The strategy alludes to phased in bans.
- The strategy will recognize a broader range of existing, new and emerging processes and technologies to recover materials for reuse and recycling.

Blue Box

- The Minister acknowledged the success of the Blue Box program, saying he intends to build on it by moving to full producer responsibility.
- He noted the need for transition in order to deal with issues such as:
 - future role of municipalities
 - how to address municipal investments
 - consumer accessibility and service standards

Waste Diversion Ontario (WDO)

The Minister indicated that there would be a clarification of the roles and responsibilities of various parties, and would be reassessing the governance structure and mandate of WDO under the new framework.

The Minister also announced that he plans to harmonize EPR with other leading jurisdictions.

*In The News, Issue 4, October 21, 2009, Stewardship Ontario,
<http://www.stewardshipontario.ca/corporate/inn/2009/10/21.html>*

Full text of speech Oct 19, 2009.

<http://www.amo.on.ca/AM/Template.cfm?Section=Home&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=155640>

The recent announcements by the Ontario Minister of Environment announcement seem to indicate that more responsibility will be imposed on business to divert waste in the near future. Therefore, it may be an opportune time to begin to lobby the MOE for a direct financial contribution or indirect local public/private partnership support to operate a materials exchange because it is likely to increase diversion.

One legal consideration that is common to all public material exchanges is the need to limit liability for any material or transfer made using the exchange. Lessons learned from other exchanges suggest that it is better not to be involved in every material transaction directly, i.e. the purpose of the exchange should be to develop contact between businesses only. This excludes, or reduces considerably, the exchange from engaging in purchase and resale transactions or commission sales transactions. This does not exclude exchange staff from actively matching generators and receivers and notification/facilitation of the match so the parties can make their own transfer arrangements.

Therefore, it is recommended that clear measures be taken to ensure that businesses realize that the materials exchange does not assist with storage or transportation of materials. Measures

must also be taken to ensure users recognize that the materials exchange has no liability for any material listed or the suitability of any material for any purpose whatsoever. The exchange must also ensure no guarantees or warranties, either express or implied, of any kind are made by the exchange. Receivers of material must satisfy themselves in all respects.

Damages caused by misuse, mishandling or escape of chemical substances are especially costly and it is recommended that extra measures disclaiming any liability be installed as an additional safeguard prior to permitting the listing of these substances.

Stakeholders

The majority of operators of the various material exchanges reviewed as part of this study revealed a strong reliance upon stakeholders for assistance and support of their services or initiatives on a variety of levels. Typical stakeholder groups identified by operators included:

- Key generators and consumers of material;
- Local brokers and industry service providers;
- Governments at various levels; and,
- Industry associations.

Private sector operators, in particular, acknowledged that the majority of their exchanges involve a minority of their clients and material consumers. Maintaining close relations with these companies is key to their success as they tend to encourage referrals with others.

All operators acknowledged the importance of developing close working relationships with brokers and material recycling facilities to facilitate the movement of materials. Governments and government agencies were recognized as a primary source of direct and indirect funding. In the United States, in particular, virtually all the exchanges contacted receive some level of government funding – usually originating from state landfill taxes. Indirect funding through support for workshops, conferences, directories and other services was also an important part of stakeholder support. The success of many of the industrial park based resource reutilization initiatives and larger projects such as NISP, in particular, were reported to be grounded in careful and extensive up front efforts to attract influential stakeholders and partners to the project to enhance credibility and develop the program's profile from the outset.

One concern identified with developing overly close relations with stakeholders was the potential for them to exert too much influence over the operation of the exchange.

Potential Markets

Over the last two decades manufacturers in North America and Europe and, in particular, those generating large quantities of hazardous wastes have made significant progress to reducing the

volumes of material generated from production processes. More importantly, they have moved to the use of less toxic raw materials and processes which has reduced their collective dependence on waste disposal and material exchanges. Long time operators of material exchanges such as the Southern Waste Information eXchange Inc. in Florida, reported that, while large material streams remain available for potential diversion, they tend to be much more complex than those being handled by exchanges prior to the turn of the century. This is, in part, due to the gradual loss of primary manufacturing capacity across Ontario and North America. Tanker truckloads of pickling liquor, for example, were routinely listed on material exchanges. Much of the material left to be moved from manufacturers tends to be difficult to divert (e.g., paper mill sludges), off-spec. product and components which require more creative and/or active solutions to be successfully diverted.

Notwithstanding the new market conditions, the greater the variety and number of businesses within a given area, the greater the opportunity for successful exchange of by-product material. Typically, the low hanging fruit for waste exchanges are larger manufacturing businesses. These businesses generate sufficient volumes of waste to make finding alternatives to landfill attractive enough to assign staff resources to the problem. Businesses generating recurring waste streams are also good candidates for waste exchanges from both a process and a packaging point of view. Processes that generate by-product and/or volumes of packaging, excess pallets and boxes and construction and demolition salvage material for example, are likely exchange candidates.

Large manufacturers have little interest in dealing with excess pallets, especially if damaged, but other manufacturers using wood as a raw material may have a use for pallets either to ship their own products or as filler material in the production process.

Another possible approach is to prepare an information packet aimed at the business user. These packets could be distributed to businesses within a specific geographic area, or within a certain business category. Particular targets for the distribution of information packets might be the waste management businesses, particularly recyclers who get most of their profit from picking up discarded equipment, etc., but maybe only have markets for a small portion of the materials they collect, and the construction sector (which accumulates large quantities of wood, paint, and other building materials from construction and deconstruction activities).

Owners of second hand shops and junk removal services often have only a small storage capacity, and might welcome information about the Materials Exchanges as a means of keeping their unsold inventory moving rapidly. Probably the manufacturing trades generate the most quantity of potentially reusable materials, and their very diversity and dispersed distribution constitutes a challenge in terms of letting them know about the services provided by a materials exchange. However, residential and corporate apartment communities represent good potential for collaboration (maintenance departments often have leftover material from installation and rehabilitation operations).

The motivation for companies to participate in materials exchanges include the following:

- Reduced waste handling costs;

- Savings in purchasing costs;
- Increased storage space usable for other purposes;
- Tax deductions and community support for donations to non-profit organizations
- Saving staff time and effort finding new users or arranging for waste disposal;
- Creating new business connections;
- Meeting ISO 14001 certification requirements;
- Aligning with corporate environmental objectives;
- Utilizing an environmentally responsible option; or,
- Just "doing the right thing."

However, many businesses focus primarily on maximizing their revenue stream, with less emphasis on cost containment strategies. Perhaps the greatest obstacle is a lack of awareness of the opportunities provided by materials exchanges, either as a market for discontinued or unwanted equipment or supplies or as a source of raw materials for manufacturing or assembly.

“The greatest challenge may be to change mindsets of business managers from "Where do I get virgin materials?" to "Where can I get cost-effective, used materials?" It is difficult to move from the concept of "once-through use" of a given product that automatically becomes a "waste material" at the end of its single use, to the more encompassing view of "materials management" that accounts for the entire life cycle of the raw materials fashioned into manufactured products, including embodied energy consumed in their initial production. Converting these subtleties into practical strategies for operating businesses is equally challenging for Materials Exchanges”¹.

Brokers are typically more entrenched in the current waste system today and have accounted for most of the profitable material currently extracted from the waste stream. A typical path for a broker managed waste material is illustrated by scrap plastic. A manufacturer may now easily locate industry brokers who will pay for clean to moderately contaminated industrial plastic scrap, such as mould flashings, and have it directly delivered to a toll reprocessor. There the scrap may be ground, repelletized, cleaned, coloured and/or blended to make compounds with specific chemical, colour and melt flow characteristics. Following reprocessing, the broker will normally market the material to manufacturers that can work with reprocessed compounds. For example, off spec. polyvinyl chloride (PVC) swimming pool liner will often make its way, via a broker, to a reprocessor where it is ground, pelletized and sent directly to a garden hose manufacturer where it can be blended into the new product directly due to its blue or green colour and flexibility specs. similar to the hose product being produced.

On the other hand, thermoset plastics like Bakelite used for electrical insulators and cookware handles etc., can not be remelted after initial moulding and are typical examples of scrap that can not be easily dealt with by brokers and so often ends up in the waste stream. These types of materials may be better suited to a waste exchange transaction as they can be used in industries outside of the generators and brokers usual sphere of operation. For example, plastic based railroad ties or curbs can contain large amounts of thermoset materials encapsulated within the end product.

¹ NERC Materials Exchanges Marketing Plan - http://www.nerc.org/documents/materials_exchanges_marketing_plan.html#4

Brokers are commonly involved in diverting waste streams which are produced on an ongoing basis, have high resale value, and readily recognizable commodities within the waste reclamation business. Common examples that fit these criteria include waste solvents from parts cleaning operations and oils from garages that can be redistilled and would otherwise incur high disposal costs as hazardous wastes. Scrap paper and metals have historically been handled by brokers because of the ease of recycling and presence of established global markets for these commodities. Brokers often play a key role in pulling together orders of different types and qualities of baled fibre and metals to meet a particular mill's or client's needs.

Complex adhesives, by comparison, are normally custom blended and produced through batch processing. As a consequence, they are discarded on a sporadic basis and difficult (i.e., costly) to re-blend or distil making them unattractive to brokers. Similarly, specialty papers (e.g., high wet strength or laminated products) are potentially recyclable but have limited markets. The time and effort required to identify a willing receiver is such that most brokers will not bother with these types of materials. In both examples, diversion through reuse is much more likely.

Catchment Areas

As discussed earlier, the inherent catchment area of any given exchange is generally limited by the basic cost of transportation and disposal of by-product materials by traditional means within that area. Very few generators will pay a premium to divert their material. Various materials do have markedly different disposal costs, particularly amongst those deemed to be hazardous wastes. Others, such as off spec. or stale-dated products will often have an inherent resale value that will justify transportation further afield in place of materials that would otherwise be purchased.

With this limitation in mind, there was general consensus amongst staff of exchanges and resource reutilization initiatives that the ideal catchment area should have a high concentration and variety of manufacturers, import/exporters, packagers and distributors from different industry sectors. This broad spectrum reportedly facilitates the transfer of materials from companies requiring high quality raw materials to those with high levels of 'forgiveness' in their product specifications. Local infrastructure to re-blend, modify and repackage materials was also identified as a key asset.

Since there is a basic overhead cost to every exchange, interviewees also suggested that the optimal catchment area contain large scale manufacturers as a core source of raw materials. In contrast, none identified an ideal industry sector that one would look for to support the operation of a material exchange. Of the exchanges examined as part of this study, only one was dedicated to a particular material type (i.e., wood waste) and was doing so only because this particular focus was the genesis for its creation as a government funded operation. In practise, industries of any sector generating large quantities of simple raw materials are ideal. The construction and demolition industry, for example, produces regular quantities of scrap steel, wood and drywall – all of which are readily recyclable. Off spec. materials, while not available in large quantities,

provide a reason for potential end users to stay in touch with exchanges because of the potential to secure high value raw materials at little or no cost. Tens of thousands of off spec doors and windows, for instance, are routinely distributed through reuse centres in Ontario from local manufacturers each year.

Sector Analysis

To sustain a viable waste exchange, sufficient exchangeable material must be available within the geographic service area. Very limited information is currently available on IC&I waste generation and recovery in either Ontario or the Pearson Eco-Business Zone.

This information is clearly valuable to agencies such as MOE, waste haulers, and recyclers. Going forward, it is possible that PPG may be able to provide this kind of detailed IC&I waste composition information to MOE and other stakeholders as part of any waste exchange value added services.

It is beyond the scope of this report to conduct field audits and analysis of IC&I wastes generated within the target service area, however, some extrapolations can be fairly made based on available information from comparable cities reported below the Provincial level analysis that follows;

Provincial Sector Analysis:

“According to a report prepared for the Ontario Waste Management Association (OWMA) by RIS International Ltd., *The Private Sector IC&I Waste Management System in Ontario*, businesses in Ontario generated 7.6 million tonnes of waste in 2004, of which only 1.4 million tonnes were diverted while 6.2 million tonnes were landfilled. About two million tonnes of IC&I and construction/demolition (C&D) materials were sent to landfills in Michigan and New York State, while over three million tonnes were dumped in 11 large private sector landfills in Southwestern and Eastern Ontario. The remainder was sent to municipal landfills.

Currently there is a lack of reliable information on sector specific IC&I waste quantities and characteristics. Nobody has a good handle on how much IC&I waste is being generated and how much is being diverted, says Robert Cook, Executive Director of the OWMA. “It’s all extrapolation and estimation.” The most recent totals compiled by Statistics Canada for 2002 and 2004 are incomplete and don’t account for a tremendous amount of IC&I waste that’s being handled outside the traditional waste management infrastructure of MRFs, transfer sites and private sector recyclers. *(This includes, for example, large quantities of materials diverted for reuse and recycling such as diversion of commercial food by-products to agricultural applications (e.g., animal feed and agricultural composting operations). Diversion of pallets for reuse and wood and oil for heating are often not captured in current data collection efforts. These omissions are significant because they often represent the efforts of informal and past exchange efforts.)*

Kelleher Environmental, in a recent report to OWMA, has tracked an additional 9.5 million tonnes of IC&I wastes and 6.3 million tonnes of C&D waste being diverted from disposal. This total includes 5 million tonnes of concrete and 1.3 million tonnes of asphalt pavement, 2.6 million tonnes of bark and sawdust, 3.4 million tonnes of ferrous and non-ferrous slag, 865,000 tonnes of coal fly ash and gypsum, and 353,000 tonnes of rendering wastes.

However, whether the official statistics underestimate the diversion rates or not, there is still some six million tonnes of IC&I waste generated in Ontario that's being trucked to disposal sites every year. (*This massive landfilled tonnage represents an enormous opportunity for waste exchanges in the Province.*)

Types of waste by sector

Although out of favour with the Province and ignored by many waste managers, O. Regs. 102/94 and 103/94 are still in force. The release of *Ontario's 60% Waste Diversion Goal: A Discussion Paper* on June 10, 2004, refocused official attention on IC&I wastes. The Ministry's Sector Compliance Branch (formerly called the Environmental SWAT Team) carried out a number of cursory surveys of compliance with the diversion regulations in 2005, followed by a province-wide inspection blitz of 260 businesses in all the regulated sectors in 2006.

The results were not encouraging. In some sectors, the inspectors couldn't find a single company in compliance. Some were unfamiliar with the two IC&I diversion regulations; others had chosen simply not to comply. About 40 per cent of the companies inspected were source separating many or even all of the materials prescribed in the Source Separation Programs, but very few had completed the formal audits, work plans and other paperwork required under the Waste Audits and Waste Reduction Work Plans. Almost 93 per cent of the inspected businesses were out of compliance in some way or other.

In July 2007, MOE announced that it was hiring ten additional Provincial Officers "to focus on increasing waste diversion in business and industry across Ontario" and to ensure that generators are complying with the province's IC&I recycling requirements. The promised new IC&I inspectors have been hired, trained and out in the field since late October, early November according to Andy Dominski, Director of the Sector Compliance Branch. To date they have been focusing heavily on the construction and demolition (C&D) sector. While a few firms are doing more than required, overall, compliance rates remain low. Only five of the roughly 235 C&D companies inspected to date are in full compliance.

While the Branch has adopted a "soft compliance" approach for the time being, companies are being told that MOE is taking the regulations seriously. Where attention is needed, the IC&I inspectors are issuing letters requesting that a company takes appropriate action, and specifying a compliance timeframe. Businesses that do not comply with these requests will be issued a Provincial Officer's order. If a company shows a total disregard to their regulatory obligations,

the Ministry is willing to take enforcement “to the next level, and refer the case to the Ministry’s Investigations and Enforcement Branch,” says Dominski.

“The primary focus is on diverting IC&I wastes from landfill, and less on tickets and fines,” says Dominski, “but we will take those steps if necessary.” With winter weather limiting construction site activity, the IC&I inspectors are moving into other sectors, beginning with retailers, and will continue to roll out the program over the coming year.

Will the border close?

If the U.S. was closed to Ontario’s solid wastes, the currently available domestic landfill capacity would be unable to absorb the estimated 3.5 million tonnes of mostly IC&I and some residential waste that’s being shipped to Michigan and another 500,000 tonnes going into New York each year.

This issue is very much alive on the political agenda, with both Republicans and Democrats seeing it as an issue that could curry favour in key border states. Legislation to amend the *Solid Waste Disposal Act* has passed the House of Representative and is sitting in the U.S. Senate that would give states greater ability to control or ban international waste shipments Michigan says waste shipments from Ontario were down in 2007 – the first time in 15 years – that’s probably because more waste is now going to New York. But despite the slight decrease in shipments, in the event of a border closing, the entire IC&I waste collection, transfer and transportation system would be completely clogged with 48 hours.”

Williams and Shier, Environmental Lawyers LLP. SPECIAL REPORT - IC&I Waste Diversion February, 2008.

<http://www.willmsshier.com/pdf/Special%20Report%20-%20February%202008.pdf>

Sector Analysis in Comparable Canadian Cities

The Pearson Eco-Business Zone currently contains over 12,500 businesses which can be categorized into 19 broad sectors listed in the following table:

Distribution by business type within the Pearson Eco-Business Zone

Accommodation/food services/restaurants	400
Agriculture/forestry/fishing/hunting	5
Association	113
Construction	350
Contractor	207
Distribution	675
Manufacturing	2,905
Municipality	4

Outdoor entertainment	16
Printing	94
Repair/service	974
Resource extraction	2
Retail	1,274
Services	3,068
Transportation and warehousing	1,029
Utility	26
Waste management	43
Wholesale	1,122
Unknown	192
TOTAL	12,500

(Source: PPG Appendices)

The cities of Ottawa, Calgary and Greater Vancouver have conducted waste by IC&I sector analysis and were deemed comparable to the sector generation in the proposed Pearson Eco-Business Zone service area.

Given the lack of diversion enforcement noted above and the greater density of businesses within the Pearson target zone, it is fair to conclude that an equal or greater amount of IC&I material is available for exchange within the Pearson Eco-Business Zone. A summary of sector waste generation in the comparable cities follows:

Ottawa:

“Seven sectors produce most of the total IC&I waste disposed from the City and they should be the primary targets of the IC&I 3Rs Strategy. These sectors and their contribution to the disposed waste stream are:

- Retail (17% to 24%);
- Accommodation and Food Services (15% to 19%);
- Health Care and Social Assistance (11% to 14%);
- Manufacturing (9% to 15%);
- Public Administration (7%);
- Professional, Scientific and Technical Services (7%)
- Cultural Industries (3% to 7%).

Based on the IC&I mix in Ottawa, the key materials in the IC&I waste stream are:

- Mixed Paper (27%);
- Corrugated Containers (15%);
- Food (14%);

- Plastics (10%);
- Ferrous and Non-Ferrous Metals (10%); and
- Glass (5%).

Paper:

Ottawa has observed that the IC&I 3Rs strategy should focus on recovering as much paper as possible from the IC&I waste stream. Paper is readily recyclable and Canadian recycled paper facilities import up to two million tonnes per year from the US to feed their fibre supply.

Over 70 per cent of the paper in the waste stream comes from six sectors:

- Retail;
- Manufacturing;
- Public administration (federal, provincial and municipal governments);
- Accommodation and Food Services;
- Health Care and Social Assistance; and
- Professional, Scientific and Technical

C&D Waste Composition:

C&D waste (i.e., waste from construction and demolition activities) is another significant waste stream that should be addressed in the IC&I 3Rs Strategy. Approximately 58 per cent of C&D waste is composed of four materials – paper, concrete, wood and metal – that can be recycled today in Ottawa. In addition the City is close to finalizing a pilot project to recycle asphalt shingles (an estimated 12 per cent of the C&D waste stream) and there is strong interest in diverting drywall (an estimated 10 per cent of the C&D waste stream).

About 191,000 tonnes of C&D waste were disposed in 2005. The composition of this material is expected to be a typical C&D mix.”

City of Ottawa 3Rs Management Strategy IC&I Waste Characterization Report ES-5 June 5, 2007.

Vancouver:

Greater Vancouver conducted a waste analysis in 2002 and produced a graphic representation of their findings illustrating waste generated and captured by sector. Comparisons can be drawn between the Vancouver retail and hospitality sectors and similar sectors in the proposed Toronto service area. The Vancouver graphic analysis follows:

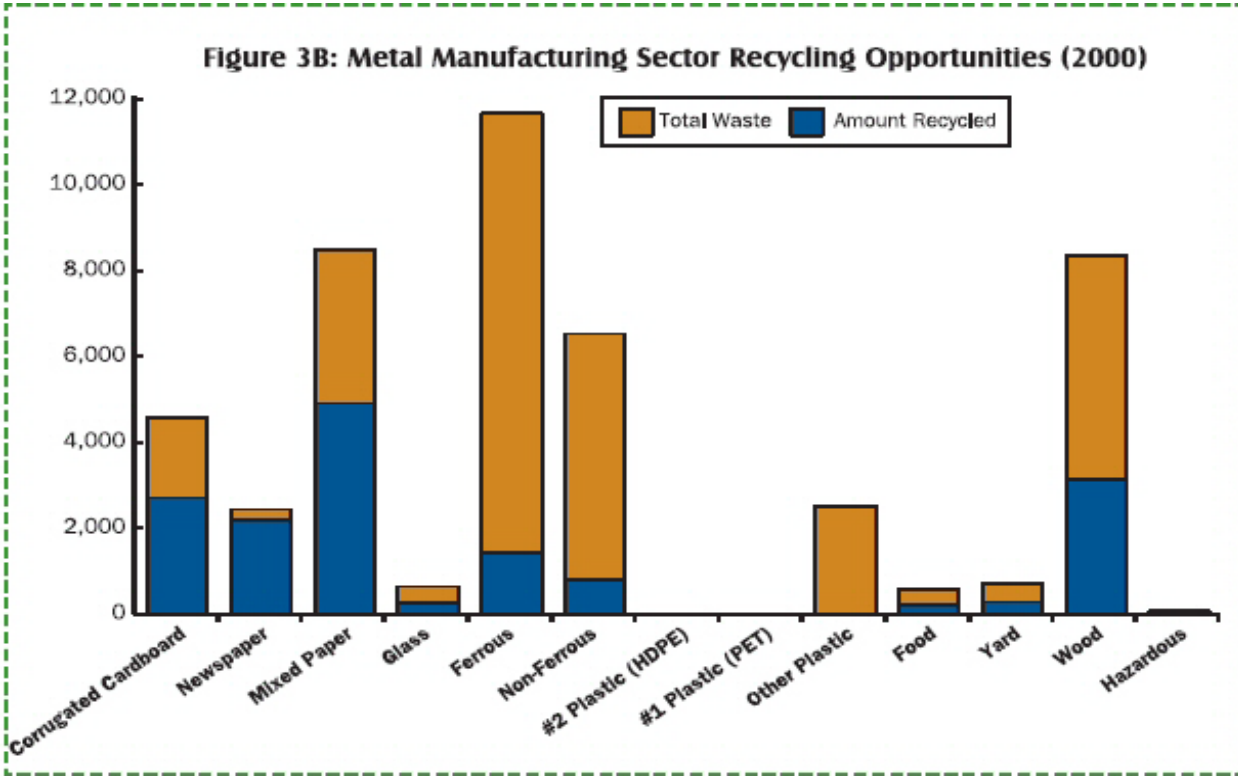
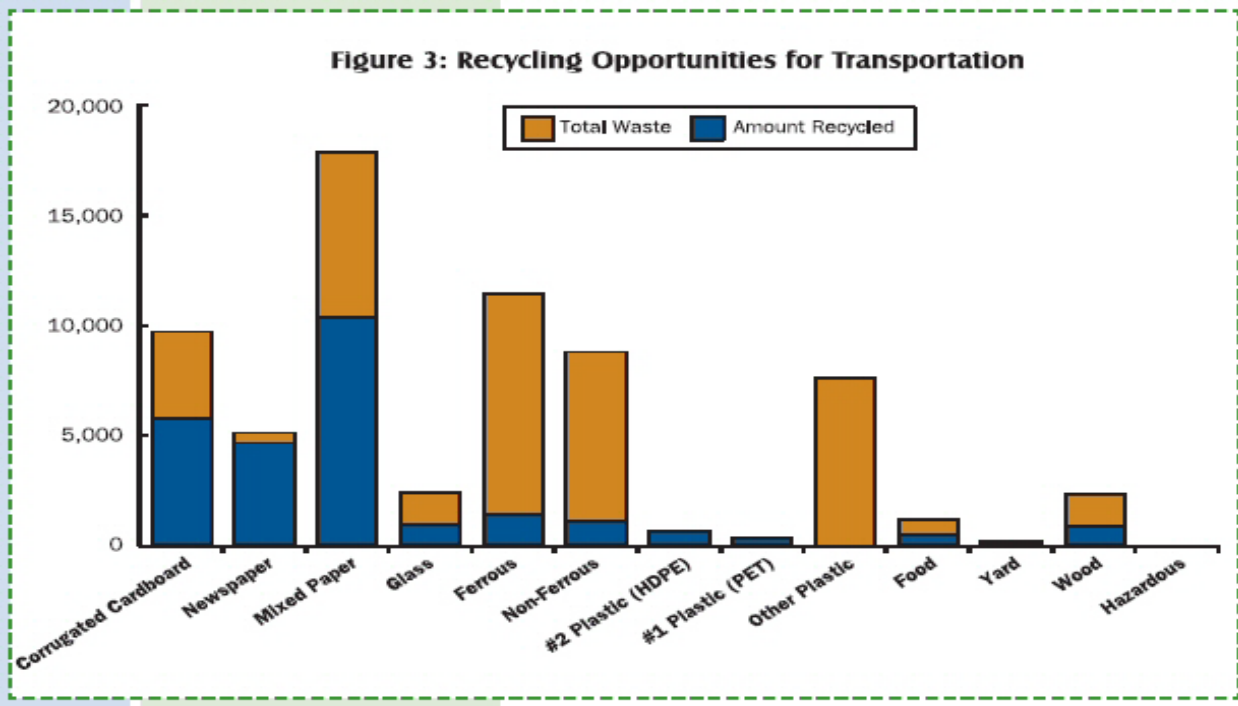


Figure 4: Hospitality Sector Recycling Opportunities (2000)

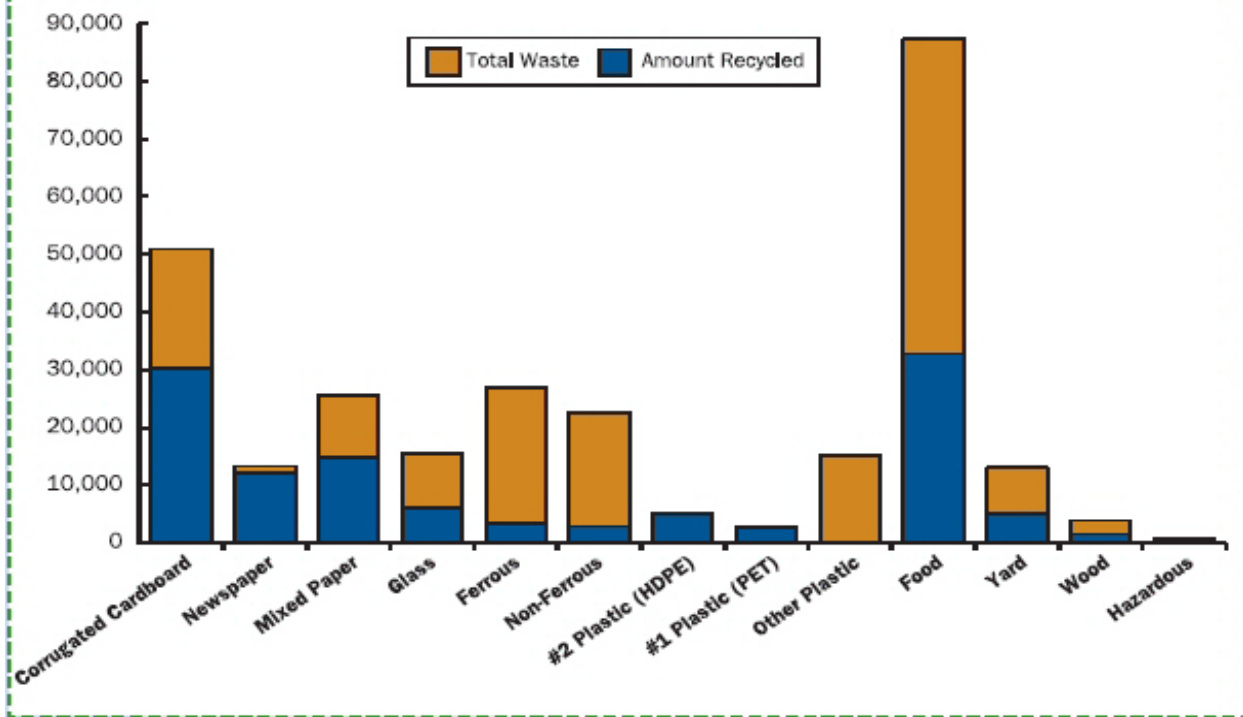
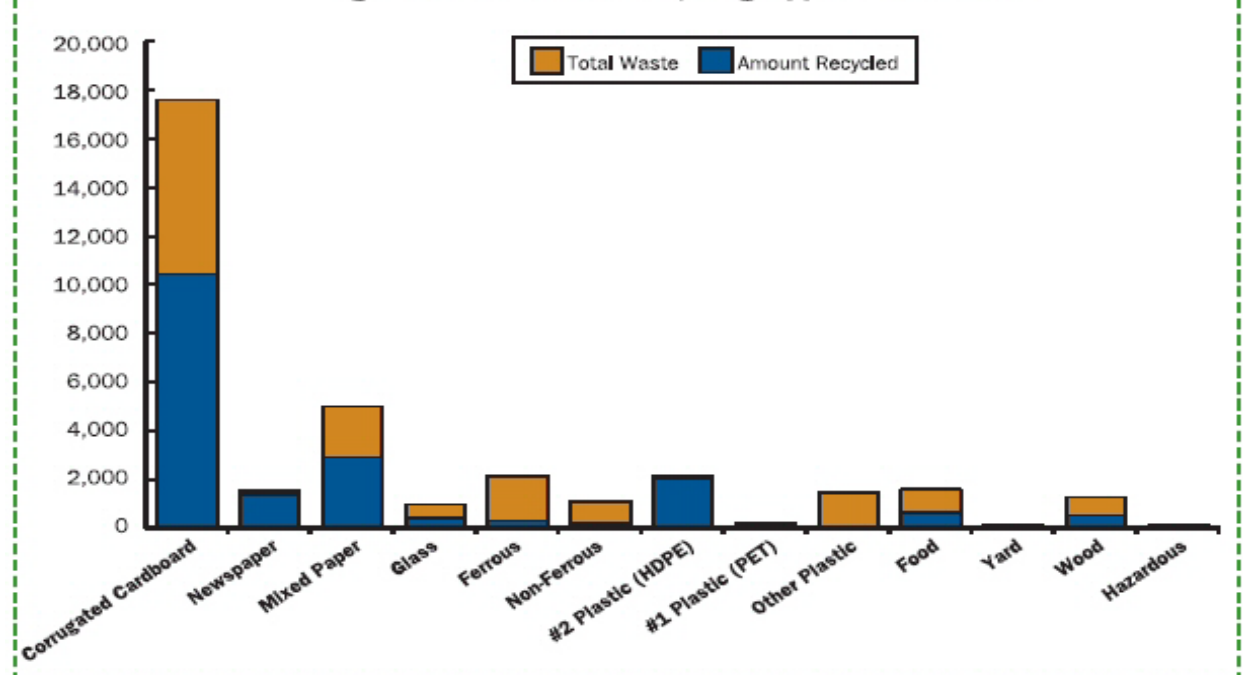
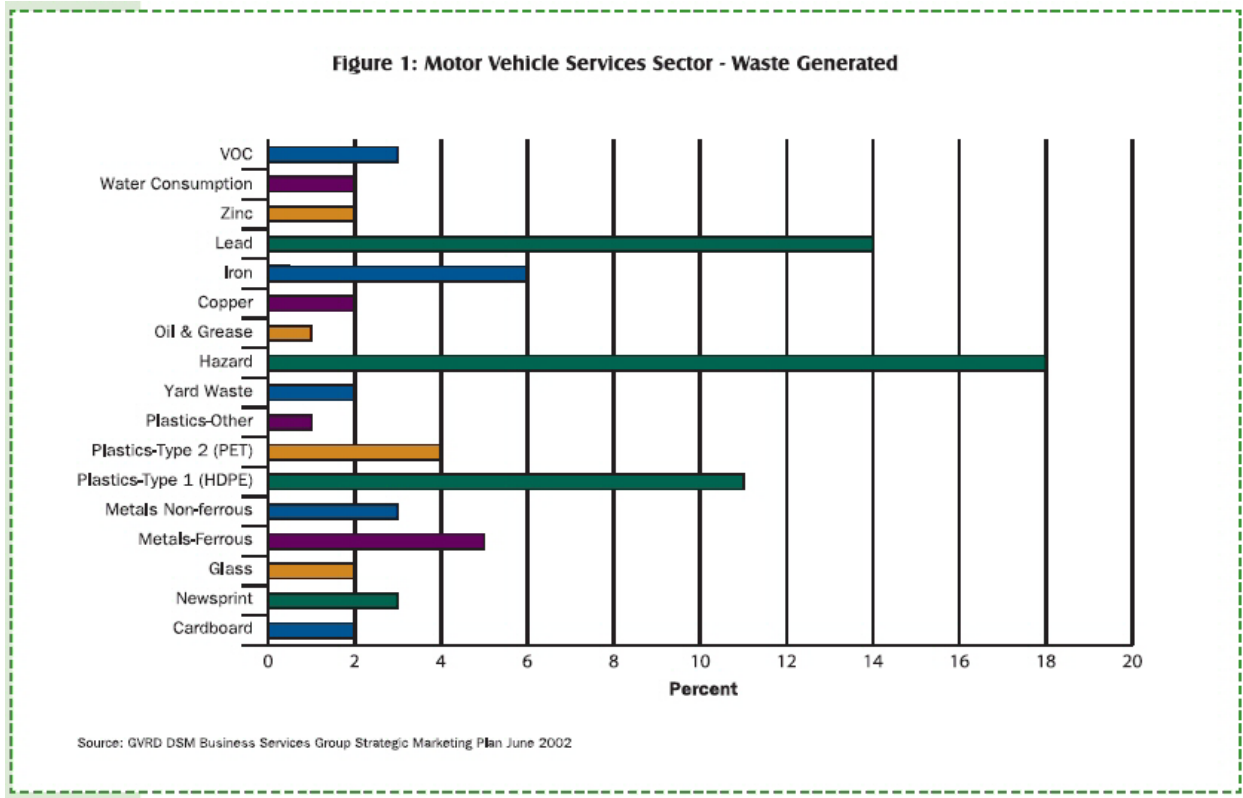


Figure 3: Retail Sector Recycling Opportunities (2000)





Greater Vancouver IC&I waste generated and recycling opportunities 2002
<http://www.metrovancouver.org>

Calgary:

In 2004, Calgary’s IC&I and C & D market sectors were estimated to produce 831,500 tonnes of waste. The City of Calgary has conducted IC&I waste audits over a number of years and their analysis is set out below:

Wood:

As of 2004, wood accounts for 10% of the total IC&I waste composition, while wood accounts for 34.4% of total C&D waste composition. These percentages equate to 158,424 tonnes of wood waste going into Calgary’s landfills each year².

Currently, in Alberta, the largest market for wood waste is feedstock for the production of roofing materials. However it is also used for landscaping and livestock bedding . Landfilling wood costs \$50/tonne; whereas recycling wood costs \$20-25/tonne.

Plastic:

As of 2004, 73,743 tonnes of plastic (14.1%) was put into Calgary's landfills by the IC&I sector alone². This is unfortunate because plastic is also one of the easiest waste materials to divert from the landfill, along with wood, metal, paper/cardboard, drywall, and concrete & asphalt.

The Calgary Materials Exchange has assisted hundreds of companies recycle everything from lumber tarps to plastic oil containers. To date more than 280,000 kilograms of plastic has been diverted from the landfill, while saving companies \$14,000 in saved disposal costs.

Paper:

In 2004, 111,134 tonnes of recyclable paper were deposited at Calgary's . At an average price of \$25/tonne, this resource is worth \$2.8million.

Papermaking fibers can typically be recycled 5-7 times before they become too short to be recycled again. As of 2004, 111,134 tonnes of paper and cardboard (13.4%) were put in Calgary landfills².

Organic Waste:

Organic waste accounts for 34% of the total IC&I waste composition. This is the single largest waste stream within the IC&I sector, equating to nearly 177,820 tonnes going into Calgary's landfills each .

1. <http://www3.gov.ab.ca/env/waste/aow/waste/industrial.html>

2. EBA Engineering Consultants Ltd. 2006. *Executive Summary: The City of Calgary IC&I/C&D Waste Characterization Study Prepared for: The City of Calgary, Waste and Recycling Services.*

3 <http://portal.citysoup.ca/NR/exeres/444FF708-8632-4016-BDA6-0B08137557FC.htm>

4 http://www.oilliercycles.com/uk/html/plastic_facts.html

Analysis of Relevant Comparative Waste Generators

Three other relevant studies were found during the project research phase that can be used to further understand the opportunities for a waste exchange within the Pearson Eco-Business Zone. Summaries of these studies are set out below:

Airport Wastes

The presence of Toronto Pearson International Airport within the Pearson Eco-Business Zone represents a potential opportunity for additional exchange activities. Total in-flight waste alone is estimated to be up to 500 kg per flight, including food waste, galley and cabin waste.

Current regulations may disqualify food waste from recycling, however, analysis shows that paper represents 32 to 71 per cent by weight of total galley and cabin waste. Polystyrene drinking cups and food containers account for another 13 per cent by weight. Aluminum cans accounted for another 4 per cent. Basic waste diversion efforts could easily divert between 45 to 58 per cent of this material⁵. The airport terminals and surrounding infrastructure also generate large quantities of readily recyclable and divertable materials similar in nature to the distribution sector.

5. 2002 Elsevier Science B.V. All rights reserved.

Food Waste Generators

A study¹ completed by Portland, Oregon found that of the 25,000 businesses identified in the City, over 5,000 were associated with food-related sectors and the top 300 accounted for approximately 50 per cent of the food waste disposed by the City's businesses. Related businesses included: food stores, restaurants, health services, hotels, educational services, manufacturing (i.e., food and kindred products) and wholesale trade (i.e., non-durable goods). Table 1 below highlights relative waste generation rates for each of these sectors. Table 2 provides associated surrogate organic composition data taken from waste composition studies in California.

Table 1. Mean solid waste disposal* (yds/week) by sector	
Food Stores¹	
O (10-19)	4.6
P (20-49)	6
Q (50-99)	8
R (100-249)	16
S (250-499)	40
T (500+)	40
Eating/Drinking²	
O (10-19)	4.3
P (20-49)	8
Q (50-99)	11.1
R (100-249)	17.4
Health³	
	58.5
Hotels⁴	
	31
Education⁵	
	48
Manufacturing⁶	
O (10-19)	4.8
P (20-49)	11.2
Q (50-99)	24
R (100-249)	40
S (250-499)	120
Wholesale trade⁷	
O (10-19)	6.2
P (20-49)	14.6
Q (50-99)	31.2
R (100-249)	72.8
S (250-499)	156

*Assumption of 80 percent capacity containers.

¹ With 10 or more employees (n=138).

² With 10 or more employees (n=743).

³ Considers the 11 hospitals in the city with food service.

⁴ Includes 18 hotels in the city with food service.

⁵ Considering the 12 Universities in the City.

⁶ Estimated disposal of 42 manufacturers with 10 or more employees.

⁷ Estimated disposal of the 72 wholesale trade businesses with 10 or more employees.

Table 2. Percent of food waste in solid waste

Sector	% Organics
1 Food stores	0.82
2 Restaurants	0.74
3 Health	0.40
4 Hotels	0.37
5 Education	0.62
6 Manufacturing	0.41
7 Wholesale trade	0.30

Source: DEQ waste sorts during pilot projects; CIWMB

While the restaurant, accommodation and food services sector makes up less than 10 per cent of the businesses in the Pearson Eco-Business Zone, food waste is a significant component of the warehousing, distribution and wholesale sectors. It is reasonable to assume that with this high concentration of commercial food preparation and related distribution companies, hotels and restaurants within the GTAA, there is further opportunity for an exchange service to target these materials should the proposed digester project under consideration by PPG not be found to be feasible.

1. *Commercial Food Composting Policy Analysis: Portland, Oregon, By Jennifer F. Porter, Portland State University, School of Urban Studies and Planning, May 2003*

Key Pearson Eco-Business Zone Sectors

The state of California’s Department of Resource Recycling and Recovery (CalRecycle) completed a comprehensive analysis of local business sectors in 1999¹. This SIC (Standard Industrial Classification) based dataset, while 10 years old, bears surprisingly close resemblance to data collected in 1991 by the Municipality of Metropolitan Toronto. In the absence of more current data, it represents a reasonable surrogate for information on wastes likely being generated in the Pearson Eco-Business Zone at the present. The following table provides a high level summary of the wastes generated by the four sectors making up approximately 75 per cent of the businesses within the Pearson Eco-Business Zone. While it is not possible to accurately determine the reuse or diversion potential of materials within such broad categories, it is clear that in many cases these are not complex materials and are present in large enough quantities that if even 20 per cent were divertable, a reasonable business case can be made to support an exchange initiative.

Table 3. Waste Composition by Key Business Sector With the GTA*

	Manufacturing - Other	Business Services	Retail - Other	Wholesale - Durable Goods	Trucking & Warehousing
Paper	28.5	40.9	39.9	33.3	34.9
Glass	2.3	3.1	2.4	2.4	2.8
Metal	6.4	7.3	7.7	9.9	12.4
Plastic	17.5	11	10	15.3	6.4
Organic	17.6	31.1	30.6	23.6	12.2
C&D	17.9	3.9	6.4	13.1	23.7
HHW	0	0.7	0.3	0.1	0.9
Special Waste	8.2	1	2	1.2	6.5
Mixed Residue	1.6	1	0.7	1.1	0.3
TOTAL	100%	100%	100%	100%	100%

*Note that where sectors are represented by multiple SIC codes, the most general group has been selected to represent the sector.

1. <http://www.calrecycle.ca.gov/Wastechar/BizGrpCp.asp>

Value Added Products and Services

While the mainstay of exchange services is based on the actual transfer of large volumes of industrial by-products and smaller volumes of off spec and stale-dated materials, exchanges and resource reutilization initiatives routinely offer a broad range of ancillary services. These value added services often generate significant revenue streams for the program and increase interest and participation amongst clients.

Services offered include: provision of conferences and workshops, regulatory and legal services, environmental consulting services, promotion of related government services, resource kits and directories and more. These services can be offered for a variety of reasons but normally fall into three categories including: service provision as part of a funding agreement with the exchange's supporting agencies, profit generating potential, and promotion of sponsors and exchange services (i.e., essentially a loss leader or business development opportunity).

Almost all the exchanges had fully functional web sites through which they offered information or links to sponsor's sites. On-line and hard copy directories of related services and sponsors are an important deliverable of most exchanges. Many also offer resource kits related to waste management. Almost one third offered topical workshops and conferences specific to their customer's environmental needs. A select few offered specialized services such as regulatory advice or direct waste and environmental auditing services. Several respondents emphasized the importance of building their web sites into information portals to encourage generators and end users to scan their listings or, at the very least, keep their service "top of mind".

In the United States, exchanges work closely with, and are funded by, government agencies and universities. As a consequence, many of the ancillary services that might be offered by an independent exchange are provided directly or in co-operation with these other groups.

Potential Value Added Products

A number of value added products and services offered under a waste exchange may be considered by PPG for inclusion in either membership fees or pay per service business models. Most exchanges offer basic listing services free of charge to encourage participation and additional premium services typically may include any of the following:

1. Preferred Material Matching Services.

This service consists of charging an added fee to have exchange staff assist listing members in actively finding suitable exchange partners. Although computerized database matching software has made significant progress in automating the ability of the exchange to match producers and takers of material, human agents that develop industry experience over time are still the best method of rapidly finding leads for the available waste as they can actively provide contact information to the waste producer or even contact potential takers directly. Exchange staff also routinely become familiar with local material brokers and could actively direct new listings to the brokers best suited to accept them.

2. Preferred Listing Priority.

This simple value added service consists of charging a fee for the listing to appear in a prominent search or notification area of the exchange. Typically, the graduated fee is applied to enable the new listing to appear at the top of the “available materials” page or in a separate side or pop up panel of the exchange. The greater the paid fee, the more prominent and/or longer lasting the new listing is positioned.

3. Standardized Material Management Information.

Some exchanges offer online reference guides/pages to members describing alternatives for disposal of common waste materials. An opportunity exists for a value added product that the exchange uses to offer basic information free with membership and increasingly more detailed information on a fee for service basis. These information packages may be offered online, printed or delivered in a seminar/workshop form.

4. Waste/Environmental Audits.

Another opportunity to provide value added services flows from the multi-stakeholder need for waste/environmental audits. There is currently a lack of information available to government and industry stakeholders on IC&I waste and recyclable generation. (*Williams and Shier, Environmental Lawyers LLP. SPECIAL REPORT - IC&I Waste Diversion February, 2008.*)

Some exchanges directly provide staff for audit services and some subcontract environmental consultants or arrange for business to business transactions. These services can generate

additional revenue for the exchange directly or on a fee for referral basis. Additionally, government agencies such as the MOE have an ongoing need for this type of information and may be willing to contract with the exchange to provide it at regular intervals.

5. Broker Services.

Some exchanges engage in direct brokerage of materials. Although this can be profitable, it does set up an obvious conflict of interest with local brokers and requires dedicated, knowledgeable staff and often warehouse/process facilities along with additional capital investment for inventory. Many exchanges consider it a better business option to work co-operatively with local brokers to provide them with leads for material on a finders' fee basis. Many exchanges consider it a better practice to avoid direct competition with local brokers in favour of co-operative activities.

Clearly, a large number of value added products and services can be deployed under an active waste exchange. This is an area that needs further development during the next steps or implementation phase of any new exchange.

Risks and Competition

The financial sustainability of exchange services remains problematic. Exchanges are unlike traditional businesses where research and development costs may be incurred at the start up of the business, but are paid off over time through repeated sales of associated product lines. By comparison, should an exchange find an alternative means of disposing of an unwanted resource or waste stream, the generator no longer needs the services of the exchange because the material has been diverted or they can continue to divert the waste stream to the identified outlet on their own.

Many of the active exchanges acknowledged having a base group of repeat clients that were important to the sustainability of their operations. However, they emphasized that the research involved in diverting their materials must begin again with each new material offered to the exchange. Efficiencies are gained over time by working with repeat customers and similar materials from different generators but not at the level required to gain profitability.

Additionally, several mentioned that the ability of an exchange to cover their upfront research to identify a 'home' for a material and transact a deal would be limited by the need to remain cost competitive with local disposal options. Consequently, most exchanges tend to gravitate towards identifying and working with materials they know they can divert to ongoing end users (e.g., waste solvent to a reclaimer). However, this action forces them to compete with traditional material brokers in a market with limited margins. It also runs contrary, in many cases, to their mandate to service all industry sectors and generators equally. If subsidized by government agencies, they can also be perceived as unfair and unwanted competition when competing with

brokers for more valuable materials. Therefore, many exchanges felt they were often the option of last resort for atypical and difficult to divert materials.

A more recent phenomenon has been the proliferation of residential or general public oriented web sites offering opportunities to buy and sell household materials. Notable examples include eBay, Craig's List and Kijiji. Several of the North American exchanges contacted noted the negative impact these sites have had on listings from small businesses seeking to move materials that hold some residual value (e.g., used equipment). Users with materials that require further processing, complex handling or large volumes tend to prefer industry-oriented exchanges and resource reutilization initiatives.

Several interviewees also cited the need to be cognizant of the regulatory and legal environment associated with waste management. As a general rule, none of the exchanges reported ever taking legal possession of a material. Several also emphasized the need to avoid representing material quality, physical and chemical properties or other details about a material to avoid the risk of regulatory or legal action after a transaction has been made. These challenges were of particular relevance for operators of active exchanges where the parties involved in shipping and receiving the material often rely heavily on the exchange to facilitate the transaction. Standard disclaimer forms and staff training were identified as important and necessary means of mitigating this risk.

To minimize risk and unnecessary use of staff resources almost all of the 'not for profit' exchanges excluded themselves from the storage, logistics and/or transportation of materials being exchanged. Brokers, by comparison, routinely organize this activity themselves as a customer service and, presumably, to protect their position as middlemen in the transaction.

Approaches to Funding and Marketing

As discussed above, it is rare to find full service exchanges operating in a financially sustainable manner based solely on the revenues from transactions. Almost all the exchanges contacted as part of this study receive some level of government funding. Notable exceptions include the brokerage services. For these companies, the cost to post their listings of wanted or available materials to their existing web sites is virtually negligible and a logical extension of their existing business promotion efforts.

Brokers tended to have very focused areas of expertise and operate in much larger catchment areas. They acknowledged being very selective in deciding which materials they would try to divert – generally restricting their efforts to larger quantities of materials with recognized value. A prime example would be the existing network of scrap plastics brokers who move post industrial and blue box plastics worldwide. Many also fund their virtual sites through provision of sponsorship opportunities and in some instances claim to generate significant revenue in this manner, some even offering franchise opportunities.

Although due diligence reviews of private exchange operators financial records was outside the scope of this project, it is reasonable to assume revenues generated from internet traffic is really more applicable to residential or general consumer oriented web sites and exchange services such as Craig's List.

Sponsorship opportunities, however, are a very real and viable means of generating revenue to the extent that an exchange can demonstrate, and is willing, to promote sponsor's services to their existing and prospective clients. One operator indicated that advertising opportunities for exchange sponsors could generate sufficient revenue to cover up to 10% of an exchange's annual operations. Sponsorship can come in the form of significant financial and in-kind contributions from like minded government agencies, important customers, founding clients and industry service providers. Contracting with municipal and senior levels of governments to deliver outreach programs on their behalf is also common practice among many of the exchange services and initiatives contacted through this study. In particular, it is often part of a combined grant and service delivery agreement used to fund exchanges in the United States.

Over the years exchange operators have looked at various models to generate revenue from exchange transactions. These include charging commissions and transaction fees to generators and/or end users and charging membership fees to belong to an exchange. While most would suggest that all of these approaches have some degree of potential, those that have tried reported the optics challenging and the system difficult to administer. Government funded exchanges, for instance, reported that their clients have an expectation that their service is delivered free of charge.

In most cases, exchanges have difficulty simply trying to get generators to report when a successful exchange has taken place on a listed material. They reported increasing reluctance amongst generators to admit to a successful transaction when a fee was associated with the exchange's services. Similar problems arose when trying to levy fees against consumers of the listed materials including potential legal issues around representation of the material to the 'buyer'. Many operators felt that fees created one more barrier to participation in the minds of prospective clients. Therefore, few if any charge fees, viewing them as administratively unworkable and incapable of generating sufficient return for the effort involved.

Brokers, again, represent a slightly different approach to this issue. By purchasing and selling the material outright, they have a very effective means of building their required margin into the transaction price. Furthermore, by only targeting preferred material streams (i.e., large volumes of high value materials) they can ensure the profitability of their operations. Underlying this issue, therefore, is a decision about whether an exchange service exists to service a community or to generate a profit. It is unlikely, based on the examples, reviewed as part of this study that a compromise position is practical. Given TCRA's non-profit status, direct competition with the private sector in this area is unlikely to be the preferred business model.

Many government funded exchanges, however, routinely subsidize their operations through the delivery of ancillary services as previously discussed. Provision of service directories, workshops, resource kits, consulting services and facility audits can generate significant

proportions of an exchange's annual operating budget (i.e., in excess of 30%). Exchange staff reported, however, that these services are time consuming to develop and administer and to be mindful that they consume resources that would otherwise be directed to facilitating audits.

Sales of customer contact databases are also a potential source of revenue. Some operators expressed concern with client confidentiality and the optics of their customers receiving 'junk mail' as a result of contact with their exchanges.

There is no clearly superior funding method for a typical exchange. Funding can come from any combination of government, charitable, sponsorship, memberships, fee per listing or fee per transaction. It was clear from discussions with interviewees that government grants remain the mainstay source of operating and start up capital for the majority of exchanges interviewed for this study and it is realistic to expect that subsidization of services is necessary if an exchange is to be more than a simple passive listing service.

Organization Structure

An 'active' outreach strategy involving personal contact and relationships between the exchange staff and potential clients is essential for a materials exchange to succeed. In cases where the exchange relied entirely on a website alone, or responsibility for the exchange is added to an individual's existing responsibilities, the exchange did not prosper. Many of the exchanges reviewed leverage relationships with sponsors and partner programs to promote their services and solicit listings.

This finding leads to the conclusion that staff for daily operations is an essential part of the organizational structure. The Calgary materials exchange concluded that a second FTE became essential after 60 users were regularly trading on the exchange. Therefore, it is recommended that a full time manager be hired at the outset followed by a second FTE when 60-100 users are listing on the service.

No clear overall governance structure has resolved from the research. A template that has repeated in several instances is to establish a board of directors with the exchange manager reporting directly to them on a regular basis. The board of directors may also be charged with fund raising and sponsorship duties in addition to high level promotion, public relations and policy review.

A steering or technical committee composed of the board of directors plus sponsors and other stakeholders seems to be desirable from the outset to provide direction and overall policy for the exchange.

An alternative organizational structure that may be possible in this case is a Public/Private Partnership (PPP) with a local governmental organization. The Region of Peel and City of Toronto immediately come to mind as candidates. Any of these entities could be approached under a PPP to act as a "host" for the exchange. Either could provide some or all of the staff,

equipment and overhead necessary to operate the exchange day to day. PPG might act as a facilitator, governance body and possibly host/marketing lead for the exchange while other sponsors might contribute to the operational support of the exchange either in kind or via direct funding. This operational structure has the potential to reduce overall costs and administration by tapping in to an existing long term municipal waste management administration structure.

Start-up and Operating Costs/Staffing

“Existing organizations suggested that a minimum of two years of funding be secured to start an active materials exchange. It takes at least one year for the Program Coordinator to obtain significant business buy-in, create promotional materials, set-up the database and develop the website.

Government and industry sponsorship are both sources for materials exchange funding. Additionally, for non-profit organizations there are numerous opportunities available throughout Canada to assist with labour costs or in-kind donations for environmental programs. For example, Environment Canada’s EcoAction website (www.ec.gc.ca/ecoaction/before_e.html), has tools and resources that can assist with program planning. It also has the Green Source Funding Database (2003) that can aid with financial support. Internet searches can also be used to identify suitable funding sources.

User fees are another way to assist with expenses once the program is operational. In 2005, the Calgary Materials Exchange started to encourage users to purchase a \$100 CDN annual membership. The Massachusetts Materials Exchange requests participants to contribute a portion of the savings resulting from any exchanges. Meanwhile, New York Wa\$te Match accepts donations.” (Calgary Materials Exchange (CMEX) Guidance Document Feb. 7, 2006)

Most operators contacted as part of this study were unsure of their start up costs and in many cases, their ongoing operating costs, as they were often blended into other operations not directly associated with the exchange. Like most ‘virtual’ businesses, however, modern exchanges require minimal capital investment beyond standard office equipment including office furniture, computers and printers. Many exchanges operate out of local government or sponsor’s offices as an “in-kind contribution” thereby eliminating this fixed overhead cost. Consideration can be given to company vehicles after the first year of operations and mileage costs for staff can be accessed accurately.

Operational costs consist of salaries, website hosting/software, office space and utilities, program outreach and promotion. One exchange can spend tens of thousands of dollars printing and mailing catalogues to businesses multiple times per year while another spends less than two hundred dollars per month to host their website. Typical exchanges that use one-off software can involve database and website upgrades and modifications that can easily cost over twenty thousand dollars.

Exchanges examined as part of this study varied considerably in size ranging from one part time or full time equivalent (FTE) to several staff. Government based passive exchanges typically maintained a web site presence with only part of an FTE allocated to site maintenance and inquiry support. Typically, all operating costs associated with maintenance of the web site and this FTE were distributed through other program budgets. Active exchanges normally operated with at least one FTE allocated to promotion and maintenance of the service. Support for this position (e.g., facilities) and the service (e.g., IT support) was frequently provided by other departments. In many cases promotion of the exchange service was provided by staff from other programs such as university and government branches responsible for providing general or environmental outreach services to the businesses on behalf of the local or state governments. Many exchanges and related services also subsidized their work force with co-op. and summer students to assist with internal administrative duties and consulting projects.

Most operators felt a stand-alone exchange could be effectively maintained with a two person operation accompanied by a part time administrative support person. The Calgary exchange identified that the need for an assistant was triggered early on when their participation level reached 60 clients. Irrespective of the size of operation, the single most commonly raised issue amongst operators was the need for several years (i.e., 3 to 5 years) of stable funding for the proposed start up of an exchange. Operators indicated that it was difficult to retain qualified personnel without the ability to offer several years of guaranteed employment. In the absence of this stability staff was often distracted with the perceived need to be looking for another job and the executive director of the exchange was often spending the majority of their time soliciting new funding sources.

Financial plan

All materials exchanges contacted stated the importance of having secure and continuous funding.

There is no clearly superior funding method for a typical exchange. Funding can come from any combination of government, charitable, sponsorship, memberships, fee per listing or fee per transaction. It was, however, clear that the majority of programs are supported to some extent by long-term government contributions. Therefore, it is recommended that the MOE, Region of Peel and City of Toronto be approached to contribute/sponsor exchange activities.

Many exchanges are funded as part of a larger organization or municipal operation. As such, there may be an opportunity to discuss the possibility of Peel and/or Toronto providing the staff and overhead required to operate the exchange with PPG acting as a host for the project from a marketing standpoint and operations coordinator with municipal staff to offset some/all of the costs.

Similarly, there may be an opportunity to revive the existing Ontario Waste Exchange with new software and sufficient staff to build on any existing goodwill and brand name remaining with that organization.

Partnering with business organizations such as the Better Business Bureau, Chamber of Commerce, Toronto Board of Trade and CME etc. may also provide a component of a stable financial plan. It is recommended that these avenues be explored as part of the initial and ongoing funding strategy.

It is recommended that a minimum of 3 years operating funding be secured prior to opening the exchange. This is generally considered adequate time to establish the exchange, hire staff, implement advertising and outreach programs and build a user/listing base. The suggested budget for these activities appears in the Appendix 1, below.

Business advertising listings/information in exchange linked directories can be sold as a value added service for exchange members which may result in the generation of some additional exchange operating revenue.

Sponsorships for the exchange can be solicited from larger businesses, government and environmental groups.

Once the exchange has been operating long enough to gain momentum, low cost membership fees can be explored as a means of generating revenue. Individual transaction fees are not recommended as they are administratively costly and tend to operate as an impediment to active listing. Collection of transaction fees may be challenging and arguments of exchange liability can be made for failed transactions if the exchange is deemed an agent.

The recommendation is that the exchange be funded as a pilot project for 5 years based on an 18 month start up phase, an 18 month growth phase and up to a 24 month operating phase. Following that period, the exchange should be reassessed both operationally and financially.

Performance Indicators/Measuring Success

Very few of the operators contacted during this study were employed by the exchange at its outset. Those that were, emphasized the need to recognize that the first year of the exchange will be spent developing working relations with clients and potential outlets for materials and limited diversion will occur during this period (*Calgary Materials Exchange (CMEX) Guidance Document Feb. 7, 2006*). This caution aside, a number of useful metrics, designed to meet the needs of various sponsors and stakeholders, have been developed to measure the performance of waste exchanges.

It is significant to note that a direct comparison of cost per tonne to operate waste exchanges is difficult to make. Many exchanges use number of trades or listings as a performance metric and

not cost per tonne. Additionally, some materials exchanged are not measured by weight, such as liquids, gasses, thermal units and volumetric materials, like wood waste, usually tracked by cubic meters. One-off materials like used packaging or shipping materials, e.g. foam peanuts, are not usually tracked by weight.

Many exchanges are funded as part of a larger organization or municipal operation. As such, their staffing, advertising and overhead costs are not directly tracked or related to a cost per tonne. Many exchanges do use performance based metrics other than cost per tonne. Specifically, number of listings, number of contacts/calls, number of successful trades or number of members are all common performance measures that are not directly related to cost per tonne.

The following metrics appear to be valuable to many existing exchange operators to gauge exchange performance and provide marketing information:

- Listings Posted by Create Date
- Listings Posted by Category and Create Date
- Current Listings by Category and Create Date
- Successful Listings
- Confirmed Weight of Diverted Material
- Avoided Disposal Costs
- Emissions Reduced
- Domain Web Statistics
- Members by Registration Date
- Member Referrals by Registration Date
- Members by Postal Code
- Members subscribed to Alerts

Some exchange operating software has the above operating metrics built in as part of the IT package.

It is recommended to track exchange operations based on weight were possible, plus the above list of metrics when weight based tracking is not available/practical. Metrics will need to be tailored to the reporting requirements of the governing board and the funding partners.

Software/Operating System

Automation and web site presence were amongst the two most critical opportunities for efficiency gains identified by study participants. It is significant to note that none of the viable waste exchanges contacted currently operate without an internet presence and some form of operating software. Although it is an option to operate without dedicated software and an internet presence, it is not likely a viable alternative to do so and it is not recommended.

Four basic software options are noted as possibilities for operating a viable waste exchange. These options will be explored in more detail below:

1. One-Off

Several exchanges have developed their own software and tracking solutions from database and spreadsheet packages. Terranova (Case Study 1) uses a database software solution developed in house. They are willing to sell this solution at a one-off cost of NZ \$10,000. (equating to CDN \$7,296 at today's exchange rate). Due to the distance to New Zealand and the international time differences, training and support for this type of software solution may be a limiting factor with this and similar one-off software solutions. This is a significant limitation and therefore this solution is not recommended.

2. Pay Per Use

The Tradeboss exchange (Case Study 2 of the preliminary report) provides exchange listing services which incur charges based on level of service. Members must buy credits and pay as they go. The advantage of this software solution is that it requires no local administration and businesses can use the service immediately. One disadvantage is that there is no local advertising component, no active business contact and no local statistics for the target exchange area and no local control. This solution might be useful as a supplementary system for PPG exchange users if they wish to have additional exposure/markets for their materials. This system already exists and users can participate immediately, however, promoting this system may tend to move users away from any local system set up later. Additionally, this type of system shows listings that can be too distant from generators and receivers to be of any real use which may cause it to discourage repeated use, therefore, using this system is not recommended.

3. Proprietary/Custom

This type of software solution is developed by an IT supplier like Recyclenet and Ecoville. Case studies 14 and 20 of the preliminary report were included to provide examples of alternative systems. Modifications to this type of software to accommodate growth, functionality or ease of use can prove costly. Stability and future support may be questionable as the number of customers using similar exchange software may be too limited to sustain the supplier. Therefore, this type of software solution is not recommended.

4. Modular

Modular type exchange websites have a similar format and operating characteristics. They are relatively low cost because of their modular (production line) business model and can include sections for: Online material (waste) exchanges, directories for reuse/recycling businesses and non-profit organizations, events listings, sponsors and recycling links. Business listings in these linked directories can be sold as a value added service for exchange members and additional exchange operating revenue can be generated.

IwasteNot Systems has emerged as one of the dominant modular waste exchange software suppliers in North America, (Case Study 26 of the preliminary report) was included to provide the reader with an overview of this system. Calgary (Case study 4), Vermont (Case study 7) and SWIX (Case study 10) use this product. About 70 other exchanges in North America also use this software.

The software can report on the weight, waste diversion savings, greenhouse gas reduction and potential carbon credits produced by the materials exchanged.

The exchange can be linked easily to other operating exchanges and/or a Provincial/National exchange/recycling map based portal similar to the Recycling Council of British Columbia, (Case study 6).

A budget of between CDN \$7,000 to \$10,000 would be required to acquire this type of exchange software, set up, training and one year subscription for up to 1,250 members. This software requires annual subscription fees of about \$4.00 per member annually. The supplier hosts the exchange and provides all IT management. A local administrator provides the local news content, advisories and notifications, approves exchange listings, member management and promotion. The local administrator can also provide active exchange matching if desired. This software has a full statistics package built in and available to the local administrator on demand.

For all of the above reasons, this type of exchange operating software is recommended to provide the optimum features and value with the required stability for long term use.

Conclusions

The following section identifies conditions that, based on the completed research, were identified as critical to the success of a materials exchange and provides guidance in determining if those conditions exist within GTAA where applicable.

Critical Factors for a Successful Exchange Program

Catchment Area

Most of the exchanges examined serviced geographical areas significantly larger than the Pearson Eco-Business Zone. The successful experiences of the industrial parks examined as part of this study plus discussions with several long time exchange operators, however, suggests that a waste exchange can successfully operate with this concentrated pocket of businesses. In most instances, existing exchanges were mandated to service entire states but did not find this situation to actually be beneficial. In fact, many suggested that the ideal catchment area should have a high concentration and variety of manufacturers, import/exporters, packagers and distributors from different industry sectors. The Pearson Eco-Business Zone with its 12,500 local businesses fits this description very well.

Target Markets

Few, if any, true exchanges are material or industry sector specific in their approach to marketing their services. The exception to this observation was the web based brokerage services which almost always specialized in select waste streams (e.g., scrap metals or plastics). In most instances, exchange operators suggested that the ideal market contain a mix of large and small manufacturers, packagers and distributors of goods. This mix of businesses facilitates a natural flow of available resources from the largest companies to the smallest and from those with particularly high product specifications to those with more flexible specifications.

A review of the Pearson Eco-Business Zone business directory/database reveals such a mix exists within the businesses area. Within the Pearson Eco-Business Zone boundaries, major sectors include; automotive supply chains, logistics and warehousing, food processing, plastics and aviation. This area is Canada's largest employment zone, home to 12,500 businesses and more than 355,000 employees.

Operating Model

Several operating models were identified in the course of completing the research phase of this project. These include passive and active exchange systems and profit vs. not-for-profit business models. It is clear from the research that passive exchanges are best suited to large audiences (i.e., millions of potential clients) or large geographical areas (i.e., national exchanges). An active exchange is likely best suited to a focused effort at diverting waste from the Pearson Eco-Business Zone.

While numerous exchanges are operated by 'for profit' businesses, none were found to be operating profitably as standalone businesses with the exception of web based brokerage services. Given the large number of brokers already operating out of the GTA, it is reasonable to assist businesses within the Pearson Eco-Business Zone to divert materials that are not readily suitable to a brokerage service. Based on the case studies reviewed as part of this service, it is recommended that this service would best be suited to a 'not-for-profit' operation.

Funding

If a 'not-for-profit' business model is considered, the most common concern raised by operators of such services was the need to ensure secure and continuous funding to ensure operational stability. Two to three years of stable funding is considered necessary for the successful start up of an exchange.

Several exchanges examined in the course of this study subsidize their operations through the delivery of conferences and workshops, web site sponsorship, in-kind contributions and other initiatives. Government funding is, however, likely going to be required to cover the bulk of the operating budget on an ongoing basis (i.e., 2/3 of the annual operating budget) if an active exchange is to be considered. Additional funding may be obtained through new and ongoing PPG value added initiatives such as:

- Sales of a marketing directory of brokers/haulers/end users
- Sponsorships of specific waste drives by a specific hauler
- Exchange site advertising
- Selling best practices/workshops on waste management
- Tiered service levels (e.g. charging for dedicated matching services, enhanced advertising or listing placement, waste audits, advisement etc.)

Marketing

Marketing approaches used by active exchanges continue to rely heavily on personal outreach by staff and supporting sponsors and/or related services. The advent of the internet has, however, made exchange web sites an essential component of the service delivery and promotional efforts.

Therefore, a strong web presence coupled with active outreach efforts is recommended as the major marketing component. Perhaps most importantly, the potential role of sponsors and supporting stakeholders in assisting with the promotion of the exchange was underscored by many operators as being key to their success.

Governance

Governance structure was not identified as a key factor in the operation of the various models of exchange services examined under this study. However, a board of directors representing stakeholders, sponsors and related associations coupled with a supporting technical committee would be an appropriate model for such an organization. Stakeholders and sponsors can bring much needed support and advice to the operation of the exchange at both levels.

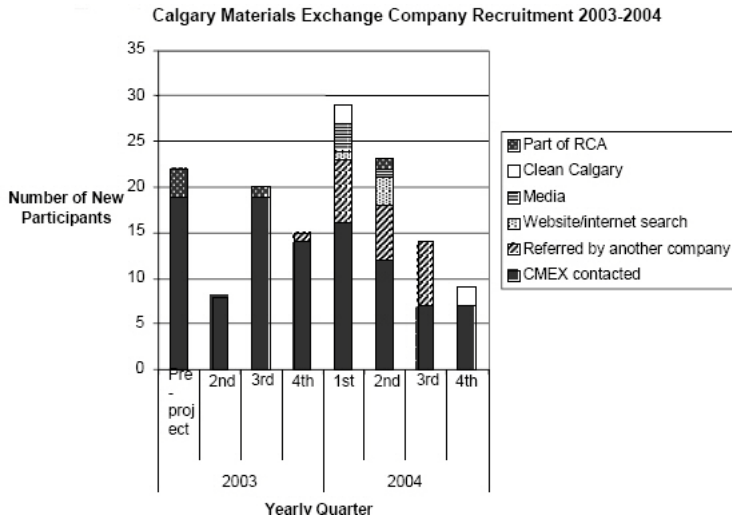
Outreach activities are critical to a successful active exchange, therefore, one possible organization model may be one or more outreach workers reporting to an exchange manager reporting to the Resource Reutilization Team acting as directors who ultimately report to the PPG Steering Committee.

Staffing

Discussions with long time exchange operators suggests that a staff of one full time exchange manager and one full time outreach worker with appropriate administrative support is sufficient to operate an exchange of the size contemplated. The number of outreach staff could be increased as warranted and as value added/chargeable services are developed over time.

Performance Expectations

While secure funding is required to launch and support the exchange, it is equally important to recognize that there will be an inherent lag in the initial performance of the exchange at the outset. Research completed by the Calgary Materials Exchange demonstrated that the first six months of operation were spent establishing the exchange and developing a network of contacts. Significant exchange activity did not occur until after this commissioning phase.



It is anticipated that the existing PPG business database would provide a significant advantage for outreach staff to target/recruit new members and they may be able to build the number of exchange users/transactions more quickly than has been the experience in other jurisdictions.

Impacts of Legislation

The Provincial Minister of the Environment has recently released a discussion paper aimed at encouraging business waste diversion in the Province. A strengthening of the government's position on the requirements for businesses to engage in 3R's practices coupled with proposed levies on disposal would certainly drive business towards a materials exchange service.

Moreover, the Province and local governments may be willing to contribute to the successful establishment of a waste exchange to aid local businesses in meeting any requirements of new legislation.

Lessons Learned

Lessons learned during the implementation and operation of material exchanges in other regions were identified during the preliminary research and telephone interviews. Many respondents provided suggestions and insights that may prove useful in developing an exchange program. The significant findings are listed below:

1. Provide adequate staffing with paid personnel.
2. Reach businesses through direct contact, based on proven social marketing techniques rather than 'passive' outreach strategies.
3. It is better not to be involved in every transaction provided the exchange is designed to facilitate contact between businesses.
4. Ensure users recognize that the materials exchange has no liability.

5. The exchange must clarify it does not assist with storage/transportation of any material.
6. If a materials exchange already exists locally, work together rather than competing for users and funding.
7. Balance the time spent obtaining sponsorship/funding with the actual amounts received.
8. Be pro-business and consider maintaining a business directory and/or business links on the website.
9. Introduce a strong professional website interface from the program outset.
10. Develop or purchase software with room for future expansion.
11. Website and listings must be easy/user friendly to build the user base.
12. Businesses appreciate receiving email notices when a material match is available; exchange staff also appreciate it as they are not required to do the search. If possible, the software should conduct a search and send email notification automatically.
13. Allocate significant time for data management, including data entry and analysis.
14. Ensure that listings are descriptive enough to avoid confusion between businesses/materials.
15. Establish appropriate monitoring and measurement of exchange operation. Businesses typically report unsuccessful listings but not successful exchanges.
16. Allow adequate time to educate businesses about the exchange.

In conclusion, the authors believe that the research supports the conclusion that conditions currently exist for an active, not-for-profit waste exchange in the Pearson Eco-Business Zone to be successful, provided adequate funding and staffing are supplied for a minimum of three to five years.

Appendices

Appendix 1. Recommended Budget

Item	18-Month Start Phase	18 Month Growth Phase	24 Month Run Phase	Total 5 yr.
Salary 2 FTE ³	\$200,000	\$200,000	\$267,000	\$667,000
Program Operations ⁴	\$11,000	\$9,000	\$12,000	\$32,000
Administration	\$11,000	\$9,000	\$12,000	\$32,000
Rent and Utilities ¹	\$36,000	\$36,000	\$48,000	\$120,000
Office Equipment ¹	\$13,000	\$5,000	\$5,000	\$23,000
Professional Development and Resources	N/A	\$5,000	\$5,000	\$10,000
Promotion Education and Resources ²	\$20,000	\$10,000	\$10,000	\$40,000
Website	\$10,000	\$7,000	\$10,000	\$27,000
Data Collection and Entry	\$5,000	\$5,000	\$5,000	\$15,000
Total	\$306,000	\$286,000	\$374,000	\$966,000

1. (It may be possible to obtain a donation in kind for this line item)
2. (This line item may be significantly reduced if promotion is done with in house staff)
3. (Some staff time may be composed of in kind donations or part time duties)
4. (Staff travel expenses may need to be increased if outreach involves significant travel)

The main difference between the start and run phase budget is attributed to salary increases. Changes include the addition of professional development in the growth and run phase and a decrease in website costs as the website was developed the first year and does not require a significant investment in later phases. Other differences include a 24-month time frame in the run phase versus 18 months for the other phases, as well as a general increase in budget costs to accommodate increased program activity.

Note: Some requirements and needs are not obvious at the beginning of the program, therefore including a contingency or surplus budget with room for additional services is advantageous.

Note: No adjustment is made for any revenue brought in for memberships, value added fees, advertising or sponsorship sales.

“Start-up Funding

Most materials exchanges are partially or wholly funded through municipal, provincial, county or state governments and may be complemented by non-profit administration. Occasionally, materials exchanges are funded through outside grants, website sponsorship, university affiliation or by a percentage of profits from exchanges. Environmental organizations or foundations also fund such initiatives depending on how the exchange fits their mandate and specified criteria. Where the program was conceived and who benefits determines what funding sources to pursue.

Many exchanges fail due to lack of funding at critical stages of development. Ideally, building a long-term strategic plan for ongoing funding from renewable sources is imperative. Achieving financial sustainability may be difficult for materials exchange initiatives, so government or external funding is necessary at the beginning. It is important to ensure that the exchange fits the funder's criteria when submitting proposals and that the funding agency has financial resources to give. The original objective, strategy and philosophy should not be compromised by trying to accommodate the funding agencies' vision. Rather, funders should be sought out that share similar mandates and goals."

Portions of this budget derived from (Calgary Materials Exchange (CMEX) Guidance Document Feb. 7, 2006)

Appendix 2. Related Legislation

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90a08_e.htmAggregate Resources Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90c27_e.htmConservation Authorities Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_94c25_e.htmCrown Forest Sustainability Act, 1994, S.O. 1994

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_07e06_e.htmEndangered Species Act , R.S.O. 2007

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90e18_e.htmEnvironmental Assessment Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90e19_e.htmEnvironmental Protection Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_97f41_e.htmFish and Wildlife Conservation Act, 1997(Formerly the Game and Fish Act)

[http://laws.justice.gc.ca/en/F-14/Fisheries Act \(Federal Legislation\)](http://laws.justice.gc.ca/en/F-14/Fisheries Act (Federal Legislation))

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_00t16_e.htmGasoline Handling Act (now the Technical Standards and Safety Act, 2000)

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90i03_e.htmLakes and Rivers Improvement Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90m14_e.htmMining Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90n02_e.htmNiagara Escarpment Planning and Development Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90p12_e.htmOil, Gas and Salt Resources Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o40_e.htm Ontario Water Resources Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90p11_e.htm Pesticides Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90p13_e.htm Planning Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/repealedstatutes/english/elaws_rep_statutes_90p34_e.htm Provincial Parks Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90p43_e.htm Public Lands Act, R.S.O. 1990

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_92w01_e.htm Waste Management Act, 1992, S.O. 1992

Appendix 3. Contact Information

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Phone: (651) 222-7678
Gabe Fidelman
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**Tennessee
Materials
Exchange** UT CIS – Knoxville, Tennessee
Institute for Public Service
105 Student Services Bldg.

55

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RENEW

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**IwasteNot
Systems Inc.**

Address: 1048 Thousand Islands Parkway
Mallorytown, ON. K0E 1R0, Canada
Norm Ruttan, President
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**RecycleNet
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SWIX

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Waste Diversion Ontario
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Ontario Waste Management Association
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Appendix 5. Preliminary Material Exchanges Researched

Case Study 1: Terranova Waste Exchanges

Web Site	http://www.terranova.org.nz/terranova/waste/
Governance	Independent chair and five directors.
Staffing	Part-time executive director plus two full-time staff and a 0.25 part-time.
Funding/Revenue	Local city or district councils for the area covered by the material exchange.
Business Model	Eight material exchanges that cover about two-thirds of the South Island, New Zealand. Terranova is a charitable trust. The Material Exchange is a free service and available to all businesses.
Time in Business	Over 5 years.
Impacting Legislation	There is not a policy requirement for material exchanges. There is a legislative (central government) requirement for all municipalities to have a waste management and waste minimization plan. Many of these plans include support for material exchanges.
Industries Served	All commercial and industrial.
Materials	All.
Stakeholders	Stakeholders are involved through appointment and contact with the trustees (directors) of the Charitable Trust. We meet with key stakeholders about once a year and with key municipal staff every few months.
Volume	Diverts about 4,500 m ³ of waste from landfill each year.
Performance Measurement	Volumes and tonnes of waste diverted each month, number of listings, exchanges and businesses contacted and a breakdown of how people heard about the material exchange and how they contacted us (e.g. phone, fax, email, Internet, or our staff visiting them). Over 90% of the materials listed are turned into successful exchanges.
Goals	The Terranova waste exchange services are part of the waste

minimization activities of local government. The goal is to divert waste from landfill.

Passive or Active Active: cold-calling approach direct to businesses. New listings are immediately checked against “wanted” listings.

Marketing A flyer on each new listing is sent to school and community groups in the area. No money changes hands.

The Waste Exchange service is marketed through direct cold-calling to businesses (on-site or via telephone calls), by mail-out of “recycling works” to 30,000 businesses as an insert in a business magazine and by local government waste officers. “Recycling works” is a twelve-page newspaper that has waste exchange success stories and listings of a selection of current available and wanted materials published twice a year.

Case Study 2: TradeBoss

Web Site	http://www.tradeboss.com
Governance	Privately controlled corporation. TradeHolding Ltd. is a registered EU (European Union) company.
Staffing	Unavailable.
Funding/Revenue	Registering a member account and using the basic services are free for one trade lead every day. Premium services incur charges based on level of service. Members must buy credits, pay as you go.
Business Model	B2B products listings website. not a pure waste exchange. Part of a rapidly growing International B2B Network: TradeHolding.com. 50+ worldwide partner sites targeting 232 countries.
Time in Business	Website registered 01 Nov 2003.
Impacting Legislation	Governed exclusively by the laws of Romania without recourse to any principles of conflict of laws.
Industries Served	All businesses served.
Materials	Any material. No warranties/liability assumed by the exchange.
Stakeholders	Feedback can be sent via email anytime from any associate website.
Volume	1,451,400+ responses to contact member companies.
Performance Measurement	Currently with 348,691 registered members, 181,100+ posted trade leads, 64,200+ products.
Goals	To help member companies find new business partners from all over the world and exchange trade offers in an online environment over the internet.
Passive or Active	Passive: never provide trade leads, internet based exchange.
Marketing	B2B service provider company and provide all our services online through our website. Trade leads can be available via email for a fee.

Case Study 3: Wastepro Australia

Web Site	www.wasteexchange.net.au
Governance	President, two Vice Presidents, 3 Full Members an Executive Officer, and any Co-opted Members from time to time.
Staffing	Six subcontracted consultants.
Funding/Revenue	Government funded and fully supported by South East Water, City West Water and Yarra Valley Water authorities.
Business Model	Free service offered through wastepro to encourage the reuse, recycling and energy recovery of all forms of waste. A Government and Waste management association partnership. The exchange database is a system to facilitate communication between generators of waste and potential recyclers. Joint venture between the EPA and the Victorian Waste Management Association (VWMA).
Time in Business	Since 2004.
Impacting Legislation	Victoria Environmental Protection Act in 1996. Municipal councils developing regional plans, EPA (Prescribed Waste) Regulations 1998,
Industries Served	All.
Materials	Waste or surplus chemicals, foundry sands, plastic.
Stakeholders	Feedback via email directly from the web page.
Volume	N/A
Performance Measurement	N/A
Goals	Through a team approach, give standard and common advice on all issues to ensure a balanced view on environmental concerns.
Passive or Active	Passive web based material matching service.
Marketing	Web based plus links from local consultants, EPA and municipal websites.

Case Study 4: Calgary Materials Exchange

Web Site	www.cmex.ca
Governance	Environmental charity, board of directors, volunteers and staff.
Staffing	1.5 for waste audits, 2 provide resources plus a supervisor. Active exchange plus staff physically go to companies.
Funding/Revenue	City of Calgary, corporate sponsors, memberships plus fees for waste audit services. Exchange costs estimated at \$60-75,000 CDN.
Business Model	CCA is a non profit charitable organization.
Time in Business	Clean Calgary since 1975, web site went live in 2003.
Impacting Legislation	None, everything is voluntary. Mandatory regs. would help.
Industries Served	All.
Materials	Cardboard, paper, wood, paint, plastic, organics, oils/petrochemicals textiles, rubber, office equipment, metal, construction waste, glass, electronics, minerals, pallets, office furniture, misc. materials, Excluding live animals, illegal goods, hazardous materials, new (unused) .
Stakeholders	Web page email and telephone. Initial focus group invited and asked for challenges and goals. Steering committee worked 18 months. Technical committee also formed. Steering committee still meets occasionally.
Volume	Tonnes Diverted: 10,819.72.
Performance Measurement	Number of Companies: 509, Exchanges: 5,235, members: 1,489 Tonnes diverted: 10,819.72, Total cost savings: \$754,701.54 CDN.
Goals	To minimize industrial waste and provide resource contact information.
Passive or Active	Active, including waste audits, referrals, ongoing performance measure.
Marketing	Cold calls, word of mouth. Some trade magazine, free press and public service announcements. Chamber of commerce etc.

Case Study 5: The Cariboo Regional District Waste Exchange

Web Site	www.cariboord.bc.ca/Services/SolidWasteManagement/Recycling/WasteExchange.aspx
Governance	The Cariboo Regional District board of Electoral Area Directors.
Staffing	N/A
Funding/Revenue	Contributions of supporters including the Cariboo Regional District, and British Columbia.
Business Model	Part of Recycling Council of British Columbia waste exchange Government/Charity partnership based exchange.
Time in Business	2-3 years for industrial exchange.
Impacting Legislation	No mandatory requirements. Some local bylaws, listings may have to be approved.
Industries Served	All
Materials	Anything reusable including chemicals. Exclusions: live animals, illegal goods, hazardous materials, new items.
Stakeholders	Local email, telephone contact. RCBC central telephone and email.
Volume	Expected to reduce waste generation within the CRD by 4 to 7 percent.
Performance Measurement	N/A
Goals	Reduce or eliminate disposal fees, find buyers for waste materials. Locate free or inexpensive materials and feedstocks;
Passive or Active	Active: RCBC (case study 6) live operator managed database of material exchanges with local municipal links and web pages.
Marketing	Local support for the program through the development and distribution of promotional materials to the IC&I sector. Staff has produced a brochure.

Case Study 6: Recycling Council of BC Materials Exchange

Web Site	http://www.rcbc.bc.ca/services/materials-exchange
Governance	Board of Directors multi-sectoral, non profit registered charity.
Staffing	Two full time staff.
Funding/Revenue	BC Ministry of Environment, corporate sponsors. Municipal funding from regional districts,
Business Model	Free online listing database helps users find alternative solutions to dispose of by-products or surplus resources. The BC IMEX has 16 material categories and over 30 subcategories.
Time in Business	Industrial exchange has operated for about 3 years.
Impacting Legislation	No mandatory requirements, some local bylaws. Listings may have to be approved.
Industries Served	All.
Materials	Any, including chemicals, with exclusions on; live animals, illegal goods, hazardous materials, new (unused) items.
Stakeholders	Monthly reports sent to funding sponsors. Meetings for input.
Volume	E.g. on Surry Reuses site, 20-40 new listings per day 4-5 successful transactions/day. Volume varies seasonally.
Performance Measurement	Amount diverted. Listings must include weight and follow-up questions when listing removed. Weight based performance measure.
Goals	Organization goal is zero waste. Reduce urban impact.
Passive or Active	Active: If listing is approved they will call to follow up.
Marketing	Municipal publications, some province wide advertising, web site, no radio or tv except public service announcements.

Case Study 7: Northeast Recycling Council - Vermont MEX

Web Site	www.nerc.org
Governance	Board of Directors, officers and executive committee.
Staffing	Executive director, assistant director, office manager, 2 program staff about 1 hr/day spent operating the exchange.
Funding/Revenue	EPA Office of Solid Waste and Emergency Response (OSWER) grant to conduct a pilot project to develop a web-based network of eight exchanges. 25k/yr. est. costs to operate VBMX.
Business Model	Not for profit, government partnership. Free web site portal. This one site allows users to easily search the available listings of any of the eight participant exchanges.
Time in Business	Established in 1993, supported by state government in New England.
Impacting Legislation	Vermont mandatory recycling regs. Some regs. over site set up. NERC bylaws http://www.nerc.org/documents/bylaws.html
Industries Served	All.
Materials	Any; excluding live animals, illegal goods, hazardous materials for disposal (reuse permitted), new (unused) items, trucks and cars.
Stakeholders	Existing members had to update accounts and input was made then. Grant fund staff involved with set up of VBMX. Direct contact via web page.
Volume	70 current listings. Advertising causes volume spikes.
Performance Measurement	Mostly weight based metrics plus dollar value moved, exchanges/month, tonnes diverted, number of members.
Goals	To promote source and toxicity reduction, recycling, and the purchasing of environmentally preferable products and services.
Passive or Active	Passive: operates like free classified ads.
Marketing	Word of mouth and active promotion at events, chambers of commerce, press releases, free ads in business periodicals. No direct promotion.

Case Study 8: Waste Matchers (UK)

Web Site	http://www.waste-matchers.co.uk/
Governance	Managed by Linden Consulting Partnership, an energy and environmental consultancy, in partnership with Groundwork Stoke-on-Trent and Staffordshire Business and Environment Network.
Staffing	N/A
Funding/Revenue	Originally funded through The British Oxygen Foundation and the Environment Agency and recently from Groundwork Stoke-on-Trent.
Business Model	Free service, web based.
Time in Business	Since 2005.
Impacting Legislation	Special waste requires Environment Agency notification before removal. License required to move a controlled waste.
Industries Served	All.
Materials	All including chemicals, food, organics, tires.
Stakeholders	Feedback from web site, direct email, local government.
Volume	There are 412,383 tonnes of material advertised on this site.
Performance Measurement	Tonnes advertised, total number of contacts made is 3,892.
Goals	To reduce the amount of waste landfilled by enabling businesses, organizations, schools, playgroups and individuals to reuse materials. Organizations are able to dispose of unwanted materials for little or no cost and others are able to obtain cheap or free raw materials.
Passive or Active	Passive.
Marketing	Local municipal links, public service announcements, Linden Consulting Partnership links.

Case Study 9: Arkansas Wood Waste & Materials

Web Site	http://www.adeg.state.ar.us/solwaste/default.htm
Governance	Managed by the Arkansas Department of Environmental Quality, Solid Waste Management Division, Market Development Branch.
Staffing	Less than one FTE.
Funding/Revenue	ADEQ funding through landfill disposal fees.
Business Model	Government service. Free web site portal. Passive exchange.
Time in Business	Established in 2006. In the process of being wound down and replace by the RENEW Program (Case Study 19) in 2009.
Impacting Legislation	None.
Industries Served	Any business, organization, school, non-profit group, or governmental unit, but not individuals may post listings.
Materials	ARMAX handles hazardous and non-hazardous IC&I wastes. The Arkansas Wood Waste Exchange handles wood and related byproducts.
Stakeholders	None.
Volume	Not tracked. >500 current listings of buyers and sellers across both exchanges.
Performance Measurement	Voluntary online survey. No regular tracking system.
Goals	Encourages the reuse, reduction, and recycling of waste materials entering community waste streams.
Passive or Active	Passive exchange.
Marketing	Relies primarily on word of mouth and promotion of the two exchanges by departmental staff at events and in the course of conducting outreach to the business community.

Case Study 10: FABR Residential Exchange

Web Site	www.biosphereexchange.com
Governance	Frontenac Arch Biosphere Board.
Staffing	One or more volunteers part-time.
Funding/Revenue	N/A
Business Model	Not for profit, government partnership. Licensed web site software from IWasteNot Systems (see Case Study 26).
Time in Business	FABR started both an industrial/C&D and residential waste exchange in summer of 2004. The industrial/C&D exchange failed within the year due to a lack of publicity and insufficient exchange volumes. The residential exchange continues at a “grass roots” level.
Impacting Legislation	None.
Industries Served	Residential waste exchange.
Materials	Residential materials.
Stakeholders	Local environmental groups of Thousand Islands-Frontenac Arch network and related provincial and federal ministries.
Volume	Negligible.
Performance Measurement	18 listings, 36 exchanges, 83 registered web site users.
Goals	Local diversion.
Passive or Active	Passive.
Marketing	Word of mouth.

Case Study 11: CalMax Materials Exchange

Web Site	www.ciwmb.ca.gov/CalMAX
Governance	California Integrated Waste Management Board.
Staffing	Four to five outreach staff with territorial responsibilities plus project lead support Cal Max part time.
Funding/Revenue	Free service funded by California EPA through the Board from landfill tip fees.
Business Model	State government service to local counties and businesses. CalMax serves as a hub providing server and software support to local exchanges and direct outreach service to local businesses.
Time in Business	Operating for over 10 years.
Impacting Legislation	SB 1016 Disposal Measurement System; Designation of Recycling Market Development Zones; Governor's Mandated Agency Closures.
Industries Served	Statewide IC&I community directly and through over 17 local counties and regions and 5 affiliated exchanges.
Materials	All IC&I hazardous and non-hazardous materials.
Stakeholders	Local counties and regions forming the CIWMB.
Volume	45 to 70 listings per week.
Performance Measurement	Web based system terminates listings automatically after one month and issues a survey soliciting an outcome based response. Monitor total number of listings.
Goals	Support for state promoted zero waste goal.
Passive or Active	Quasi active in that outreach staff endeavour to connect potential generators and users of material when possible.
Marketing	Promoted along with the Program's other IC&I services during site visits and at special events. Literature and other materials are available.

Case Study 12: Cdn Env. Reg & Compliance News

Web Site	www.canadianenvironmental.com/wasteexchange/app_master.cfm
Governance	Under control of editor and staff.
Staffing	Part time admin staff.
Funding/Revenue	Free service provided to draw potential subscribers.
Business Model	Passive web site service started in 2003 and terminated due to perceived liability.
Time in Business	Operated for 3 years.
Impacting Legislation	None.
Industries Served	Canadian IC&I sector.
Materials	Hazardous and non-hazardous IC&I wastes.
Stakeholders	None.
Volume	Unknown; over 1,500 listings in 3 years.
Performance Measurement	None.
Goals	To provide a value added service to existing and potential subscribers.
Passive or Active	Passive.
Marketing	Advertisements in associated magazines and web site.

Case Study 13: Integrated Waste Exchange

Web Site	http://www.capetown.gov.za/en/iwex/Pages/default.aspx
Governance	Managed by City of Cape Town Solid Waste Management Dept.
Staffing	Web site operated by one FTE as part of other duties.
Funding/Revenue	Web site operations funded by the Dept.
Business Model	Free passive exchange service.
Time in Business	Established in 2006 as part of integrated waste management policy.
Impacting Legislation	S. 24 & Sch. 5B of the Constitution of South Africa (Act 108 of 1996); National Waste Management Strategy; City Integrated Waste Management Policy.
Industries Served	City industrial sector.
Materials	Non-hazardous industrial waste.
Stakeholders	Local business council.
Volume	Unknown. Over 100 materials listed.
Performance Measurement	Track listings and exchanges where possible.
Goals	Diversion from remaining 3 city landfills.
Passive or Active	Passive.
Marketing	Promotion on web site and general information distributed to businesses and through presentations at schools and events.

Case Study 14: Lancaster County SWA Waste Exchange

Web Site	http://www.myecoville.com/us/pa/lancaster-county/about-us/information-request-form
Governance	Lancaster County Solid Waste Authority staff.
Staffing	Periodic involvement of one staff person to maintain web site.
Funding/Revenue	Free web portal.
Business Model	Free web service disposal/recycling directory provided by the County.
Time in Business	Since 2008.
Impacting Legislation	None.
Industries Served	IC&I and residential.
Materials	Hazardous and non-hazardous IC&I and residential wastes.
Stakeholders	Local communities.
Volume	Negligible. Still under development.
Performance Measurement	None.
Goals	Waste diversion from County landfills.
Passive or Active	Passive.
Marketing	Lancaster has purchased and is using a novel web site portal called “Ecoville” which has clients in Canada and the USA. This standardized portal allows communities to geographically and pictorially present their services to residents. They are in the process of building a passive exchange into this portal.

Case Study 15: The Free Market

Web Site	www.twincitiesfreemarket.org
Governance	NGO staff receive are responsible for day to day operations and report periodically to the organization's board.
Staffing	Web site managed by one FTE with co-op student(s) responding to inquiries.
Funding/Revenue	Free service funded by contract with City and though county and state grants or other project work.
Business Model	Free service provided by Eureka Recycling, a local not for profit in St Paul's MN.
Time in Business	Initiated in 1997.
Impacting Legislation	None.
Industries Served	Targets local residential waste stream.
Materials	Residential reusable goods.
Stakeholders	Twin City councils.
Volume	5,500 tons since its inception, 78,000 exchanges and over 150,000 users.
Performance Measurement	Monitor number of listings, registered users and exchanges through follow up phone calls.
Goals	Diversion of non-hazardous residential materials from landfill. Promotion of reuse before recycling.
Passive or Active	Quasi-active in that staff make an effort to monitor the exchange and assist diversion of materials to appropriate outlets.
Marketing	Word of mouth and through NGO contacts.

Case Study 16: Ontario Waste Materials Exchange

Web Site	http://www.owe.org
Governance	Operated by Ontario Centre for Environmental Technology Advancement is a private sector not-for-profit federally incorporated company.
Staffing	Minimal staff support to maintain web site.
Funding/Revenue	Partially supported by Environment Canada and Toronto Economic Development, Volunteer Action Ontario, Shell Environmental Fund and other initiatives.
Business Model	Staff reduction three years ago resulted in exchange currently maintained as a passive presence on the net.
Time in Business	Began operations in the mid 1980's with operational responsibility transferred in December, 1997 to OCETA.
Impacting Legislation	None.
Industries Served	Provincial IC&I sectors.
Materials	Hazardous and non-hazardous materials.
Stakeholders	Stakeholders include local municipalities, provincial and federal governments and others.
Volume	Currently not active.
Performance Measurement	N/A
Goals	To promote the reuse or recycling of industrial wastes.
Passive or Active	Passive.
Marketing	Web based.

Case Study 17: Eastex National Materials Exchange

Web Site	www.eastex.org.uk
Governance	Regional managers and local municipalities.
Staffing	Four regional managers part time plus part time local managers.
Funding/Revenue	East of England Regional Assembly, the Environment Agency and the local authorities of the East of England (who also contribute in-kind support to their local exchanges) and corporate sponsorship offered by Mott MacDonald and May Gurney.
Business Model	Free online information service. Comprises eleven localized exchanges, based in east England.
Time in Business	Started in 2004.
Impacting Legislation	http://www.eastex.org.uk/norfolk/information.asp Duty of Care, Controlled Wastes, Licensing, Carriers.
Industries Served	All.
Materials	Almost anything.
Stakeholders	A representative round-table team from across the East of England was convened for the purpose of developing the exchange.
Volume	Covering a population of more than 10 million people.
Performance Measurement	N/A
Goals	Landfill preservation, Reduce, Reuse, Recycle.
Passive or Active	Passive.
Marketing	Links to local municipalities. Eastex will share the technology freely with any public organization wishing to provide a similar service.

Case Study 18: Tennessee Materials Exchange

Web Site	www.cis.tennessee.edu/environmental/recycle/TME.shtml
Governance	Advisory Council of Centre for Industrial Services, U of T.
Staffing	Operated part-time by one FTE with grad students.
Funding/Revenue	State landfill taxes and contract work.
Business Model	Automated web site and recycling directory. One of several free extension services provided by the centre to businesses in the state through the university.
Time in Business	Operating since mid 1990s.
Impacting Legislation	None.
Industries Served	IC&I businesses state-wide, emphasis on industrial manufacturing sector.
Materials	IC&I hazardous and non-hazardous wastes.
Stakeholders	Local manufacturing community, Chamber of Commerce and government organizations. Broad range of affiliated organizations and networks.
Volume	The Centre averages about 6,500 clients annually. Average 600-700 listings at any time and 3-4 new listings per week.
Performance Measurement	Conservatively estimates \$350,000US in savings to date. Actively tracks exchange outcomes.
Goals	Diversion from landfill and improving the economic competitiveness of state businesses on a national and global basis. The Centre sets focus and performance goals annually.
Passive or Active	Active exchange including research contract work to develop outlets for key manufacturing wastes in the state such as wood waste.
Marketing	Standard website presence, flyers, monthly newsletter and delivery of presentations by outreach staff.

Case Study 19: RENEW

Web Site	http://www.zerowastenetwork.org/renewdev/
Governance	Operated by EPA Region six staff with tech assistance from Zero Waste Network, Texas.
Staffing	Operated by one FTE until 2004. Reduced to ½ FTE after automation to provide tech support and assistance with report writing to member exchanges. Member exchanges will have additional staffing requirements.
Funding/Revenue	Free service funded by state landfill taxes specifically through an EPA Pollution Prevention Information Network (PPIN) grant.
Business Model	Regional, web based exchange service provided by EPA Region 6 to support Arkansas, New Mexico, Louisiana and Texas waste exchanges. EPA operates the web service. Member exchanges handle client interface.
Time in Business	Renew was established in 1987 to service Texas. Expanded in 2007 by Zero Waste Network to service EPA Region 6.
Impacting Legislation	Formally established by the Texas Legislature to promote the reuse or recycling of industrial wastes.
Industries Served	Member state IC&I communities.
Materials	Hazardous and non-hazardous materials.
Stakeholders	Partners include Texas Commission for Env. Quality, Arkansas and Oklahoma DEQ, Oklahoma Recycling Association, Southwest Network for Zero Waste.
Volume	Over 1,000 tons diverted with over \$3 million USD in avoided disposal costs and revenues from sales of materials.
Performance Measurement	Member exchanges must complete annual reports tracking number of listings, exchanges and value amongst other information.
Goals	To promote the reuse or recycling of industrial wastes.
Passive or Active	Primarily passive. Some member exchanges and partners provide outreach services to local businesses and/or facilitate exchanges.

Marketing Renew partners aid in promotion through outreach staff, presentations to industry groups and advertisement in trade magazines.

Case Study 20: RecycleNet Corporation

Web Site www.recyclexchange.com/

Governance Private corporation with formal board.

Staffing Proprietary information.

Funding/Revenue Sales from leads generated from web sites and exchanges.

Business Model RecycleNet is a proprietary trading system consisting of over 60 web sites.

Time in Business Launched May 1 1995. Owners previously operated The Recyclers Exchange for 17 years.

Impacting Legislation None.

Industries Served Primarily IC&I scrap recyclers on a global basis.

Materials RecycleNet’s customers operate exchange services for hazardous and non-hazardous industrial waste.

Stakeholders N/A

Volume Claim to manage over 2 million “hits” or inquiries per month.

Performance Measurement Web site hits.

Goals Provision of a proprietary trading system for secondary commodities.

Passive or Active N/A

Marketing Web based.

Case Study 21: Dalhousie/Burnside Eco-Industrial Park

Web Site	http://eco-efficiency.management.dal.ca/index.php
Governance	Dalhousie University's Eco-Efficiency Centre is a non-profit environmental management centre supporting small- and medium-sized enterprises in Nova Scotia and reports to the college's senate.
Staffing	6 FTE's, 2-3 coop students and admin support from the university.
Funding/Revenue	Initial 3 year budget of \$180,000/yr CDN supported by private corporations, governments and foundations such as Nova Scotia Power.
Business Model	Joint initiative between the School for Resource and Environmental Studies at Dalhousie University and Nova Scotia Power Incorporated.
Time in Business	Launched in 1998.
Impacting Legislation	None identified.
Industries Served	The Centre was launched to provide a variety of services, acting primarily as an information resource, for small- and medium-sized enterprises (SMEs) in Dartmouth's Burnside Industrial Park and Atlantic provinces.
Materials	No formal waste exchange program. Centre staff conducts site visits to identify opportunities to reduce costs, minimize waste and improve resource efficiency and assist with carbon footprinting.
Stakeholders	Atlantic Canada Opportunities Agency, Nova Scotia Power, RRFB, Nova Scotia Environment, Natural Resources Canada, Dalhousie University.
Volume	N/A
Performance Measurement	N/A
Goals	To be the catalyst that makes Atlantic Canada the global benchmark of sustainable prosperity through life cycle thinking, innovation and product stewardship.
Passive or Active	N/A

Marketing Actively marketed through web site, conferences and other events held by the Centre.

Case Study 22: Kalundborg Symbiosis (Denmark)

Web Site	http://en.symbiosis.dk
Governance	Co-operation between six processing companies and Kalundborg.
Staffing	N/A, as required.
Funding/Revenue	One company's by-product becomes an important resource to one or several of the other companies. The collaborating partners also benefit financially from the co-operation because the individual agreement within the Symbiosis is based on commercial principles.
Business Model	The Industrial Symbiosis of Kalundborg is a network co-operation between six processing companies, one waste handling company and the Municipality of Kalundborg.
Time in Business	The co-operation has developed over 30 years and today comprises some 20 projects. All projects are environmentally and financially sustainable.
Impacting Legislation	None noted.
Industries Served	Six local manufacturing industries.
Materials	Industries exchange solid waste, organics, waste water, energy from waste, heat, steam, biomass, gypsum, plasterboard and other materials.
Stakeholders	Direct input. 25 bilateral, commercial agreements are in force in which water, energy, by-products and waste is exchanged.
Volume Performance Measurement	Annually: 130,000 tonnes of combustible waste, 220,000 cubic meters of water, 4,500 households in Kalundborg receive district heat from Asnæs Power Station, ammoniumthiosulphate, which is used in the production of approx. 20,000 tonnes of liquid fertilizer roughly corresponding to the annual Danish consumption, 150,000 cubic meters of solid biomass.
Goals	To exploit each other's residual or by-products on a commercial basis to reduce consumption of resources and environmental impact.

Passive or Active	Both.
Marketing	Annual Symbiosis Research Symposium in Kalundborg, Denmark. Co-operation with the Center for Industrial Ecology at Yale University's School of Forestry and Environmental Studies and the International Society of Industrial Ecology.

Case Study 23: Der Grüne Punkt DSD GmbH

Web Site	www.gruener-punkt.de/?L=1
Governance	Private corporation reporting to an advisory board.
Staffing	Approximately 300 employees at four facilities.
Funding/Revenue	Licensing fee paid for collecting and sorting the package concerned.
Business Model	Provider of 'take back' programs similar to Stewardship Ontario. Core business includes packaging, transportation, disposal and recovery, non-returnables deposit scheme and disposal of used electrical and electronic equipment.
Time in Business	Founded in September 1990.
Impacting Legislation	German Packaging Ordinance, Recycling and Waste Management Act, Battery Ordinance, Ordinance on End-of-Life Vehicles and Electrical and Electronic Appliance Act, and the European Packaging Directive.
Industries Served	Primarily first importers and packagers selling products into Germany.
Materials	Non-hazardous packaging, batteries and electronic/electrical waste.
Stakeholders	Customers, local authorities and waste industry.
Volume	Manage almost 600,000 tonnes of waste from over 18,000 customers annually.
Performance Measurement	Mass flow verification submitted to the State Environment Ministries each year and environmental indicators such as energy consumption, fossil fuel, CO ₂ , SO ₂ , PO ₄ and other indicators reported in annual env. report.
Goals	To become the leading provider of take back programs in Europe.

Passive or Active N/A

Marketing N/A

Case Study 24: Waste MINZ

Web Site	www.wasteminz.org.nz
Governance	Six member Board of Directors serve two years. Any financial member can be nominated, with elections for three Board member positions held annually. The Chairman is chosen from Board by the Board members.
Staffing	Full-time Chief Executive Officer, Membership Manager and Sector Group Coordinator, and part-time Sector Group Coordinator and Administration Assistant.
Funding/Revenue	Membership fees (variable levels), Government grants and sponsorships.
Business Model	An incorporated not-for-profit society, independent organization with over 800 members encompassing central and local government. Web map portal permits fast location of local exchanges across NZ with links to free exchanges. Map portal linked to local exchanges including case study 1.
Time in Business	Founded in 1989.
Impacting Legislation	http://www.mfe.govt.nz/laws/waste-minimisation.html The Waste Minimisation Act 2008 puts a levy on all waste landfilled to generate funding to help reduce the amount of waste.
Industries Served	All.
Materials	All.
Stakeholders	Direct input to main web site and board of Directors via members.
Volume	Tracked under each local exchange.
Performance Measurement	Tonnes diverted, number of members.
Goals	To promote effective waste minimization practices to protect human

health and improve the quality of the environment.

Passive or Active Either depending on local exchange.

Marketing Bi-monthly magazine published by WasteMINZ, web links to other sites.
Public Service publications.

Case Study 25: National Industrial Symbiosis Programme

Web Site www.nisp.org.uk/default.aspx

Governance NISP is a national industry symbiosis initiative managed by International Synergies Limited.

Staffing Approximately 38 full and part-time staff across various regional offices.

Funding/Revenue Funded by UK Dept of Environment, Foods & Rural Affairs, the Scottish Government, Welsh Assembly Government and Invest Northern Ireland. Local offices/councils and businesses sponsors.

Business Model Outreach services delivered through 12 regional offices in England, Wales and Scotland. NISP and associated programmes have 8,000 members.

Time in Business Since 2005. Many member ISP's have been in operation prior to this date.

Impacting
Legislation None noted.

Industries Served Continental IC&I sector with a focus on manufacturing.

Materials Hazardous and non-hazardous wastes.

Stakeholders NISP is a partnership with the Resource Efficiency Knowledge Transfer Network, Environment Agency, the Local Government Association, local councils and in industry groups.

Performance
Measurement Monitor diversion from landfill, revenue from sales of waste, savings in avoided disposal costs, waste elimination, reductions in resource usage, CO2 emissions reduction, job creation, industry investment.

Goals Improving cross industry resource efficiency through the commercial

trading of materials, energy and water and sharing assets, logistics and expertise. Creating a competitive advantage involving physical exchange of materials, energy, water and/or by-products together with the shared use of assets, logistics and expertise.

Passive or Active Active exchange effort through outreach activities.

Marketing Web presence, newsletter, active contact and outreach, print media, active media contact and presentations.

Case Study 26: IWasteNot Systems

Web Site www.iwastenotsystems.com

Governance Board of Directors, private corporation.

Staffing N/A

Funding/Revenue Sales/support of specialty recycling and waste exchange software services.

Business Model Provides exchange operating and measurement software for over 70 exchanges in north America including Chicago, New York, Calgary, Washington State, Vermont and British Columbia. All I.T. services (software, secure hosting, updates & upgrades, support, and access to a network of other material exchange managers) provided for one annual subscription fee. Will discuss operating a new PPG exchange.

Time in Business Established 2003.

Impacting Legislation None noted.

Industries Served All.

Materials All.

Stakeholders State and local government and any business stakeholders are involved as desired from inception to final operation. Template style software permits rapid deployment.

Volume Over 70 operating waste exchanges plus State of Mass. pending.

Performance Measurement	Volume, tonnage, transactions, listings, greenhouse gas avoided calculation is built into software.
Goals	Cost effective, template style waste exchange and promotion/education software, hosting and service provider.
Passive or Active	Either model can be accommodated with the software.
Marketing	Varies with each exchange.

Case Study 27: Southern Waste Information eXchange Inc.

Web Site	http://www.swix.ws/
Governance	Standard board consisting of state officials, industry and environmental NGO representation.
Staffing	3 FTE's including an office manager.
Funding/Revenue	Approximately \$300,000US annually from the Florida Dept. of Environmental Protection, sponsors and project work.
Business Model	Not for profit operating an information clearinghouse and waste exchange.
Time in Business	Launched in 1981.
Impacting Legislation	None identified.
Industries Served	Focus on businesses in Florida but serving others where appropriate.
Materials	Hazardous and non-hazardous IC&I wastes.
Stakeholders	Florida DEP, Chamber of Commerce, Institute for International Cooperative Environmental Research at Florida State University and various key businesses in the state.
Volume	Handles an average of 50,000 inquiries plus 20,000 web site inquiries annually.

Performance Measurement	Diverts an average of 90,000 tons of waste annually with an estimated savings in avoided landfill costs of \$7.9 million USD.
Goals	To encourage and facilitate sound environmental and cost-effective alternatives to the landfilling, incineration or treatment of solid waste through direct interaction with waste generators in both the public and private sectors.
Passive or Active	Active exchange.
Marketing	Actively marketed through web site, conferences, mailout catalogue, promotion by state outreach staff.

Appendix 6. Short Listed Material Exchanges Researched

Case Study 1: Terranova Waste Exchanges

Web Site	http://www.terranova.org.nz/terranova/waste/
Background	<p>Terranova operates eight waste exchanges that cover about two-thirds of the South Island, New Zealand. These include the waste exchange for Christchurch, the largest city in the South Island. This waste exchange, along with the exchange for the adjacent Waimakariri District, serves about 450,000 people in greater Christchurch and diverts about 4,500 m³ of waste from landfill each year.</p> <p>Terranova is a charitable trust with the objective of waste minimisation. As well as operating the waste exchanges it also provides waste education services (primarily to pre-school centres and schools) and owns Meta New Zealand. Meta New Zealand is a not-for-profit company that operates the refuse transfer stations for Christchurch City and handles all curbside-collected recycling from greater Christchurch. Meta New Zealand operates a modern MRF (materials recovery facility), employs about 130 staff and has turnover of about \$NZ30 million/year. Meta New Zealand's operations support Terranova's activities.</p>
Governance	<p>The Terranova Trust has an independent chair and five directors appointed by a range of interests including local government, a region-level waste minimization committee, the Canterbury Employers Association, the Christchurch economic development agency and the local manufacturers association.</p>
Staffing	<p>Terranova employs a part-time Executive Director to oversee its operations and undertake some research projects. Additionally, two full-time staff and a 0.25 part-time person to operate its eight waste exchanges. These include a waste exchange facilitator who supervises all of the waste exchange activities as well as working directly with business and local government to facilitate material exchanges. He is supported by a full-time facilitator/administrator and a part-time administrator.</p>
Business Model	<p>The strength of the waste exchange services offered by Terranova is the cold-calling approach direct to businesses rather than reliance on</p>

an 'Internet only' delivered system or on businesses voluntary material listings. Terranova operates the waste exchanges as a service to business. Businesses are the primary focus of the waste exchange operations as they provide the materials that can then be listed and taken up by schools, community groups or other organizations.

The waste exchanges provide a direct way for businesses to deal with "waste" materials by providing a connection to schools and community groups for whom the "waste" is a valuable resource, thereby avoiding the waste going to landfill.

The waste exchanges get listings of materials from a full range of businesses. A flyer on each new listing is sent to school and community groups in the area. Over 70% of listings are exchanged within a week of first listing with the school or community group arranging for the material to be collected from the business. Over 90% of the materials listed are successfully exchanged. Many listings are for materials that are generated on a repetitive basis. No money changes hands with the only cost being for the collection/transportation of the material. The waste exchange is a free service and available to all businesses. For more details see <http://www.terranova.org.nz/terranova/material-listings/>

Funding/Revenue Terranova waste exchanges are funded from contracts with the respective local city or district councils for the area covered by the waste exchange. The funding covers salary and direct operating costs but do not fully cover overhead charges. Terranova does not receive charitable donations directly. Exchange users are not charged or pay any membership fees.

Performance Measurement The waste exchange contracts with each local authority specify expected service levels (e.g. number of businesses contacted and volumes of waste diverted). Volumes and tonnes of waste diverted each month are tracked as well as the number of listings, exchanges and businesses contacted, and a breakdown of how people heard about the waste exchange and how they made contact (e.g. phone, fax, email, Internet, or our staff visiting them).

Exchanges are confirmed either by phone or email contact with the business supplying the material. Only materials are exchanged, waste heat, water or air pressure are not traded.

Materials The Terranova waste exchanges serve all businesses and industries. A very wide range of materials are listed on the exchanges (glass,

plastics, compostables and organics, electronics, metal and metal containers, pallets, paper and cardboard, polystyrene, rubber and foam, textiles, leather and carpet, and wood). For a sense of the range of materials, the latest listings may be viewed at <http://www.terranoa.org.nz/terranoa/latest-waste/>

Marketing

The exchange service is marketed through direct cold-calling to businesses (on-site visits or via telephone calls), by mail-out of “recycling works” to 30,000 businesses as an insert in a business magazine (see below), and by local government waste officers. “Recycling works” is a twelve-page newspaper that has waste exchange success stories and listings of a selection of current available and wanted materials. It is published twice a year.

Once a material listing is received from a business it is immediately checked against “wanted” materials listings. If the material is not on the wanted list it is advertised (with photos) via an email flyer to schools, community groups and other organizations in the local area. Most listings are exchanged within days. If the material is not taken up, a listing on the internet site is published.

Goals

The Terranova waste exchange services are part of the waste minimization activities of local government. The goal is to divert waste from landfill.

Stakeholders

Stakeholders are involved through appointment and contact with the trustees (directors) of the Charitable Trust. Key stakeholders meet about once a year. Contracts for the local waste exchanges are managed by the municipality and key municipal staff meet Terranova on a regular basis (every few months to every 4-6 months). There are performance measures (e.g. waste volumes diverted) in each contract. The contracts are reviewed annually.

Impacting Legislation

There is no policy requirement for local waste exchanges. There is a legislative (central government) requirement for all municipalities to have a waste management and waste minimization plan. Many of these plans include support for, but not mandatory, waste exchanges.

Terranova operates eight waste exchanges that cover about two-thirds of the South Island, New Zealand, and interacts with WasteMINZ that covers the north of the island. WasteMINZ is an incorporated not-for-profit society, founded in 1989, with over 800 members encompassing central and local government, waste management specialists, and other entities that operate in the waste management and minimisation environment.

WasteMINZ operates as a national waste management organization seeks to enable the achievement of an environmentally and economically sustainable waste minimisation strategy for New Zealand. WasteMINZ has over 800 public and private members.

WasteMINZ operates the internet based New Zealand Waste Exchange Portal that directly maps and links all of New Zealand's waste exchanges with local users.

<http://www.wasteminz.org.nz/wasteexchange/index.htm>

The Terranova exchanges are part of this portal system.

Software

Terranova does not sell or otherwise provide its contact lists to other parties. Terranova has a proprietary (Microsoft Access database) exchange management system. This database has functions that allow data entry, management and reporting, contact management, provision of email flyers advertising new materials listings, and internet access for new listings. The database is currently being improved to provide a more comprehensive search function and to develop more standardized descriptions for materials.

Terranova will provide this waste exchange database software for a one-off cost of NZ \$10,000. (equating to CDN \$7,296 at today's exchange rate). Due to the distance to New Zealand and the international time differences, training, administration and support for this software may be a limiting factor.

Case Study 2: Calgary Materials Exchange

Web Site	www.cmex.ca
Governance	Environmental charity, board of directors, volunteers and staff.
Staffing	4.5 paid staff directly work on the exchange program. 1.5 for waste audits, 2 provide resources plus a supervisor. This is an actively managed exchange with managed listings plus staff physically going to companies.
Funding/Revenue	Exchange funding comes from City of Calgary, corporate sponsors, memberships and fees for waste audit services. Exchange costs estimated at \$60-75,000 CDN annually of a \$350,000 total program budget. The membership and sponsorship funds go directly to running the CMEX program.
Business Model	Calgary Materials Exchange (CMEX) assists companies in finding alternative disposal options for operational waste. CMEX provides businesses in the industrial, commercial, institutional, construction and demolition sectors with the knowledge and tools required to reduce, reuse and recycle. CMEX meets the unique needs of businesses by providing one on one support to reach waste diversion goals. It is the responsibility of the materials recipients and sellers to arrange payment terms and transfer logistics.
Time in Business	Clean Calgary has operated since 1975, exchange web site went live in 2003.
Impacting Legislation	None, everything is voluntary. Staff report that mandatory regs. would help promote the exchange.
Industries Served	All business in the Calgary and surrounding areas may use the exchange.
Materials	Cardboard, paper, wood, paint, plastic, organics, oils/petrochemicals textiles, rubber, office equipment, metal, construction waste, glass, electronics, minerals, pallets, office furniture, misc. materials, Excluding live animals, illegal goods, hazardous materials, new (unused). 21 of current 115 listings are for wood waste. This single material is not the primary focus of the exchange, but wood pallets are common waste in the area.

Stakeholders	Web page, email and telephone provide the main stakeholder involvement. The initial focus group was invited and asked for challenges and goals. Steering committee worked 18 months to guide development. Technical committee also formed at inception. Steering committee still meets occasionally.
Performance Measurement	Number of Companies: 509, Exchanges: 5,235, members: 1,489 Tonnes diverted: 10,819.72, Total cost savings: \$754,701.54 CDN. An average diversion rate is calculated from waste audits also used to create a baseline summary to measure ongoing performance.
Goals	To minimize industrial waste landfilled and provide resource contact information and to provide free customized recycling information to participating companies.
Passive or Active	High level active: The following services are available from CMEX: <ul style="list-style-type: none"> • Recommendations and referrals for waste diversion solutions (e.g. recycler contact information). • Visual Waste Assessment: A facility tour to identify diversion opportunities and solutions. • Recycling Report: A comprehensive report to provide recommendations for implementing an effective recycling program and to quantify diversion initiatives. A calculation of ecological benefits achieved will be provided to members at the 1-year renewal date. • Waste Measurement Toolkit: A standardized methodology of waste measurement that quantifies the amount and composition of waste and diverted materials/ recyclables and creates a baseline summary to measure ongoing performance.
Marketing	Cold calls, word of mouth. Some trade magazine, free press and public service announcements, word of mouth, contact with building owners and managers, Chamber of commerce etc. No radio/tv advertising is used.
Software	CMEX uses software provided by IwasteNot Systems specifically designed for waste exchange operations. Websites are modular and can include sections for: Online material (waste) exchanges, directories for reuse/recycling businesses and non-profit organizations, events listings and recycling links. The software can report on the weight, waste management savings, greenhouse gas reduction and potential carbon credits produced by the exchanges.

Case Study 3: Northeast Recycling Council - Vermont MEX

Web Site	www.nerc.org
Governance	Board of Directors (min. 3 members), officers and executive committee. The Executive Committee has general administrative oversight for the management of NERC and may act in lieu of the full Board of Directors between meetings. The Executive Committee is responsible for all decisions and projects assigned to it by the NERC Board of Directors.
Staffing	Executive director, assistant director, office manager, 2 program staff about 1 hr/day spent operating the exchange.
Funding/Revenue	EPA Office of Solid Waste and Emergency Response (OSWER) grant to conduct a pilot project to develop a web-based network of eight exchanges. US \$25,000/yr. estimated costs to operate VMEX. No membership fees.
Business Model	Not for profit, government partnership operating a free web site portal. This one site allows users to easily search the available listings of any of the eight participant exchanges. Users can also post requests for items they need or have available. The site works like a classified ad section, free to use.
Time in Business	VMEX was first established in 1993 and is one of the original Exchanges developed and supported by state government in New England.
Impacting Legislation	Vermont mandatory recycling regs., no direct waste exchange regs. Some regs. over how site must be set up and operated. NERC bylaws http://www.nerc.org/documents/bylaws.html Exclusionary rules: No advisor, agent, or employee is liable or responsible for any warranty, expressed or implied, as to the accuracy of the material description, the suitability for a particular use, or the saleability of any material offered through this service. Neither Northeast Recycling Council, its sponsors nor any advisor or employee thereof is liable for any information, error, or representation, nor makes any warranty, expressed or implied, as to the accuracy or quality of any information, service, or product/equipment offered through the VMEX Exchange.
Industries Served	All.

Materials	Any; excluding live animals, illegal goods, hazardous materials for disposal (reuse permitted), new (unused) items, trucks and cars. A large amount of construction and demolition material is listed but there is no deliberate specialization of any material on the exchange.
Stakeholders	When exchange went live, existing members had to update accounts and input was made then. Grant fund staff involved with set up of VMEX. Stakeholders are given direct contact via web page or call in.
Volume	70 current listings. Advertising causes volume spikes.
Performance Measurement	Mostly weight based metrics plus dollar value moved, number of exchanges/month, tonnes diverted, number of members.
Goals	To promote source and toxicity reduction, recycling, and the purchasing of environmentally preferable products and services.
Passive or Active	Passive: operates like free classified ads.
Marketing	Word of mouth and active promotion at events, chambers of commerce, press releases, free ads in business periodicals. No direct promotion.
Software	<p>VMEX uses software provided by IwasteNot Systems specifically designed for waste exchange operations. Websites are modular and can include sections for: Online material (waste) exchanges, directories for reuse/recycling businesses and non-profit organizations, events listings and recycling links.</p> <p>VMEX will link to other operating waste exchange sites. Currently linked to Fla., Mass., RI., CT.</p> <p>The software can report on the weight, waste management savings, greenhouse gas reduction and potential carbon credits produced by the exchanges.</p>

Case Study 4: CalMax Materials Exchange

Web Site	www.ciwmb.ca.gov/CalMAX
Governance	The California Integrated Waste Management Board (CIWMB) is the state agency tasked with tracking, managing and diverting over 90 million tonnes of waste produced annually from over 450 jurisdictions across California. It is one of 6 agencies operating under the California EPA. Managed by a 6 member board, the agency funds and oversees the provision of a variety of services including the CalMax Materials Exchange. CalMax is a service offered under the CIWMB's Sustainability Program through its Local Assistance and Market Development Division (LAMD).
Staffing	CalMax has three full-time staff directly associated with the operation of the exchange. Their services are augmented significantly by the outreach and promotional efforts of LAMD Division program staff.
Funding/Revenue	The LAMD Division and, consequently the CalMax service underwent a reorganization several years ago and its budget remains in flux due to the current economic conditions in the state. The current budget associated with the program is approximately \$300,000US. It should be recognized, however, that this cost does not consider the value of the outreach services provided by the rest of the Division including financial and administrative support or the activities of partner exchanges. Funds for the operation of the Division are provided for by the board through state taxes and landfill tip fees.
Business Model	The CalMax materials exchange is part of a group of free outreach services offered by the state to local businesses either directly or indirectly through local cities, counties and regional waste management compacts. CalMax currently has 17 partnerships with Regional or county governments wherein CalMax hosts advertisements and provides server and software support including maintaining branded web pages for these communities. CalMax also works closely with other independent exchanges in the state to promote their services. CalMax serves as a hub providing server and software support to local exchanges and direct outreach service to local businesses.
Time in Business	The CalMax materials exchange has been in operations for over 10 years and is one of the best known exchange programs in the United

States.

Impacting Legislation	CalMax along with many of the state's diversion programs resulted from passage of AB 939 (Integrated Waste Management Act of 1989) which established aggressive diversion targets across the state. Other legislation or policy related documents that support CalMax include the CIWMB 2009 Strategic Directions (SD2), California's Global Warming Solutions Act of 2006 and the Designation of Recycling Market Development Zones. These policies and pieces of legislation established a role for waste exchange services as a means of supporting the State's waste hierarchy and provide funding for local outreach and service support.
Industries Served	As a government service, CalMax is available to any business or resident of the state with no emphasis placed on any particular business sector. However, as much of the exchange activity is initiated by Divisional outreach staff, the focus of the waste exchange varies depending on the business sectors targeted by the Division in any given year. For instance, the plating industry may be a priority group one year and restaurants in another year.
Materials	CalMax accepts both hazardous and non-hazardous materials on their exchange categorized broadly as: construction, containers, durable goods, electronics, glass, metal, organics, paint, wax, pallets, paper, plastic, rubber, textile and wood. A review of their current listings revealed a broad mix of used and discarded durable goods and containers, pallets, drums and electronic waste from large and small businesses, schools and individuals. Residential materials were negligible.
Stakeholders	The CIWMB provides grants, loans and services to a broad range of municipalities and businesses. As such, partner exchanges, local municipalities and business groups such as local compact representatives play an integral role in supporting CalMax and its services.
Volume	The exchange currently averages 45 to 70 listings per week. Volumes of listings have dropped significantly since the start up of the exchange and in particular since the Division was reorganized. The significant drop in activity is likely due, in part, as least to the negative impact of the reorganization and economic conditions in California. CalMax staff believe the growing presence of independent reuse/resale sites such as Craig's List, eBay and Kijiji has virtually eliminated the role of CalMax in diverting residential materials and even much of the durable goods available from businesses.

Performance Measurement	CalMax’s web based system terminates listings automatically after one month and issues a survey soliciting an outcome based response. Division staff encourages clients to inform the exchange of successful exchanges. CalMax metrics include overall activity in terms of listings, reported successes, diverted tonnage and avoided costs reported out as part of the CIWMB Strategic Directions annual report.
Goals	As part of the CIWMB Sustainability Program, CalMax’s primary goal is to support the Board’s diversion efforts as outlined in its Strategic Directions document.
Passive or Active	While the exchange itself is fundamentally a passive exchange, the provision of outreach services by LAMD Division staff allows it to operate effectively as an active service.
Marketing	Promotion of the CalMax program is done through a variety of channels but most prominently through the LAMD Division staff’s regular outreach activities. Outreach staff routinely gives presentations to business groups and at special events. Flyers and a brochure highlighting the exchange, amongst other Divisional services, are made available to prospective clients during site visits at local businesses. CalMax’s strong working relations with its county and regional affiliates and independent exchanges in the state plays an important role in facilitating exchanges. CalMax’s long term existence and strong web site presence makes it a known commodity in the state and reduces the need for extensive promotion.

Case Study 5: The Free Market

Web Site	www.twincitiesfreemarket.org
Governance	<p>The Free Market is a free listing service provided by Eureka Recycling for residents of St Paul, Minnesota to exchange reusable goods. Eureka Recycling is a non-profit organization 501(c)(3) corporation created 20 years ago as part of the St Paul Neighbourhood Energy Consortium and incorporated under a stand alone board in November 2001. Eureka's eight member board consists of members elected by the NEC board and others elected at large. Board members include past and current government bureaucrats, politicians, academics and business representatives. The political contacts and business acumen these members bring to the organization is believed to be one of the reasons for the long standing success of the organization.</p> <p>The day-to-day operational decision making of Eureka Recycling is handled by the organization's CEO and COO and management team. Governance issues such as budget approval are overseen by the standing board.</p>
Staffing	<p>Eureka Recycling currently has a staff of over 20 full-time personnel primarily involved in provision of curbside recycling collection services and operation of a recycling facility. The Free Market web site is maintained by one full time equivalent with a co-op student(s) responding to inquiries.</p>
Funding/Revenue	<p>Funding for the Free Market is provided indirectly through a long term contract between Eureka Recycling and the City of St Paul to provide a range of recycling services including the residential exchange service. Eureka Recycling also engages in various independent project work on behalf of the county and state to further supplement the organization's budget. The Free Market web site is also supported by sponsors and the proprietary system is offered as a franchise to interested communities and community groups.</p>
Business Model	<p>The Free Market is a free service offered to the community as one of the deliverables provided by Eureka Recycling under contract to the city of St. Paul. As a result, it has no expectations of financial recovery or solvency. The automated nature of the software package allows Eureka staff the opportunity to minimize staff costs to operate what essentially is a loss leader service.</p>

Time in Business	Launched in 1997, the Free Market was the first web based exchange service in North America focused on residential waste. Eureka Recycling officially incorporated as an independent not-for-profit organization in November 2001.
Impacting Legislation	Free Market staff does not believe that legislation plays a significant role in driving residents to their web site. Anecdotally, staff does believe that waste diversion efforts such as bag limits and higher tip fees are more likely to have a real impact on encouraging residents to participate in diversion programs such as the Free Market. Staff acknowledged that state tip fee surcharges play a key role in providing funding for waste diversion programs across the USA.
Industries Served	The Free Market targets reusable, local residential waste exclusively as it is a service deliverable provided under contract to the city of St. Paul.
Materials	The Free Market is mandated to deal with residential reusable goods only and does not accept listings for live animals, plants, automobiles, motorcycles, services, firearms, child car seats or garage sale items.
Stakeholders	Eureka Recycling’s long-term success is due, in part, to its strong relations with the Twin City district councils, local business groups and the local waste management industry. These relations have aided in the organization in securing lucrative contracts and other means of financial support (e.g., sponsorships). Oversight and support in the early years from its parent organization (NEC) has also been an important factor in ensuring organizational and financial support.
Volume	The Free Market has diverted over 5,500 tons of reusable goods since its inception. This amount represents an impressive 78,000 exchanges. The exchange currently has over 150,000 registered users. However, staff acknowledges the impact free internet services such as eBay and Craig’s List have had and continue to have on the long term viability of the service. To-date, the impact has been mitigated due to the high level of recognition enjoyed by the service but market erosion is expected to continue into the foreseeable future.
Performance Measurement	Exchange staff routinely monitors the number of listings, registered users and exchanges made through tracking of data off the web site and follow up phone calls. This information is used to substantiate their performance under contract with the City and as a marketing tool for securing additional funds.

Goals	In co-operation with their primary client, Eureka Recycling has a target goal of 75% diversion of residential waste from landfill for the Twin City area. Provision of the Free Market service directly supports this endeavour.
Passive or Active	The Free Market can be considered a quasi-active exchange in that staff makes an effort to monitor the exchange and assist diversion of materials to appropriate outlets.
Marketing	Marketing of the exchange's service is primarily done through word of mouth and promotion of the service by other NGOs and city staff. Eureka Recycling staff promotes the exchange when speaking publicly and the service is promoted in recycling literature produced for local residents.

Case Study 6: Tennessee Materials Exchange

Web Site	www.cis.tennessee.edu/environmental/recycle/TME.shtml
Governance	<p>The Tennessee Materials Exchange (TME) is a free service operated by the Tennessee Centre for Industrial Services (CIS). The Centre was established in 1963 by the Tennessee General Assembly and charged with the broad mandate of "...provision of information, data and materials relating to the needs of industry...". The Centre is, in turn, an agency of the University's Institute for Public Service that offers non-agricultural public service assistance to business and industry in Tennessee.</p> <p>Operations of the CIS and the TME are overseen by two key groups. Fiscal and fiduciary responsibilities are within the purview of the University's Board of Trustees. Input and advice into the strategic direction of both the Centre and Exchange are provided by the CIS Advisory Council which consists primarily of local business representatives.</p>
Staffing	<p>The CIS has a staff of over 50 personnel located at 5 offices across the state. The TME is operated part-time by one FTE with the assistance of one or more graduate students. Financial and administrative support is, however, provided to the TME through one central group associated with the CIS. Moreover, much of the long term success of the exchange is directly linked to the research and outreach work associated with CIS staff not directly associated with the exchange.</p>
Funding/Revenue	<p>CIS funding sources include state appropriations, contracts, co-operative agreements with state and federal agencies and funds generated by fee-based services. The TME is funded, in part out of the CIS's general budget allowance, through project specific work conducted on behalf of interested parties such as the Regional EPA and applicable grants (e.g., state landfill taxes).</p>
Business Model	<p>In the USA universities are closely linked to businesses and governments. They frequently deliver programs and services on behalf of government agencies. The University of Tennessee is no exception with its focus being split across three services including:</p>

education, applied research and public service.

The operation of the CIS follows that of a traditional extension service model. Provision of a waste exchange service is consistent with the mandate and focus of the CIS to improve the competitiveness of local businesses. It is, however, the relationship between the exchange, outreach service offered by CIS staff and their “in-house” research capacity that makes this particular waste exchange notable. TME staff routinely identifies sector specific problem materials and prioritizes them for further research by the CIS. Should a solution be identified, they are able to provide that solution to the entire industry sector resulting in a value added response.

Time in Business	The TME has been in operations since the early 1990’s and have evolved over time to the current automated web site and recycling directory offered today.
Impacting Legislation	The existence of the CIS and its services was enacted by the Tennessee General Assembly almost 50 years ago. However, TME staff, felt there are notable differences between the environment the TME operates in and that of a potential exchange in Ontario. Specifically, the US Regional EPA continues to play a strong role in regulating and funding IC&I diversion activities. From their perspective, this is not the case in Ontario.
Industries Served	The TME services the IC&I business sector across the state of Tennessee. There is, however, a particular emphasis placed on the industrial manufacturing sector.
Materials	IC&I hazardous and non-hazardous wastes are accepted under the following broad categories: Acids Solvents Alkalis oils and waxes Other organic chemicals Metals and metal sludges Other inorganic chemicals Plastics and rubber Textiles and leather Wood and paper Miscellaneous
	As mentioned above, it is notable that the CIS prioritizes and targets industry specific materials in their research and diversion efforts based on input from its Advisory Council, outreach staff and TME operators.
Stakeholders	The CIS and TME have strong ties back into the local manufacturing community, Chamber of Commerce and various government organizations through their Advisory Council and network of affiliates. These affiliates include state and local economic

development agencies, the Regional US EPA, National Institute of Standards and Technology, Dept of Defence and more.

Volume	The TME averages about 6,500 clients annually with an average of 600-700 listings at any time and 3-4 new listings per week.
Performance Measurement	TME staff conservatively estimates \$350,000US in savings to date. Exchange outcomes are actively tracked through staff follow up. Avoided disposal costs, avoided raw materials purchase costs and total tonnes diverted from landfill are all tracked.
Goals	The primary goals of the TME include diversion from landfill and improving the economic competitiveness of state businesses on a national and global basis. The CIS sets quantified performance goals and targets for all its services including the TME annually.
Passive or Active	The TME is an active exchange offering the standard automated web site service, monthly email listing service and as mentioned previously, engages in contract research work to develop outlets for problem manufacturing wastes.
Marketing	The TME has a standard website presence but leverages the availability of the CIS's outreach staff at 5 different locations throughout the state to promote its services. This occurs primarily when outreach staff is conducting site visits at manufacturer's facilities, through the delivery of brochures, distribution of its monthly newsletter and of presentations by outreach staff.

Case Study 7: RENEW

Web Site	http://www.zerowastenetwork.org/renewdev/
Governance	The Resource Exchange Network for Eliminating Waste (RENEW) is a materials exchange network administered by US EPA Region 6 staff. Financial and operational responsibility for the program falls within the purview of the Region 6 Pollution Prevention & Education Section Program. A loose network of government staff from the various state partners involved in the project are also involved in day to day exchange activities.
Staffing	The RENEW initiative was operated historically by one FTE until 2004. This level was reduced to ½ an FTE after reorganization and automation of the system by the Southwest Network for Zero Waste, (a collaborative project of the U.S. Environmental Protection Agency, the University of Texas, and regional environmental agencies). The current Region 6 staff resource is responsible for the provision of technical support and assistance with report writing to the individual member state exchanges that are a part of the network. This does not, however, take into account the underlying administrative and related outreach support provided by the Pollution Prevention & Education Section and other branches of Region 6. Member exchanges also provide additional staff to facilitate local exchanges and promote the service. In addition, staff from the Southwest Network for Zero Waste provides tech assistance to the exchange under contract with Region 6 staff.
Funding/Revenue	RENEW is a free service funded by state landfill taxes specifically through an EPA Pollution Prevention Information Network (PPIN) grant.
Business Model	RENEW is good example of a collaborative, web based exchange service. Its success lies in the provision of technical and administrative support by one central partner, in this case EPA Region 6, to reduce overhead labour costs and provide a standardized service across a large, Regional area. This approach frees up member's staff to handle the client interface to the extent they choose to run active or passive services. It also encourages collaborative problem solving at a level where critical mass can easily be achieved.

Time in Business	Renew was established in 1987 to service Texas. It was subsequently expanded in 2007 by the Southwest Network for Zero Waste to service EPA Region 6.																		
Impacting Legislation	RENEW was established by the Texas Legislature in 1987 to promote the reuse or recycling of industrial wastes. As noted with the other USA based exchanges, the legislated ability to levy landfill tip fees is a key source of funding for many of these free services.																		
Industries Served	The exchange is available to any IC&I businesses with the Region of Arkansas, New Mexico, Oklahoma, Louisiana and Texas.																		
Materials	<p>RENEW handles listing for hazardous and non-hazardous materials including:</p> <table border="0"> <tr> <td>Acid</td> <td>Organics</td> </tr> <tr> <td>Alkali</td> <td>Textile and leather</td> </tr> <tr> <td>Solvent</td> <td>Wood</td> </tr> <tr> <td>Inorganic Chemicals</td> <td>Rubber</td> </tr> <tr> <td>Oil</td> <td>Paper</td> </tr> <tr> <td>Laboratory Chemicals</td> <td>Glass</td> </tr> <tr> <td>Plastic</td> <td>Construction and demolition</td> </tr> <tr> <td>Metal and metal sludge</td> <td>Electronics</td> </tr> <tr> <td>Paints and coatings</td> <td></td> </tr> </table>	Acid	Organics	Alkali	Textile and leather	Solvent	Wood	Inorganic Chemicals	Rubber	Oil	Paper	Laboratory Chemicals	Glass	Plastic	Construction and demolition	Metal and metal sludge	Electronics	Paints and coatings	
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Stakeholders	RENEW partners include the US EPA Region 6, Texas Commission for Env. Quality, Arkansas and Oklahoma Department of Environmental Quality, Oklahoma Recycling Association and Southwest Network for Zero Waste.																		
Volume	EPA staff estimate that the RENEW project has diverted over 1,000 tons with an approximate value of over USD \$3 million in avoided disposal costs and revenues from sales of materials.																		
Performance Measurement	Performance of the network is measured through a requirement that member exchanges complete annual reports tracking the number of listings, exchanges and value amongst other information.																		
Goals	The goal of the network is to promote the reuse or recycling of industrial wastes.																		
Passive or Active	The individual exchanges which make up RENEW range from passive to active systems. Some better resourced member exchanges utilize their extension services staff to actively promote their network and facilitate exchanges. Others simply provide a web site presence.																		

Marketing

Renew partners aid in promotion through utilization of individual state environmental outreach staff, presentations to industry groups and advertisement in trade magazines. Region 6 and Zero Waste staff are also actively involved in promoting the service. Flyers, brochures, and a web site presence are commonly provided by the network's member exchanges and partners.

Case Study 8: Recycling Council of BC Materials Exchange

Web Site	http://www.rcbc.bc.ca/services/materials-exchange
Governance	<p>Recycling Council of British Columbia is a multi-sectoral, non-profit registered charity, dedicated to promoting the principles of Zero Waste.</p> <p>A five member Board of Directors and seven Directors at large composed of multi-sectoral representatives govern the organization including the waste exchange. Business is conducted as a non profit registered charity.</p>
Staffing	Two full time staff work on waste exchange business plus some part time education outreach.
Funding/Revenue	<p>BC Ministry of Environment, corporate sponsors. Municipal funding from regional districts. In 2008, 58 sponsors contributed either cash or in kind. In 2008, overall RCBC operating expenses were \$608,244 only a portion are used to operate the waste exchange, see 2008 annual report:</p> <p>http://www.rcbc.bc.ca/files/u6/pub_0708AnnualReport.pdf</p>
Business Model	<p>The BC IMEX program is a free-to-use online listing database linked to eight separate exchanges sites:</p> <ul style="list-style-type: none">Vancouver ReusesSurrey ReusesOkanagan ReusesThompson-Nicola ReusesColumbia Shuswap ReusesSunshine Coast ReusesBC Electronics Materials ExchangeBC Industrial Materials Exchange <p>The exchanges work to help companies and industry find alternative solutions to dispose of by-products or surplus resources. The BC IMEX has 16 material categories and over 30 subcategories, making it easy for companies and industry to list and search for resources. More exchanges are planned.</p> <p>The exchange lets users sell, give away or trade like an online garage sale. The site works like a classified ad section where the user can post listings of items and materials to get rid of or browse for wanted materials currently available in their area.</p>

Time in Business	RCBC has operated since 1974. The industrial exchanges have operated for about 3 years.
Impacting Legislation	<p>No direct impacting legislation. RCBC has a number of policy positions that promote their objectives to the appropriate level of government:</p> <p>Approved RCBC Public Policy Positions (Summary: Comprehensive listing of RCBC's approved public policy positions on various issues from 1992 to present.)</p> <p>Terms of use: Information provided through the materials exchange is supplied by the lister of the material, not the materials exchange or Recycling Council of British Columbia. No advisor, agent, or employee is liable or responsible for any warranty, expressed or implied, as to the accuracy of the material description, the suitability for a particular use, or the saleability of any material offered through this service.</p>
Industries Served	All operating in British Columbia.
Materials	Any, including chemicals, with exclusions on; live animals, illegal goods, hazardous materials and new (unused) items.
Stakeholders	Monthly reports sent to funding sponsors. Meetings for input are held regularly, annual reports.
Volume	Amount diverted in 2008 was 128.2 tonnes through 4,754 trades. E.g. on Surry Reuses site, 20-40 new listings per day 4-5 successful transactions/day. Volume varies seasonally.
Performance Measurement	Listings must include weight and follow-up questions when listing removed. Weight based performance measure tracked through IWasteNot Systems exchange management software. 129,229 inquiries to the RCBC hotline last year.
Goals	<p>Recycling Council of British Columbia is a multi-sectoral, non-profit registered charity, dedicated to promoting the principles of Zero Waste.</p> <p>Organization goals are:</p> <ol style="list-style-type: none"> (1) Zero waste. (2) Reduce urban impact. <p>RCBC is Canada's longest-serving recycling council. Since 1974 they</p>

have led B.C.'s progressive policy of **Extended Producer Responsibility** programs and other initiatives to find innovative ways to eliminate waste and decrease British Columbia's environmental footprint.

Passive or Active Active: If listing is approved, staff will call to follow up. Reuse hotline was staffed over 1,700 hours in 2008.

Marketing Municipal publications, some province wide advertising, web site, no radio or tv except public service announcements.

Software RCBC uses IWasteNot Systems software to manage all their exchanges and track performance metrics. The software is specifically designed for waste exchange operations. Websites are modular and can include sections for: Online material (waste) exchanges, directories for reuse/recycling businesses and non-profit organizations, events listings and recycling links.

The software can report on the weight, waste management savings, greenhouse gas reduction and potential carbon credits produced by the exchanges.

Case Study 9: National Industrial Symbiosis Programme

Web Site	www.nisp.org.uk/default.aspx
Governance	The National Industry Symbiosis Program (NISP) is an industrial symbiosis (IS) initiative managed by International Synergies Limited (a private sector provider of industrial ecological solutions). NISP is the first IS initiative in the world to be launched on a national scale and is delivered across the UK through a network of 12 regionally based offices. Day to day operations is managed by the regional staff supplemented by regional advisory groups with appropriate oversight by a central executive team of International Synergies Ltd (ISL) staff.
Staffing	The NISP has a team of approximately 38 full and part-time contractors and staff managing the various regional offices. Leadership for these offices is provided by the executive team of ISL staff.
Funding/Revenue	Funding for the NISP is provided for by the UK Department of Environment Foods & Rural Affairs, the Scottish Government, Welsh Assembly Government and Invest Northern Ireland. Local government offices and councils may invest in specific, regional initiatives and businesses sponsors contribute time and money to certain NISP activities.
Business Model	<p>The NISP is a free national program delivered at regional level to its members. Outreach services are delivered through 12 regional offices in England, Wales and Scotland. NISP and associated programmes have over 8,000 members. Staff works directly with businesses of all sizes and from all sectors. A programme advisory group, consisting of key industry representatives, assists each of the regional teams to ensure the programme is driven by genuine business requirements and that the strategic direction is relevant for each region.</p> <p>Each of the twelve regions has a dedicated team of IS practitioners working closely with local businesses to raise the profile of industrial symbiosis and to recruit members to the programme. NISP staff felt this unique arrangement allowed the organization to tailor its initiatives more effectively and to tap into local knowledge for opportunities to target.</p>
Time in Business	The NISP was officially launched in July 2005 at the House of Commons by the Chief Executive of the Environment Agency. It should be noted that many of the programme's members were

involved in or developed ISP's prior to this date.

Impacting Legislation	While assisting businesses with legislative compliance is part of the services provided by NISP staff, their focus is on encouraging self directed initiatives that go beyond current compliance requirements. As a result, NISP staff did not view legislation as significantly affecting their programme.
Industries Served	As a national programme, the NISP provides its services to businesses across the United Kingdom. Each regional office does, however, have its own focus tailored to meet the specific needs of its local businesses. This may range from the textile industry in one area to electronics in another.
Materials	NISP's mandate to support industrial symbiosis allows staff to support local business initiatives dealing with a broad range of issues including water and waste water management, energy conservation or hazardous waste management to name just a few. An IS mandate allows NISP staff to effectively provide "one window shopping" solutions to local businesses.
Stakeholders	Part of the success of the NISP programme is undoubtedly the emphasis placed on the development of strategic partnerships at both a national and local level. NISP partners include local councils and industry groups, the Local Government Association, Environment Agency and the Resource Efficiency Knowledge Association. The NISP employs dedicated liaisons to strengthen working relations with these key groups and solicit their support and involvement in the development of the programme.
Volume	Since the outset of the programme, NISP has reportedly diverted over 5 million tonnes of industrial waste, reduced carbon emissions by the same amount, avoided the consumption of almost 8 million tonnes of virgin materials and saved its members over £130 million.
Performance Measurement	NISP monitors a broad range of indicators to measure programme success including but not limited to diversion from landfill, revenue generation, resource usage, CO emissions, job creation and industry investment. Importantly, each regional office has their own output targets tailored to meet the needs of their local clients and the results of their efforts are verified by the customers and independent third parties.
Goals	The aim of the NISP is to improve cross industry resource efficiency through the commercial trading of materials, energy and water and

sharing assets, logistics and expertise. It endeavours to encourage traditionally separate businesses from different industry sectors to collaborate to collectively improve their competitiveness.

Passive or Active While the NISP is not a traditional waste exchange, their programme incorporates a number of better practices that could be of use in developing a successful waste exchange. Chief amongst these is the emphasis placed by NISP on active solutions development for clients.

Marketing NISP uses a broad range of media to raise its profile and market its services. These include a strong web presence, newsletter, active contact and outreach efforts, print media, active media contact, workshops and presentations. NISP regularly arranges workshops and seminars for local authorities and businesses to assist them in get to know the programme and how it operates. NISP staff believes their promotional efforts have been a key factor in the program's success to date.

Case Study 10: Southern Waste Information eXchange Inc.

Web Site	http://www.swix.ws/
Governance	Southern Waste Information eXchange Inc (SWIX) is an incorporated not-for-profit information clearinghouse and waste exchange service operated out of Tallahassee, Florida and servicing the south-eastern United States with an emphasis on the state of Florida. SWIX has a three member board of directors and six member advisory board consisting of state officials, industry, legal and environmental NGO representation. The board of directors have traditional fiduciary responsibilities with the advisory board providing advice on the operation and strategic direction of the organization.
Staffing	SWIX is operated by 3 FTE's including an executive director, director of program development and office manager.
Funding/Revenue	SWIX provides three core services including the exchange, an information clearinghouse service and directory of waste services in the state of Florida. The exchange represents the primary operating cost of the business and operates on an annual budget of approximately \$300,000US. Funding for the free service is obtained primarily from the Florida Dept. of Environmental Protection (DEP) with supplementary income from sponsors, project work such as the clearinghouse that was funded under a separate innovative grant from the Florida DEP and event organization.
Business Model	While the waste exchange service represents the core business of SWIX, the organization also actively engages in the provision of information and assistance to local waste generators in the state seeking assistance with the registration and management of their wastes. SWIX has traditionally placed an emphasis on the management of hazardous waste due to the high disposal costs of these materials. A toll free hot line is provided for this purpose. SWIX staff also typically runs at least one conference, workshop or training event annually on sector specific topical or regulatory matters as a revenue generating and promotional activity. SWIX staff strongly believe that adequate long-term government funding is required to sustain a waste exchange service.
Time in Business	SWIX was launched in 1981 and is one of the longest standing and successful exchanges in North America.

Impacting Legislation	SWIX staff did not feel that there was any particular legislation that directly affected the operation of the exchange. They felt that active enforcement of the existing regulatory regime was, perhaps, more important in promoting diversion. This perception is predicated on the belief that an effective regulatory environment is present to promote diversion which may not be true of Ontario. They also felt that the availability of low cost disposal options was more significant in driving IC&I diversion.
Industries Served	SWIX has as a primary objective of providing options for the recycling and reuse of solid and hazardous waste generated by businesses and the general public throughout the south-eastern United States.
Materials	The exchange accepts listings for both hazardous and non-hazardous wastes generated by the general public and industry. The traditional focus of SWIX has, however, been on hazardous waste generated in the state of Florida. Materials currently listed ranged from waste industrial solvents through to used equipment such as forklifts.
Stakeholders	As a long-term service provider in the state of Florida, SWIX has strong ties to the Florida DEP, local chamber of commerce, organizations such as the Institute for International Co-operative Environmental Research at Florida State University and a broad range of local businesses. SWIX staff commented on the role that these stakeholders play in supporting and promoting the exchange's services.
Volume	Staff reported that the exchange typically handles an average of 50,000 direct or phone inquiries plus 20,000 web site inquiries annually regarding: the availability of and demand for waste materials; diversion opportunities; best management practices; available waste management services and products; and federal, state and local regulations. It is noteworthy that their clearinghouse service downloads an average of almost 20,000 documents annually with almost 50% of these requests being SWIX's directory of waste management services. This activity level suggests that provision of this complimentary service may have merit. At the time of contact, the exchange had about 45 listings and 39 registered site users.
Performance Measurement	As part of their grant agreement with the State of Florida, SWIX staff monitor and report out on tons diverted, estimated savings in avoided landfill costs, savings in avoided raw materials purchases, and greenhouse gas emissions reduction. They also generate a Cost

Benefit Ratio Average which compares the cost of the exchange with the savings of the reported exchanges.

Goals	SWIX's mandate is to encourage and facilitate sound environmental and cost-effective alternatives to the landfilling, incineration or treatment of solid waste through direct interaction with waste generators in both the public and private sectors.
Passive or Active	While SWIX operates a fully automated exchange based on IWasteNot's software platform, the staff of the exchange is actively involved in working directly with generators to solicit materials and assist in their diversion. SWIX staff believes this is a fundamental requirement of a successful exchange.
Marketing	SWIX's waste exchange and related services are actively marketed through the organization's web site, the conferences and workshops they run, a mailout catalogue distributed to state agencies and private firms throughout the south-eastern United States, and promotion by state outreach staff and sponsors.

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