
G.I.P.P.E.R.'s Guide

To

ENVIRONMENTAL PURCHASING

Governments Incorporating Procurement Policies to Eliminate Refuse

Third Edition ● October, 2002

G.I.P.P.E.R.'s Guide To Environmental Purchasing

3rd Edition

October, 2002

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PREFACE

About 7 million metric tonnes of solid waste was disposed of in 1997 in Ontario. Landfills serving some areas, like the Greater Toronto Area will be reaching capacity in a few short years. In some cases, alternative sites have not yet been established. Other municipalities in Canada face similar challenges with the management of their waste. In addition, municipalities face other health and environmental concerns such as air and water quality, the impacts from electricity generation and the harmful effects of toxic waste.

There is a need for a major change in the way that government procures goods and services. Since governments purchase a large amount of material, they are also significant contributors to the waste stream. Much of the waste presently sent to landfills could be avoided through procurement policies and practices that help in the reduction, reuse, and recycling of material.

This Third Edition of GIPPER's Guide to Environmental Purchasing is a tool to assist purchasers' to incorporate environmental considerations into the procurement process. The document describes a number of methods for doing this, one of which is the application of environmental criteria to target product and service categories. It is recognized that this is not always a simple matter, especially when one must consider all requirements within the material life cycle in making a final decision, along with performance, health & safety and cost requirements.

Although the procurement process is only one aspect of selecting environmentally preferred materials, it can only be effective when collaboration exists between the material requester (user, owner, etc.), the material specifier (designer, engineer, etc.), the purchaser, AND the supplier (manufacturer, distributor, etc.). The procurement function provides an important link to bring the key players together to collectively improve the way in which we make, buy, use and dispose (reuse/recycle) of goods and services.

INTRODUCTION

The GIPPER Guide presents an overview of frequently used products. Listed alphabetically, each product in the "Guidelines" section contains information on the product's environmental impact. In addition, each product guideline includes "Procurement Recommendations" and "3-R Recommendations". In addition, some product guidelines include summary and application charts to assist in the procurement policy process. The Guide also features an in-depth background and review of "Packaging" standards and best practices. "References," "Definitions" and "Appendix" round out the Guide.

THE GIPPER COMMITTEE

In June of 1989, Metropolitan Toronto organized a forum to co-ordinate effort by various levels of government to address procurement's contribution to alleviating the waste problem. As a result of this initiative, the Governments Incorporating Procurement Policies to Eliminate Refuse (GIPPER) committee was established. GIPPER is comprised of both Waste Management and Purchasing Representatives of the Federal, Provincial and Municipal levels of Government and other concerned organizations. It is GIPPER's intention to incorporate environmental considerations into purchasing procedures focusing on waste reduction. GIPPER members realized that in order to close the recycling loop, governments must not only recycle, but must also BUY products containing recycled materials, otherwise the benefits of recycling will not be realized. GIPPER's Goal and Focus are as follows:

GOAL: To investigate, develop and promote effective government purchasing policies and practices that will contribute to continued reductions in waste generation.

FOCUS: The focus of the procurement policies will be to:

- a) reduce the quantity of waste produced by government bodies and associated agencies, boards, commissions and their suppliers;
- b) provide markets necessary to promote and sustain waste reduction, reuse, recycling and recovery of materials initiatives;
- c) develop a process to facilitate co-operative or joint purchasing among different levels of government so as to substantially influence and enhance item b) above.

This Guide was produced to help those in the purchasing field achieve waste reduction through their procurement policies and procedures. The Guide highlights various environmental and health concerns associated with different products so that procurement officers have the knowledge to purchase those alternatives with less damaging impacts.

As a first step, GIPPER developed and adopted the following Statement of Principle:

GIPPER

Statement of Principle

In order to contribute to the reduction of waste, toxic or harmful emissions and substances and to increase the development and awareness of environmentally preferred purchasing, acquisitions of goods and services will ensure that wherever possible, specifications are amended to provide for expanded use of durable products, reusable products and products (including those used by service contractors) that contain the maximum level of post-consumer waste, the least amount of toxic or harmful content for the sustainability of a clean environment without significantly altering the effectiveness of the product or service. It is recognized that cost analysis is required in order to ensure that the products are made available at competitive prices.

The Statement of Principle expresses a commitment to waste reduction and has been adopted by various organizations both inside and outside of the GIPPER membership. We encourage all environmentally conscious organizations to adopt this or a similar Statement of Principle.

ABOUT THESE GUIDELINES

As in the two previous editions of the Guidelines, the Committee reviewed the items purchased in large quantities by its members, which contributed to the waste stream and focused on ways to reduce waste through more enlightened purchasing practices. The Committee's recommendations are reflected in these guidelines. The guidelines are intended to help organizations achieve the commitment made through the adoption of the Statement of Principle. They are not referenced in legislation and are being distributed for information purposes only. The GIPPER members will not accept responsibility for any liabilities incurred consequent to the use of the recommendations in these guidelines. **IT IS THE USER'S RESPONSIBILITY TO DECIDE WHETHER THESE RECOMMENDATIONS ARE APPLICABLE TO THEIR SPECIFIC NEEDS.**

As determined by the GIPPER Committee, and as technology and the marketplace changes, these guidelines may be updated to revise the information and to include additional topics or product categories. It is the Committee's intention to review other items/services and add to and/or revise these guidelines in the future. All information contained in this guide is current to the time of publication. The information may change as new technology, processes and regulations come into effect.

The following section has been added in this third edition:

- Office Equipment: Printers, Photocopiers, Facsimile Machines and Toner Cartridges

The GIPPER Committee welcomes comments or inquiries on these guidelines. Your comments can be addressed to the Committee Chair. For additional copies please contact:

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ENVIRONMENTAL PROCUREMENT CONSIDERATIONS

MATERIALS AND SERVICES

This section outlines some of the environmental factors contributing to waste reduction that should be considered prior to specifying and purchasing materials and services. These factors apply generally to all materials. Further considerations that are more applicable to specific product types are identified in the Guidelines section of this document under the various product sectors.

1. Specifications which require 'new or virgin materials only' should be amended to include the maximum recycled content (especially post-consumer) and salvaged materials where practicable. These materials should meet all requirements for their intended use, performance criteria and appropriate regulations and standards (i.e. CSA, building codes, product health and safety requirements - WHMIS, etc.). When evaluating the cost effectiveness of the material alternatives, environmental "costs" should be taken into consideration.
2. Recyclable materials should be used wherever possible and applicable. Avoid materials for which no recycling facilities or collection systems exist at the point of end use. The recycling process, however, should provide a net environmental benefit and should minimize adverse environmental effects.
3. Eliminate or replace all hazardous materials and products requiring the use of hazardous chemicals in their production. Where possible, replace or minimize the use of equipment and materials requiring maintenance that involves hazardous products or produce hazardous by-products through their use.
4. All product environmental labelling and advertising should meet the guidelines in Consumer and Corporate Affairs Canada document titled "Principles and Guidelines for Environmental Labelling and Advertising" (see References section for details). Canadian Standards Association (CSA) Guideline Z761-93, "Guideline on Environmental Labelling" assists businesses to identify acceptable environmental labelling for their products and packaging. The (CSA) Guideline Z766-95 "Environmentally Responsible Procurement ("Green Procurement")" has been developed to aid organizations to assess, implement, and sustain an Environmentally Responsible Procurement plan (ERP). Guideline "ISO 14021 Essentials" is a practical guide to the application of the Standard and clarifies linkages of ISO 14021 with other documents in the ISO 14000 series.
5. The following environmental factors should be considered by purchasing staff in pursuing all purchase transactions. These factors are in the form of questions that should be addressed in developing specifications and tender terms and conditions. Answers to these questions should become the basis of purchase specifications, tender evaluation and contract award decisions. Product specific requirements or specifications will have to be much more detailed than these general questions/guidelines.

5.1 General Environmental Criteria for all Products

- Is the product size/magnitude necessary?
- Is the product really needed?
- Are all the features of the product necessary? Can any features be eliminated, Is there a suitable alternative that is less harmful to the environment and safe to use?
- Is the product designed to be durable/long-lasting?
- Are recycled materials used to produce the product?
- Was the product produced locally? How far did it travel?
- Does the product contain any banned or restricted substances? (Consult the "References" section for the Agency For Toxic Substances and Disease Registry, The National Pollutant Release Agency, and the CEPA substances list)
- Does the product contain any exotic/endangered materials? (Consult the "References" section for Convention on International Trade in Endangered Species of wild Fauna and Flora)
- Is the product reconditionable or recyclable following use?
- Has the product been designed for disassembly (e.g., computers, vehicles)?
- Does the product require special disposal considerations (e.g. hazardous materials)? (Consult the "References" section for Workplace Hazardous Materials Information Systems)

5.2 Environmental Considerations for Durable Products

- Is the product energy efficient?
- Are any components of required maintenance environmentally damaging?
- Is the product designed for easy maintenance and repair?
- Are recycled materials used to produce replacement parts?
- Are replacement parts reconditionable or recyclable (e.g. laser printer cartridges)?

5.3 Environmental Considerations for Consumable Supplies

- Are the supplies designed to reduce consumption (e.g. rechargeable batteries)?
- Are the supplies designed to minimize waste (e.g. carbonless multi-part forms)?
- Are the supplies required by the equipment non-toxic and/or do they require special disposal considerations?
- Are recycled materials used to produce the supplies?
- Are the supplies reusable?
- Can the supplies be recycled or composted after use?

5.4 Environmental Criteria for Packaging

- Is the packaging designed to be minimal?
- Is the product packaged in bulk (if functional)?
- Is the packaging reusable, specifically, will the supplier take it back for reuse or will the end user reuse it?
- Are recycled materials used to produce the packaging?
- Is the packaging material recyclable?

5.5 Guidelines for Preparing Environmental Specifications

When developing purchase specifications, please:

- Specify products that meet or exceed requirements of Environmental Choice ProgramM (ECP) certification criteria, where available, or
- Specify other standards/guidelines issued by accredited standards writing organizations where ECP certification criteria are not available, or
- Write your own specifications to suit your procurement needs in accordance with the general guidelines outlined in this document when such specifications are not available from other sources, and,
- Specify that all services carried out in an environmentally sensitive manner in order to minimize the pollution created during the use of the equipment and supplies and the amount of waste generated during the process.

PURCHASING

This section provides general information that should be considered during the procurement process. These guidelines are meant to be used to initiate a dialogue with suppliers about the environmental aspects of their business processes, products and services. Additional purchasing related processes are described in the section on Packaging. Refer to the Packaging section in order to incorporate packaging waste reduction efforts along with the requirements listed below when dealing with suppliers.

1. To ensure quality, suppliers and contractors should be requested to provide representative samples of materials as well as names of previous users of the product or service (references). Consider use of new products on a trial basis until performance and technical requirements have been proven.
2. All supplier or manufacturer claims should be supported with appropriate documentation on first time buys or if any of the original information changes such as types of material or process used to produce the product. Examples of supporting documentation are toxicological information, test results from a recognized or accredited laboratory, source of recycled content information (domestic or foreign, post-consumer or reprocessed manufacturing scraps) and accreditation from recognized program such as ECP. Consider a visit to the manufacturing facility or send an inspector to verify these claims. Refer to the Appendix for an example of a product verification form (developed by ACCESS, the Association of Canadian Cities on Environmentally Sound Strategies) that may be used to establish environmental-ly sound attributes of a product.
3. Promote environmental objectives to industry associations and companies through seminars, brochures or other means. Whenever possible or appropriate make environmental issues an agenda item in meetings with suppliers. Where possible, deal with suppliers/manufacturers who have implemented environmental policies and operating guidelines and are actively seeking ways to minimize adverse impacts on the environment through their operating practices. Written responses to the questions below should be requested. Reluctance to respond or no response will give an indication of a firm's commitment to the environment and level of downstream support that can be expected.
 - Does the supplier/manufacturer have an environmental policy statement?
 - What is the supplier's history on environmental and safety issues?
 - Can the supplier verify all their environmental claims?
 - Has the manufacturer/supplier implemented energy efficiency measures and/or conducted a comprehensive energy audit?
 - Has the manufacturer/supplier received any environmental fines?
 - What waste reduction programs does the company have in place? Are there further plans for environmental improvements?
 - If using recycled materials, what is the percentage, source (domestic or foreign), and type of recycled material content (post-use or post-consumer, or reprocessed manufacturing scrap)?
 - Has the supplier conducted a comprehensive waste audit?
 - Does the supplier conform to the Ministry of the Environment (MOE) regulations and all other applicable legislation and regulations*?
 - Is the supplier ISO 14000 certified?

** Note: MOE "3R" Regulations became law in Ontario on March 3, 1994. Five regulations cover three main components: 1) Municipalities; 2) Industrial, Commercial and Institutional (ICI) businesses; and 3) Streamlining the approval process. The regulations will require major Industrial, Commercial and Institutional businesses to implement source separation programs for certain materials, waste audits, and waste reduction work plans. Major packaging users within certain business sectors will also be required to implement packaging waste minimization measures.*

4. Environmental factors should be taken into account to establish **life cycle costing criteria** to ensure that tender evaluation gives proper consideration to the environment over the creation and life of the product and at the time of ultimate disposal. All environmental factors or boundary conditions that are not built into the product specifications but nevertheless form part of the requirement must be clearly identified elsewhere in the tender documents in order to be considered in the evaluation. Factors that might appear in tender terms and conditions include **price, economic and environmental impact (such as unnecessary or unsuitable packaging), production processes used, energy use, maintenance, and disposal requirements**. Canadian Standards Association (CSA) Guideline Z760, "Life Cycle Assessment", provides a conceptual framework and several evolving methods for analysis of environmental loadings, and the evaluation of environmental releases. The guideline gives technical guidance on an acceptable method for conducting life cycle assessments and reporting assessment results. The CSA also publishes a number of Environmental Management Systems 'PLUS' documents dealing with life cycle assessment.
5. Ensure all tender specifications and contracts are printed double sided and encourage suppliers to correspond with a minimum of paper waste. Consider paper reduction possibilities such as system contracting using Electronic Data Interchange (EDI) or blanket contracts using phased releases or call-ups instead of individual purchase orders.

GUIDELINES

ALTERNATIVE SOURCE ELECTRICITY

From a consumer perspective electricity is clean, cheap and has no visible environmental consequences. If we look beyond the outlets in our walls however, environmental costs become apparent. In Canada the major methods of generating electricity generation include burning fossil fuels, harnessing the power of water, and using nuclear power. Each power source has consequences for the environment, from creating acid rain to flooding lands to disposing radioactive waste. The Environmental Choice Program has made a commitment to promote electrical energy sources that have greatly reduced environmental impacts. The ECP recognizes electricity that has been generated from naturally occurring energy sources (such as the wind and sun), and from power sources that with the proper controls, add little in the way of environmental burdens (such as less intrusive hydro and certain biomass combustion). Additional information can be found in the "References" section via Natural Resources Canada's Renewable Energy Deployment Initiative, The Canadian Wind Energy Association and the Canadian Solar Industries Association.

Certification Criteria

All Sources

- The facility must be operating, reliable, non-temporary and practical.
- During project planning and development, appropriate consultation with communities and stakeholders must have occurred, and prior or conflicting land use, biodiversity losses and scenic, recreational and cultural values must have been addressed.
- No adverse impacts can be created for any species recognized as endangered or threatened.
- Supplementary non-renewable fuels must not be used in more than 2.00% of the fuel heat input required for generation.
- Sales levels of ECP-certified electricity must not exceed production/supply levels.

Certification Criteria

Specific Sources

- Solar (cadmium containing wastes must be properly disposed of or recycled).
- Wind (protection of concentrations of birds including endangered bird species).
- Water (compliance with regulatory licenses; protection of indigenous species and habitat; requirements for head pond water levels, water flows, water quality and water temperature; and measures to minimize fish mortality and to ensure fish migration patterns).
- Biomass (use only wood wastes, agricultural wastes and/or dedicated energy crops; requirements for rates of harvest and environmental management systems/practices; and, maximum levels for emissions of air pollutants).
- Biogas (maximum levels for emissions of air pollutants; and leachate management).
- Other technologies that use media such as hydrogen or compressed air to control, store and/or convert renewable energy.
- Geothermal technologies.

CLEANING PRODUCTS

Cleaning products on the market have been labelled "environmentally friendly" because they are phosphate free or are considered biodegradable, however, this determination has been difficult in the past due to lack of definitive standards for biodegradability and other environmental factors. The Environmental Choice Program has developed certification criteria for Laundry Bleach (PRC-034), Liquid Laundry Detergents and Fabric Softeners (PRC-042), Industrial Hand Cleaners (PRC-046) and Hospital Grade Disinfectants (PRC-48). The Environmental Choice also has developed guidelines for General Purpose Cleaners (ECP-33) and Industrial and Commercial Cleaners (ECP-57). It is highly recommended that copies of these documents be obtained and reviewed in detail to provide greater insight into the specific requirements. These criteria provide specific requirements which cleaners must meet in order to be licensed to carry the EcoLogoM - the program's symbol of certification. The first procurement recommendation is to specify products that meet the Environmental Choice Program criteria as applicable.

One of the key recommendations to purchasers is the requirement for suppliers to substantiate their environmental and safety claims. Numerous products have been offered for sale making environmental and safety claims that cannot be substantiated. These claims must also consider product performance. In order for any product to be practical it must do the job for which it was intended. There are some available standards which measure effectiveness of cleaners, for example, ASTM D 4488-85, Standard Guide for Testing Cleaning Performance of Products Intended for Use on Resilient Flooring and Washable Walls provides a method for determining the capacity of a product to remove any of various soils from standard surfaces relative to standard cleaning solution. However, the results of actual in-house testing may provide a more meaningful evaluation.

The examination of the specific cleaning operation is as important as the selection of the cleaning product. The combination of equipment, procedures and products should be reviewed together due to the breadth and complexity of some cleaning operations. The wide variety of chemicals belonging to many chemical groupings makes it difficult to provide definitive procurement recommendations, however, there are some considerations to be aware of, such as:

- avoiding products which contain designated hazardous substances, although there is not a definitive list both the EPA Office of Pollution Prevention and Toxics and the International Agency of Research on Cancer (IARC) have lists that can be viewed on the internet;
- minimizing the amount of volatile organic compounds (VOC's);
- whenever possible, review the complete ingredient list (with non-disclosure agreements if needed); as well, request a Material Safety Data Sheet (MSDS);
- no secondary packaging; availability of bulk packaging;
- recognition by environmental testing/labelling agency (e.g. Environmental Choice);
- be aware of ingredients identified on any lists of chemicals being targeted for phase out (e.g. Accelerated Reduction or Elimination of Toxic Substances [ARETS]; MOE /MOEST: Candidate List of Substances for Bans or Phase-outs; Water Quality Board of the IJC [International Joint Commission] list of 10 chemicals for virtual elimination; Canada Ontario Agreement [COA]: virtual elimination of persistent, bioaccumulative and toxic substances from the Great Lakes ecosystem -- priority given to 13 toxic substances, etc.).

Procurement Recommendations

1. Purchasing specifications for some cleaning products should include requirements for meeting existing government specifications (Canadian General Standards Board (CGSB) or the American Society for Testing and Materials (ASTM)) in order to validate manufacturer claims that products work just as well or better than other products.
2. Products that are non-hazardous and low in phosphate (where wastewater treatment is inadequate) should be specified.
3. Where biodegradability is requested, the products ability to degrade at the disposal site must be evaluated based on specific criteria such as time required to degrade, recognized test method used, degradation by-products, and overall toxicity of substances generated during the degradation process. By-products of degradation and the product in question must not contain ingredients that are known to be damaging to the environment and/or the sewage collection or treatment facility.
4. Products which require only a small amount to clean well should be specified over others that require a larger amount provided that all performance criteria are met (e.g. concentrates).
5. Cleaning products should be purchased in containers which are reusable (refillable), returnable or recyclable (where recycling programs accept the containers).
6. Contracts for janitorial and cleaning services should specify the use of Environmental Choice Program approved products where applicable.
7. It may be possible to omit the use of certain cleaning products by investigating new technologies and/or using materials that are self-cleaning.

3-R Recommendations

- Investigate increased use of concentrates or products that have smaller usage amounts carefully considering the application and potential health and safety risks that may be introduced during decanting and mixing of hazardous products. When using concentrates ensure that proper measuring devices are included with the product (e.g. one-stroke pump dispensing system that measures the correct amount and ensures no spillage occurs).
- Develop programs for container return, reuse or recycling.
- Measures to minimize wastage of cleaning products, such as carefully following instructions for use, should be encouraged.
- Develop programs to reduce the variety of cleaning products and standardize on the safest and environmentally preferred products.

COMPOST

Composting, both at home and centrally, is very effective at diverting organic materials from landfills. Composting initiatives should be supported in order to reduce the amount of organic waste that is sent to landfills. Organic wastes form a substantial part of the total waste stream, and they create landfill leachate and methane gas problems. Environmental benefits of composting are not confined to waste diversion, there are also many benefits from the use of compost, such as, increased aeration, improved moisture and nutrient retention, decreased soil erosion, reduced soil surface crusting, plant disease suppression, improved tilth, etc. In order to realize the full potential of composting, markets must be developed in order to ensure that supply does not greatly exceed demand for the product.

Procurement Recommendations:

1. Purchases of small (home) composters should include the requirement for units to meet Environmental Choice^M Program Guideline ECP-15.
2. Purchases of composters and related products used in the collection of organic waste for the purpose of composting should include provisions for evaluating the products on the basis of post-consumer and post-industrial recycled material content.
3. Whenever compost can be used as a substitute commodity, for example as a soil conditioner, priority should be given to using compost that is produced by the requesting organization's own composting program, then other municipality programs, and finally from private sector composting programs.
4. Specifications for finished compost should meet the standards found in the Interim Guidelines for the Production and Use of Aerobic Compost in Ontario published by the Ontario Ministry of Environment (MOE) or the Environmental Choice Program's criteria for Compost from Fish Offal (PRC-044).
5. Service contracts for landscape and gardening work should specify that soil amendments be obtained from compost programs (as per recommendation 3 above) and should meet the Ontario Ministry of Environment standards.

3-R Recommendations

- Organizations and locations which create significant amounts of organic wastes should consider setting up on-site composting facilities in accordance with regulations or making arrangements with central composting facilities.
- Central composting facilities require EPA and Ontario Water Resources Act (OWRA) approval unless exempt. The composted material must meet Ontario compost guidelines if it is to be used on an unrestricted basis.

Compost Information Summary

	Home Composting	Central Composting
General	Home composting is a common practice. The process is meant to be aerobic (no smell). Finished compost can be used as a soil enhancer. Mid-scale composters are available for multi-unit residential buildings and Industrial, Commercial & Institutional businesses.	Central composting is becoming common practice. Primarily for composting yard waste but may also accommodate composting of food waste, including meats. Windrow composting method is most common.
	Composters: Composters may be homemade or purchased. Used to compost grass and other yard waste. Used also for kitchen waste except meat, fish, and dairy products.	Windrow Method: Generally done outdoors, with or without cover. Relatively inexpensive capital investment but requires turning and mulching equipment. Operating costs are low. Finished compost in 1 to 9 months typically.
	Digesters: These are anaerobic composters (may smell). Used mainly for kitchen waste (incl. meat, etc.). Not as common as aerobic composting.	Open Channel: Generally done indoors or with partial cover. Capital costs are generally higher. Operating costs are somewhat higher. Finished compost in less than one month typically.
	Vermi-composters: Composting with worms; it's clean! Good for apartment dwellers. It's indoors, so it's active year round. Must be properly maintained (re: moisture content) to prevent appearance of gnats.	In-vessel Method: Enclosed tank, silo, or tunnel. Capital costs are high depending on size. Operating costs are generally higher. Finished compost in less than one month typically. Favourable in urban settings.
Uses of compost	Used generally as a soil enhancer. Improves soil structure, moisture retention, etc. It's not strictly a replacement for fertilizer.	Potential for sale of finished compost, otherwise: Give it away to residents and farmers. Can also be used by parks and recreation. Some use as part of landfill soil cover.
Advantages	Composters have been widely used successfully. Can reduce garbage going to curb by over 25%. Inexpensive to purchase. No operating costs. Can help reduce municipal waste costs.	Capital funding assistance is provided by MOE. Can achieve substantial waste diversion.
Disadvantages	Digesters may cause problems if improperly used. Hard to track how much waste is diverted. Not everyone wants to compost.	Separate collection of yard waste required. Odours can occur if process not controlled. Siting difficulties due to NIMBY.
Municipalities	Many Ontario municipalities have programs. Composters have been made widely available. Digesters have recently been made available. Typically a nominal fee is charged to residents. MOE has provided subsidies for purchase.	Some central composting on pilot scale. Several regions looking at large scale. Many government facilities (approx. 344 for Provincial and territorial) have centralized composting facilities.
Approvals	None required.	MOE Certificate of Approval may be required.
Information	Many municipalities have compost seminars, etc. Recycling Council of Ontario has a Compost Ontario program.	The Composting Council of Canada 16 Northumberland Street Toronto, Ontario, M6H 1P7 Tel: (416)535-0240 Fax: (416) 536-9892 Internet: www.compost.org E-mail: ccc.compost.org
Standards	ECP-15 Guideline for compost units. PRC-044 Compost from Fish Offal	MOE Guidelines for the Production and Use of Aerobic Compost in Ontario

CONSTRUCTION AND DEMOLITION MATERIALS

As construction and demolition waste make up approximately one-half of all waste entering a landfill site, this section is key. Information and recommendations relating to construction and demolition can be found from Asphalt to Wood.

While the construction and demolition industries are both involved with the handling and use of building materials, it is important to distinguish the two as each may require different methods for the 3-R's and disposal requirements. A one-page code promoting 3-R's practices among the members of the construction industry has been endorsed by many organizations. Entitled: "Ontario Construction Industry 3-Rs Code of Practice", the Code of Practice has been included at the end of this section.

Construction waste source separation is less complicated than demolition waste since waste is generated on an item by item basis. It is difficult to control due to the involvement of multiple trades and contractors. However, a long project life (as compared to the short life span of demolition projects) allows for more opportunity for the separation of waste categories.

Demolition waste involves post-use materials that may have components attached or which may have been altered (painted, glued, etc.). As demolition wastes are commingled with many components, separation of these components is difficult. The short duration of the project results in limited opportunities for source separation. However, since only one contractor is involved (usually), control is simplified.

Although all phases in the design, construction, renovation, and demolition of buildings should be reviewed for their overall environmental impacts, these recommendations will deal more specifically with effects on the (solid) waste stream.

Design

All requests for building design should require architects to incorporate sustainable development principles. Buildings should be designed to maximize energy and water efficiency, while maintaining healthy air quality and worker ergonomics. Design should also include the minimization of waste in the construction, operation and maintenance of buildings, incorporating means to collect, store, and compact waste for recycling. Adequate work and aisle space is needed and recycling methods must comply with fire codes. The building layout should allow recycling to be easier than disposal. Design should also include use of environmentally preferred materials and limit use of materials contributing to poor indoor air quality. A concerted effort should be undertaken between all constituents (i.e. from the designers to the end users or customers) to ensure that design goals and objectives do not adversely affect environmental efforts.

Flexible design will enable renovation for future needs to be done with minimum waste. For example, modular design with moveable walls or use of the open office concept. Inclusion of unnecessary features should be minimized.

Waste Management Plan for Pre and Post Construction

Contractors should be required to submit a Waste Management Plan with their quotations, which is to include:

- procedures for educating workers and subcontractors in order to ensure adherence to the Waste Management Plan;
- methods for reducing waste such as ordering material only as required, using up excess material on site where possible, or prefabricating sections off site;
- the percentage of recycled content in construction materials;
- methods and techniques for collecting, separating, and recycling waste materials and packaging, including a list of materials to be recycled and percentage expected to be recycled or sent to landfills;
- provisions for dealing with hazardous waste, including procedures for handling, clean-up and disposal;
- a list of carriers and disposal destinations for each material to be disposed of or recycled. The list should be provided initially or at least before the final payment is made. This will ensure that all materials are being recycled and waste is legally disposed of.
- alternative options for recovering higher percentages of materials and related costs;
- the cost associated with the recovery of the material and the anticipated revenues from the sale of such material;

Other Recommendations

- Avoid over-packaged materials. Buy nails, etc. in bulk.
- Use leftover insulation for soundproofing interior walls.
- Buy materials made with recycled-content.
- Buy pre-used materials where available locally from your local reuse centre. Your leftover or used materials can also be dropped off here.

Environmental Choice Program criteria exist for other building materials, such as ECP-35 "Building Materials: Acoustical Products"; ECP-40 "Building Materials: Thermal Insulation"; ECP-45 "Sealants and Caulkings"; ECP-50 "Gypsum Wallboard"; PRC-024 "Particleboard Manufactured from Agricultural Fibre "; PRC-037 "Fibreboard Manufactured from Recycled Resources"; PRC-043 Cork Flooring Products; PRC-063 "Commercial Modular Carpet "; PRC-069 "Bamboo Flooring Products"; and, PRC-072 Neoprene Latex Roofing System.

R-2000 and C-2000 Building programs aimed at energy efficient and environmentally responsible technologies and practices.

"Designing With the Environment: The Professional's Guide" document on environmentally responsible design (contact MOE "Waste Reduction Branch" or "Waste Management Policy Branch")

ASPHALT (Paving)

Paving asphalt is a mixture of 5% asphalt cement and 95% aggregate. It can be used as a "cold mix" -- crushed asphalt, aggregate, and stone, compacted to form a roadbase; or "hotmix" -- heated asphalt, compacted to form the road surface.

Procurement Recommendations

1. Purchase recycled asphalt for new roads. Many road surfaces made up of 25% recycled and 75% virgin material meet Ministry of Transportation and Ontario Provincial Standard Specifications for road construction.
2. Consider pilot programs for reuse of asphalt or asphalt containing recycled materials (e.g., glass, crumb rubber).

3-R Recommendations

- Asphalt may be stripped from a road surface, crushed and used as granular or hot mix on the same or future road construction projects.
- Road asphalt not deemed suitable for recycling should be used as road base material

BRICK, MASONRY & TILE

Brick, masonry and tile are construction materials made up of kiln-fired mixtures of water, clay and sand. The Greater Toronto Home Builders' Association estimates that approximately 400 bricks are wasted for each home built.

Procurement Recommendations

1. Purchase bricks that have been ground into granular material as an aggregate for secondary uses, i.e., road base, backfill material.
2. Purchase tile made from recycled glass.
3. Purchase used bricks to add "character" to construction projects, e.g., fireplace walls, or for buildings being built to create a certain ambience or to suit the existing environment.

3-R Recommendations

- There is a growing market for recycled brick, although these markets are not highly developed in areas where landfill costs are low and the materials are not banned outright from the landfill sites.
- Send bricks to recycling companies that will grind brick into granular material, to be used as aggregate material for future construction.

Note: Material contaminated with lead paint or with mixed contaminated rubble is not currently marketable. Refractory brick may contain heavy metals, fluoride and other contaminants and is not currently marketable.

CONCRETE

Concrete is made of a hardened mixture of cement, sand, stone and water. Concrete waste is produced in the construction, renovation and demolition of bridges, roads, sidewalks, buildings, foundations and structural elements.

Procurement Recommendations

1. Purchases of construction aggregates for secondary uses (e.g., roadbase, fill materials) should specify crushed "demolition" and "left-over" concrete and other post-use concrete and masonry products (e.g., concrete pipes, blocks, bricks, and glass). Concrete can be crushed and used as an aggregate for roadbeds, provided it passes a density test to determine its suitability

2. Purchases of concrete and cement should specify fly ash or slag aggregate, depending on intended use. Concrete blocks are also available comprised of lightweight aggregates made with a percentage of fly ash.
3. Purchase of ground concrete aggregate should be considered in place of sand for icy road applications where its use would not compromise the intent.

Note: Use secondary crushed concrete aggregate only when it meets specified structural requirements.

3-R Recommendations

- Improved material planning can avoid excess concrete mixture and promote reduction of leftover concrete mixture (i.e., returned from site due to over estimated requirements).
- Prior to demolition operations, opportunities for use of crushed materials and other salvageable items should be identified in the immediate vicinity.
- On-site crushing/screening operations may prepare the material for both on-site and off-site use.
- Minimize need for virgin aggregates by using crushed demolition materials wherever possible. This will help to preserve natural environments where aggregates are mined.
- While some dealers accept concrete reinforced with steel bars, it reduces the material value, due to the cost of separating metal from concrete.

DRYWALL

Drywall is a construction material made of gypsum compressed between two layers of paper. Recycling drywall involves separating it into paper and gypsum. The Greater Toronto Homebuilders Association estimates that approximately 400 kg of drywall is wasted on the site of each new home built. The MOE and Ministry of Energy, Science and Technology (MOEST) estimates that all of the waste drywall used in new construction could be recycled.

Procurement Recommendations

1. Purchasing specifications should include a minimum percentage of post-consumer recycled drywall content. Environmental Choice Guideline ECP-50 provides specific criteria for environmentally preferred drywall. Wallboard has been produced with over 20% recycled content. Recycled drywall should meet the relevant performance standards (e.g., CSA A82.27 and A82.20 series).
2. Other products may be available which are made from recycled drywall, e.g., fine calcium sulphate for agricultural uses, coarse calcium sulphate for cat litter.

3-R Recommendations

- Source separate at construction and demolition sites.
- Discourage unnecessary generation of wastes through controlled issue of drywall and utilize scrap pieces to full extent (e.g., place scrap drywall pieces within interior walls in order to increase the heat retention as well as improving sound absorption).
- Utilize drywall recyclers. Recycling companies will accept drywall according to their specifications. Some dealers prefer new construction drywall or renovation off-cuts, while others will not accept painted, vinyl-coated, or an abundance of nails in drywall.

WOOD

Wood-based construction materials are derived from trees. Wood debris, referred to as clearing and grubbing material, is generated by land clearing operations. Wood wastes include packaging materials (wooden pallets, skids and crates), and building materials such as veneer, particle board, plywood, lathing, flooring, doors, frames, lumber, forms and mouldings and off-cuts.

Procurement Recommendations

1. Purchase wood products made from wood scraps. Such products include finger-jointed off-cuts, wood trusses (2 load bearing members connected by a thin web - the load-bearing members can be made with laminated strips from fast growing trees [not from old growth forests] and the webs from wood scraps), exterior cladding pressed from scrap wood.
2. Purchase wood containing natural preservatives in lieu of chemically treated wood.
3. Purchase chipped waste wood for landscaping, mulch and animal bedding.
4. Where appropriate, consider purchases of lumber substitutes made from recycled materials.
5. Avoid purchasing tropical hardwoods, and wood from old growth forests which are not harvested in a sustainable manner.
6. Where possible, purchase wood that has been grown and harvested in a sustainable manner; referencing one or more of the following:
 - a) Buying wood from forests certified against a sustainable forest management system standard. Examples of this include certification by the Forest Stewardship Council (FSC). Currently, the FSC is the only certification scheme using an easily recognizable label to identify certified wood products. The Canadian Standards Association (CSA) measures against CAN/CSA-Z808 and CAN/CSA-Z809
 - b) Buying wood from forests that have been managed such that the management systems, practices, procedures, processes and timeframes set meet sustainable forest management criteria such as those identified by the Canadian Council of Forest Ministers (CCFM),
 - c) Buying wood from forests that have been managed such that the system, practices, procedures, processes and timeframes set meet environmental management standards such as the ISO 14000 series.

3-R Recommendations

- Re-use dimensional lumber off-cuts on site for bridging or finger-joining.
- Centralized woodcutting can reduce lumber use up to 15%.
- Reduce waste by ordering and issuing material only as required, using up excess material on-site.
- Pre-fabricating sections off-site (i.e., factory built), such as roof trusses, to minimize waste and improve quality control.
- Reclaimed lumber or other whole wood products obtained from demolition sites. Often, excellent quality timbers and lumber can be salvaged from those sites.
- Separate scrap wood for re-use. Source separation of waste wood for recycling options and proper disposal of contaminated wood. Purchasers of recyclable wood include:
 - Pulp & paper manufacturers
 - Manufacturers of chip, particleboard and oriented strand board
 - Pet and livestock litter and bedding processors
 - Compost/mulch processors
 - Fire log processors
 - Energy recovery installations
- Using an on-site chipper for uncontaminated wood may reduce the cost of managing waste wood.

**Ontario Construction Industry
3-Rs CODE OF PRACTICE
January 1993**

The Ontario construction industry has adopted this Code of Practice relating to the 3-Rs of waste management: **REDUCE**, **REUSE**, and **RECYCLE**. This Code will give the construction industry a point of reference from which to coordinate its activities. The Code demonstrates the commitment to working toward sustainable development, recognizing the need to balance environmental and economic considerations. The Code outlines the commitment of the Ontario construction industry to responsible management of its waste stream and material resources. The Code is not intended to be a comprehensive document establishing a construction industry standard for the 3-Rs of waste management.

The Ontario construction industry will promote strategies to reduce the amount of waste being sent to landfill. This commitment goes beyond simple compliance with the letter and spirit of the law: it involves a commitment to leadership by taking the initiative to employ advanced material management techniques.

Construction industry members are encouraged to consider implementing the following principles and initiatives to the extent practical, recognizing members' individual business and operating constraints:

REDUCE

- promote the Ontario construction industry's commitment to reduce the waste stream;
- incorporate 3-Rs waste management considerations into the preplanning of projects;
- investigate construction techniques, technologies and design which produce less waste;
- target factors which contribute to excessive waste generation;
- consider purchasing options that minimize packaging and product waste;
- purchase construction materials in dimensions and quantities to satisfy project requirements; and
- avoid damage of construction materials by proper on-site handling and storage.

REUSE

- consider methods of reusing materials on site where appropriate;
- separate materials on site for reuse purposes where appropriate;
- strip reusable materials out of buildings during demolition and renovation if practical; and
- network locally to identify markets for reusable materials.

RECYCLE

- investigate methods of recycling material resources;
- separate material on site for recycling purposes where practical;
- use recycled-content and recyclable construction materials;
- co-operate with private and government initiatives to divert recyclables from disposal; and
- network locally to identify markets for recyclable materials.

The 3-Rs Code of Practice has been endorsed by:

Canadian Standards Association International
Council of Ontario Construction Associations
Electrical Contractors Association of Ontario
Grand Valley Construction Association
Greater Toronto Home Builder's Association
Heavy Construction Association of Toronto
Independent Contractors Group
London & District Construction Association
Mechanical Contractors Association of Ontario
Metropolitan Toronto Demolition Contractors Association
Niagara Construction Association
Ontario General Contractors Association

Ontario Hot Mix Producers Association
Ontario Home Builders' Association
Ontario Industrial Roofing Contractors Association
Ontario Painting Contractors Association
Ontario Sewer & Watermain Contractors Association
Ottawa Construction Association
Provincial Building & Construction Trades of Ontario
Sarnia Construction Association
Sudbury Construction Association
Toronto Contractors Association
Utility Contractors Association of Ontario

ENERGY EFFICIENT LIGHTING PRODUCTS

Canadians first became aware of the need to reduce their energy consumption as a result of the oil crisis in the 1970's. Electricity is one form of energy where much time and effort has been spent on reducing the amount Canadians consume. A benefit of lower electricity consumption is lower costs and one way to reduce electricity consumption is through the use of energy efficient lighting.

The percentage of the total electricity costs due to lighting is approximately 40% for commercial and 10% for industrial businesses. With the use of energy efficient lighting products, such as compact fluorescent lamps and energy efficient electromagnetic ballasts, electric lighting costs can be reduced by as much as 60% annually. The newer lamps and ballasts are more energy efficient, generate less heat than older models and may last longer. Thus part of the cost savings are due to lower labour costs for maintenance and replacement as well as lower air conditioning costs for removal of lamp and ballast generated heat.

A further benefit is an environmental one, as lower electricity consumption can result in a reduction in the air pollution resulting from coal fired generating plants. As well, new products do not use lead solder on the ends of fluorescent tubes and use less environmentally harmful materials such as mercury. Newer models of fluorescent lamps use less mercury than those produced ten years ago. Mercury cannot be totally eliminated, however, because it is essential to the operation of the lamp.

Although the lighting products of today are environmentally better than those of twenty years ago, there are environmental impacts still not resolved. Disposal of lighting products still causes problems for the environment. Lamp manufacturers, the CEA, and Ontario Power Generation (formerly Ontario Hydro) are investigating the best practices for reclamation or disposal in landfill. The most environmentally benign option has yet to be determined.

Design

Evaluation

During the design or restructure of a lighting system the following questions should be asked:

- What is the area to be illuminated used for?
- What is the existing lighting? (i.e. type, illuminance levels, and controls)
- What is the effectiveness of the existing lighting?
- What is the efficiency of the existing lighting?
- What is the desired lighting impression (i.e. warm & cozy vs. cool & crisp)?
- What are the appropriate lighting system alternatives? What is the required illumination for the work area?¹
- What are the energy savings using appropriate lighting system alternatives?²

¹ A source for recommended illuminance levels is the IESNA (Illuminating Engineering Society of North America) Lighting Handbook, ninth edition.

Evolution of lighting must include both system performance (efficacy or energy efficiency) and the resulting visual environment. The visual environment takes into account illuminance on the task, glare, space layout and colour rendition. The lighting system design should attempt to make use of natural lighting, such as skylights, and energy saving lighting controls where practical. Any lighting fixtures should be accessible for easy cleaning in order to maintain the light output. Lights that are cleaned regularly maintain consistent lighting levels and may also result in a longer service life.

Resources

Expertise is available through most energy utilities in the design or restructure of lighting systems by means of an energy management representative. Qualified lighting contractors, building architects, engineers and interior designers also offer expertise. The recommended lighting levels for various tasks and other lighting system design information is available through the Illuminating Engineering Society of North America (IESNA). The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) has published ASHRAE/IES 90.1-1989, "Energy Efficient Design of New Buildings Except Lowrise Residential Buildings" that covers a section on lighting system design. "Guidelines for the Interpretation of ASHRAE/IES 90.1-1989" is contained in the "Supplementary Guidelines to the Ontario Building Code 1997" which is available through the Publisher, Orderline at 1-888-361-0003 or www.orderline.com. The Ontario Building Code recommends ASHRAE/IESNA 90.1-1989 as "good engineering practice." Also a technical reference guide for lighting technology and ancillary equipment, "Lighting Reference Guide", is available through Ontario Power Generation.

Procurement Recommendations

1. Existing lighting systems should be re-examined for possible areas where more energy efficient lighting alternatives could be used. The alternatives should then be evaluated on a payback period basis. A Cost Evaluation Worksheet has been included at the end of this section to help with this task. Lighting can be eliminated or lowered and still remain within the IESNA's recommended lighting level for that task.
2. Streetlighting can be converted to use high-pressure sodium lamps that use less energy than mercury vapour and incandescent lamps. A total lighting system changeover is recommended over any part measures (i.e. change all the lamps to fluorescent, not just one). The Environmental Choice Program has criteria for Energy Efficient Lamps & Compact Fluorescent Lights (PRC-073).

The following table describes some of the lighting technologies available and their applications:

Note: Efficacy is an indication of lighting efficiency. The higher the efficacy, the more light produced per watt input and therefore the more efficient the light source is and the higher the savings potential.

² To help with this, a Cost Evaluation Worksheet has been included at the end of this section.

³ Although ASHRAE/IESNA 90.1-1999 has replaced ASHRAE/IES 90.1-1989, 90.1-1989 is reference in the 1997 Ontario Building Code (OBC)

LIGHTING TECHNOLOGIES / APPLICATIONS

Lamp Type	Efficacy (Lumens/Watt)	Lamp Life (hrs)	Applications
INCANDESCENT LAMPS			
standard incandescent (7-1000 watts)	18 to 24	750 to 1000	Most indoor uses, dimmer switches, photo cells ** Note: <i>essential for situations where color rendering is critical</i>
energy saving incandescent (20-200 watts)	24 to 35	1500 to 2500	Same as above
halogen incandescent (42-72 watts) ** Note: <i>all halogen operate at very high temperatures</i>		3500	Most indoor uses, some can be dimmed
tungsten halogen (75-1500 watts)	40	750 to 6000	Spot or flood lights (<i>outdoor</i> or <i>indoor</i>), display rooms, outdoor motion sensors, dimmers, car headlights
halogen PAR (45-150 watts)		2500 to 4000	Same as above, excluding car headlights
GAS DISCHARGE Low Pressure Discharge:			
standard fluorescent (T12) (15-215 watts)	37 to 75	20000	Large, wide areas, kitchens, laundry rooms, basements, workshops, offices, indoor parking garages
energy saving fluorescent (25-185 watts)	40 to 62	20000	<i>Same as above</i> ** Note: <i>slight light loss</i>
compact fluorescent (5-28 watts)	50 to 70	10000	Exit signs, table, floor lamp and bathroom fixtures, most places where incandescent lamps are used now
triphosphor (25-215 watts)	50 to 75	20000	Commercial and residential applications where both color rendition and lumens output are important
triphosphor T-8 (17-40 watts)	56 to 80	20000	<i>Same as triphosphor but provides greater efficiency</i>

low pressure sodium (18-180 watts)	100 to 180	18000	Road lighting, security lighting, area floodlighting and warehousing applications, where color rendering is not at all required. ** Note: <i>most efficient light source currently available</i>
High Intensity Discharge (HID):			
mercury vapour (40-1000 watts) ** Note: operates under high pressure and very high temperature)	20 to 63	24000	Retail, industrial interior and street lighting applications ** Note: <i>least efficient HID lamp (it ranks between incandescent and fluorescent), currently being phased out in favour of the more efficient HID lamps</i>
metal halide (35-1500 watts) ** Note: operates under high pressure and very high temperature)	50 to 110	10000 to 20000	merchandising areas, assembly spaces, schools, public buildings, roadways, large industrial areas, floodlighting and sports arenas ** Note: <i>most efficient white light source</i>
high pressure sodium (35-1000 watts)	50 to 140	16000 to 24000	street lighting, floodlighting, security lighting, industrial and commercial indoor lighting, parking lot applications, underground garages, airport lighting, outdoor applications ** Note: <i>some "white" units are available</i>
SEMI-CONDUCTOR LAMPS:			
light emitting diode (LED) (3-10 watts)	N/A	20000 (15 years)	exit signs, traffic lights

LIGHTING EQUIPMENT

Energy efficient lighting equipment can be used separately or together to offer a combined energy savings. For example, a good combination might be an occupancy sensor and an ambient light detector.

LIGHTING UNIT

BALLASTS

Ballasts are used with gas discharge lamps. Ballasts act as a control gear between the primary lighting circuit supply and the lamps. The control gear regulates the starting characteristics and operating power supply of the lamp. During this process ballast components suffer energy losses through heat, vibration, and current leakage. Energy efficient ballasts are designed to minimize these losses while still providing the lamp with the required operating current and voltages. Most ballasts are designed for about 50 000 hours under standard conditions.

Note: Fluorescent ballasts produced before 1979 may contain a small amount of PCBs located in the capacitor. Mercury vapour ballasts in industrial and streetlighting fixtures may also have PCB capacitors. When re-ballasting, the Ontario Ministry Energy, Science & Technology (MOEST) should be contacted for information and assistance in the identification and proper handling of PCB-laden ballasts.

Under the Energy Efficiency Act all ballasts manufactured for sale in Ontario after October 1992 are required to be energy efficient.

REFLECTORS

Preformed reflectors, placed inside fluorescent fixtures, will reflect more light down into the work area. Fluorescent reflectors can cut lighting costs by up to 50% because they allow you to remove half of the lamps (and ballasts) from a fluorescent fixture with only a 15-20% reduction in illuminance levels. In a fixture with a properly designed reflector, more light is precisely reflected onto the work surface in a narrower beam pattern rather than being lost on the room surfaces or absorbed inside the fixture. Common applications include the installation of a reflector in a recessed 2'x4' fixture, with removal of two of the four lamps and using reflectors for fixture retrofitting. In new fixtures, specular material or high reflectance finishes are used.

Note: Reflectors tend to direct more light straight down. If the fixtures are widely spaced, the light levels between fixtures may be too low. Check that resultant light distribution patterns and light levels are acceptable for your needs.

LIGHTING CONTROL SYSTEMS

OCCUPANCY SENSORS/ MOTION DETECTORS

Occupancy sensor or motion detector lighting control systems offer energy cost savings by reducing the time that your lighting system operates. These automated control systems activate the lighting only when human motion is detected in the controlled space. Occupancy sensor lighting control systems also offer additional convenience by eliminating the need for manual operation of the lighting system. For security lighting controls, occupancy sensors are often called "motion detectors." Occupancy sensor lighting control systems are composed of a motion detection unit and an automated switching device. The majority of occupancy sensor systems have either passive infrared or ultrasonic motion sensors. Occupancy sensor lighting control systems are available in the 'wall switch' which replaces manual switches and 'ceiling- or wall-mounted' models.

DIMMERS, AMBIENT LIGHT DETECTORS, THREE-IN-ONE BULBS (TRILIGHTS), TIMERS

Dimmers, ambient light detectors and trilights are all lighting controls that are intended to reduce the lighting level and accordingly reduce energy usage. Residential trilight bulbs give the choice of three light intensities so that the user may fit the light needed to the task. Dimmers enable users to vary the lighting level completely from "off" to the maximum wattage of the incandescent bulb. Ambient light detectors are light sensing systems which adjust the electric lighting level according to illuminance level needed in the room. For example, a room that allows for use of natural sunlight would be adjusted to low electric lighting levels during the day and higher electric lighting levels at night.

Timers are used for security lighting and as a means to control light usage. They can be programmed to turn lights on and off automatically at specified times.

3-R Recommendations

- Promote energy conservation within the office. Turn lights off when they are not in use. Install some of the energy conserving lighting control systems (i.e. motion detectors, ambient light detectors, etc.).

3-R Recommendations

- Promote energy conservation within the office. Turn lights off when they are not in use. Install some of the energy conserving lighting control systems (i.e. motion detectors, ambient light detectors, etc.).
- Ensure that proper maintenance of lighting fixtures (lamps, reflectors, etc.) is done on a continual basis. Clean and dust the fixtures regularly. Practise group relamping instead of spot relamping as a cost saving measure.

Note: When disposing of large quantities of waste lamps, it must be classified according to type of waste stream according to Ontario Regulation 347. There may be small quantity exemptions. To determine the type of waste stream a Reg. 347 Leachate test must be performed. The results of the test classify the lamps into hazardous, registerable solid (non-hazardous) or nonregisterable solid waste classes. The disposal may be different for different classes.

- Buy light fixtures that have replaceable components (light source) instead of the complete throwaway units.
- Reuse the ballast after the lamp expires. Ballasts are usually good for ten lamp changes.
- Reclaim lamps and recycle lamp parts where possible. During lamp reclamation, the mercury is removed, the glass and metals recovered and the phosphors sent to landfill. But often various other combinations of recycling can be used depending on the technology available. Package waste lamps in their original cardboard containers to prevent breakage, when sending lamps for recycling or disposal.

Note: Lamp glass cannot be added to the same waste stream as container glass. Mercury- decontaminated samples should be sent to the glass broker/recycler in order to establish recyclability.

- Ballasts made before 1979 contain capacitors that are filled with PCBs and must be stored long term in barrels in approved 11/82 sites, and handled as hazardous wastes. Post 1979 electromagnetic ballasts contain valuable metals and are recyclable. To determine whether ballasts contain PCBs please consult Environment Canada EPS 2/CC/2 Aug. 1991 booklet entitled, "Identification of Lamp Ballasts Containing PCBs."
- Fixtures contain valuable metals such as aluminum, as well as glass, both of which can be recovered and recycled where facilities and markets exist.

A Cost Evaluation Worksheet for Efficient Lighting Alternatives

Detail Cost Spread Sheet			
Lamp Data	Present	Alternative #1	Alternative #2
A. Type of lamps			
B. Lamp wattage (W)			
C. Ballast wattage (W)			
D. Total kilowatts (kW) = (B+C)/1000			
E. Burning hours/year			
F. Rated life (hrs)			
G. Annual Factor = E/F			
H. Number of lamps			
Operating Costs			
I. Cost per lamp			
J. Annual Energy Cost*			
K. Annual Demand Cost**			
L. Labour per lamp for group revamping			
M. Total operating cost = (I+L)xGxH+J+K			
Cost Comparison			
N. Fixture cost for each lamp installed			
O. Labour per lamp for installation of fixture			
P. Capital Cost = (N+O+I)xH			
Q. Saving (difference between Present and Alternative)			
R. Payback (years) = P/Q			

* Energy charge @ \$/kWh ** Demand charge @ \$/kWh See your electrical bill or check with your local utility.

LUBRICANTS: ENGINE OIL, ADDITIVES AND SYNTHETIC OILS

This section focuses on a small segment of lubricants. There are many uses of lubricants which may be explored in future editions of this guide such as, cutting fluids, coolants, hydraulic fluids, chainsaw oils, thread compounds, and greases. Environmental advances have been made in many of these products, for example, increasing biodegradability, elimination of ozone depleting and toxic chemicals, increasing performance and efficiency, re-refining/recycling, and "in-situ" recycling. In the past, the consideration of the environmental aspects of these products was often ruled out because of higher initial cost, however, today these other factors must be considered in order to achieve the lowest overall cost effectiveness. The growing trend for environmentally acceptable lubricants is a result of increased awareness of health aspects and the tightening controls on the disposal of waste products.

Problems associated with disposal of waste oils can be greatly reduced by recycling/re-refining. The re-refining process involves removing the contaminants and returning the fluid to an as-new condition. This is a sensible way of utilizing a precious resource rather than sending it to landfill or pouring it down the drain thus contaminating waterways and soil with hazardous materials.

ENGINE OIL

There are three principal components of engine oil performance: viscosity, or resistance to flow; protection against wear, deposits, and oil deterioration; and fuel economy. The viscosity of an oil is a basic criterion for predicting engine oil performance. The second component of engine oil performance is protection against wear, deposits and oil deterioration. These threats to engine life and performance are minimized by incorporating additives to improve an oil's properties, e.g., anti-wear additives, detergents and dispersants to help prevent buildup of contaminants, and oxidation inhibitors to help prevent lubricant breakdown at high temperatures. The third component of engine oil performance is fuel economy. An oil designated as "fuel economy", "fuel efficient", or "energy conserving" is specifically formulated to provide significant fuel savings. Used oil can be collected, cleaned and re-refined into new oil products. Used engine oil and solvents are considered a waste and must be transported accordingly under applicable regulations (in Ontario, Regulation 347). Various collection programs are available in the marketplace. There is usually a charge associated with these programs though market conditions could change. Arrangements should be reviewed periodically to keep abreast of market conditions.

Used engine oil is normally recycled by one of two following ways:

- re-refined for blending with additives
- re-used as a supplementary heating fuel

Re-refined oils typically meet or exceed the automobile manufacturer's specifications for virgin crude oil and they are cheaper.

A recent addition to the collection scene is for used motor oil filters. These are collected and components are then separated (oil, metal, rubber) and recycled for remanufacture into related products.

Refer also to the Synthetic Oils category since Engine Oils are also available as a synthetic oil.

Procurement Recommendations

Purchasing re-refined oil products, while ensuring they meet SAE, API, or equipment manufacturer's specifications, so that vehicle/equipment warranty is not affected by use of the product(s). Re-refined oils bearing the EcoLogo are readily available. Specify Environmental Choice Program Guideline ECP-01, Automotive Engine Oil.

1. Specify that service maintenance garages use re-refined engine oils and recycle the used oil.
2. Monitor market conditions periodically to ensure competitive pricing.
3. Collection companies must be able to state the final use for the used materials and verify if requested.
4. Collection companies must be licensed to transport waste under Ontario Regulation 347.

3-R Recommendations

- Ensure that the end use for the waste oil, solvent and filters is environmentally acceptable.
- Where possible, select a company that re-refines the waste oil over one that uses it as a supplement to heating fuels.
- Ensure that selected company has always complied with all applicable government regulations and will continue to do so.
- Reduce use of truck and automobile transportation; driving less reduces the need for all transportation products.
- Commonly used oils should be purchased in bulk to avoid packaging waste and disposal of small quantities of oil remaining in the containers. Plastic packaging of smaller containers should specify a minimum 25% post-consumer plastic content.
- All organizations using engine oil, filters and antifreeze should investigate the potential for implementing a collection program for the used materials.

ENGINE OIL ADDITIVES

There are a number of fuel and oil additives on the market which claim to improve engine performance and/or provide better fuel consumption. Before using such products, we recommend that you ensure that the products are approved for use by the manufacturer of the vehicle and that the use of such products in the vehicle will not affect vehicle warranty.

Procurement Recommendations

1. Purchasing specifications for fuel and oil additives should include requirements for meeting SAE, API, or equipment manufacturer's specifications to ensure that vehicle/equipment warranty is not affected by use of the product(s).
2. Purchasing specifications should include a requirement for independent test results to back up claims made by the supplier.
3. Bidders should be asked to state the environmental benefit(s) resulting from the offered products. This information should be considered in the bid evaluation process.

3-R Recommendations

- Ensure that products provide a net environmental gain.
- Ensure that the disposal of the product(s) does not have detrimental effects on the environment. Bidders should be asked to state the disposal requirements for the products offered and this information should be considered in this bid evaluation process (i.e., cost of disposal, which will pay).

SYNTHETIC OILS

Synthetic oils and lubricants represent approximately 3% of the total volume of lubricants in Canada compared to 15-20% of the market in the United States, and over 20% in Europe and Japan. It is apparent that there are cost and environmental benefits from using synthetic oils and greases. These benefits are achieved as synthetic lubricants are more stable than conventional petroleum based products. Being more stable means they do not break down, even under severe conditions, allowing for a much longer operating life. Since a longer operating period is attainable, savings can be realized through less inventory turnover of lubricants, less maintenance and down time costs, and lowered capital replacement costs.

A number of synthetic lubricants claim other environmental benefits, such as: biodegradability, or elimination of harmful substances like trichloroethane, mineral oil, and chlorine. Many have a rape-seed or vegetable oil base. Synthetic lubricants have been designed to service the heavy equipment and food service industry. However, synthetic and semi-synthetic products have been introduced into the automotive use market in limited amounts. Some common uses are:

Heavy Equipment:

- Contractors' equipment
- Crushers, conveyors
- Water treatment plants
- Off road equipment
- Tractors and loaders
- Lifting equipment
- Pneumatic tools
- Heavy equipment transmissions

Food Industry:

- Overhead conveyors
- Poultry plants
- Packing equipment
- Saws and slicing equipment
- Refrigeration systems
- Cafeteria equipment

Procurement Recommendations

1. When purchasing synthetic or semi-synthetic lubricants, users must be assured that the appropriate regulatory authority approves their use on specific equipment. For instance, Health and Welfare Canada, Foods section, should authorize lubricants used in the food industry. Heavy equipment lubricants generally meet OSHA and ASTM standards; however, buyers must assure themselves that the Original Equipment Manufacturer (OEM) warranties will not be voided by using synthetic or semi-synthetic oils in their equipment.
2. Purchasers of synthetic or semi-synthetic lubricants should require the suppliers to provide technical training and support for an ongoing maintenance education program.
3. Synthetic and semi-synthetic lubricants (specifically hydraulic and lubricating oils) are reclaimable and can be re-refined. Purchasers should assure themselves that the supplier has the commitment and ability to support a reclaiming and re-refining program.
4. Purchasing specifications should require independent test results to verify any environmental claims made by the supplier. The Environmental Choice Program has certification criteria for: Synthetic Industrial Lubricants (PRC-022); Re-refined Industrial Lubricating Oil (PRC-028); Biodegradable Bicycle Chain Oil (PRC-028); and, Vegetable Oil Based Industrial Lubricants (PRC-068).

3-R Recommendations

- Synthetic and semi-synthetic oils are high quality products, therefore, when a reclaiming program is in place there is a great opportunity to continually use the base product resulting in a lesser degradation of natural resources.
- Buy these products in returnable containers such as drums, or in bulk (pumped by tanker trucks) so that packaging disposal problems can be avoided. Make this a requirement of the supplier.

OFFICE EQUIPMENT

At one time, buying environmentally responsible products for the office was limited to "recycled" or "recyclable" paper. Fortunately, times have changed. Fax machines, photocopiers, printers, batteries, and binders, certified by the Environmental Choice Program, are now available. In addition to meeting or exceeding industry performance standards, the companies providing these types of ECP certified products have taken major steps to reduce the environmental impacts associated with the manufacture, use and disposal of their products. These improvements include dramatically reducing, and in some cases eliminating toxic materials, incorporating recycled content, lowering indoor VOC emissions, and cutting back on energy consumption.

FACSIMILE MACHINES

Facsimile machines have become a fact of life for most offices. Newer machines engineered with environmental considerations consume less energy, work with "one-side used" paper, use recycled toner cartridges and release only minute amounts of ozone into office air. The Environmental Choice Program Guideline for facsimile machines is:

ECP-71: "Facsimile Machines"

Certification Criteria:

- Must not be manufactured using CFCs in any phase of the manufacturing process.
- Must meet the requirements with respect to energy consumption as tested in accordance with United States Environmental Protection Agency's (EPA) "Testing Conditions for Energy Star Measurement Printers."
- Must include the following information: the energy used in the printing, transmitting, and energy-saver modes of operation as tested in EPA's "Testing Conditions for Energy Star Measurement Printers"; and the noise emission values of the unit for both printing and energy-saver modes of operation as tested in accordance with ISO 7779: Acoustics-Measurement of airborne noise emitted by computer and business equipment.
- Ink-jet facsimile machines must be compatible with ink that does not exceed a total VOC content of 5% by weight. They must include information on the percent by weight of the VOCs of the ink.
- Laser facsimile machines, LED facsimile machines, and multi-functional units must:
 - Not cause an ambient ozone concentration in excess of 0.04 mg/m³ and they must not cause a dust concentration in excess of 0.25 mg/m³.
 - Where applicable, be compatible with remanufactured cartridges without voiding the original manufacturer's warranty.
 - Include information on the ambient ozone level being met, including the test conditions; if applicable, the procedure for changing ozone filters and the recommended frequency of filter replacement or service by the manufacturer; and the dust concentration being met, including the test conditions.

MULTI-FUNCTION TECHNOLOGY

Multi-function office equipment must meet all relevant certification criteria of facsimile machines, photocopiers and laser printers, in order to be eligible for ECP certification. Furthermore, multi-function equipment has the added environmental benefits of requiring less space and energy than the combined requirements of equipment it replaces.

PHOTOCOPIERS

Photocopiers are indispensable pieces of office equipment. Environmental Choice certified machines quickly and efficiently copy while producing insignificant amounts of ozone and volatile organic gases. Photocopiers can also add unnecessarily to your energy bills if not equipped with power saving devices. The Environmental Choice^M Program Guideline for photocopiers is:

ECP-46: "Photocopiers"

ECP certification criteria for photocopiers are as follows:

- Must not emit ozone at a concentration in excess of 0.04 mg/m³ and it must not emit dust at a concentration in excess of 0.25 mg/m³.
- Must not emit total volatile organic compounds at a concentration in excess of 170 mg/m³ (25 ppm) if using wet-process technology.
- Must be equipped with a power saving device such as an automatic shut-off feature, or for models released after July 1, 1997, it must meet specific energy consumption levels as specified in the ECP guideline.
- If producing 44 copies or more per minute, must be equipped with automatic duplexing capabilities and be programmable by the end-user such that the duplexing mode may be set as the default mode.
- Where applicable, must have the ability to use remanufactured printing cartridges that do not void the original manufacturer's warranty.
- Must not be manufactured using CFCs in any phase of the manufacturing process.
- Be compatible with at least three types of recycled paper, containing at least 50% recycled content, including at least 10% post-consumer content.

Include information on: the ambient ozone level being met, including the testing conditions; the procedure for changing ozone filters and the recommended frequency of filter replacement or service by the manufacturer; and the noise emission values of the mainframe for both in-use and standby modes.

PLASTIC STATIONARY PRODUCTS

Every year, the plastic products that Canadians discard contribute some 7% by weight and 30% by volume to the solid waste in our municipal landfills. Plastics also make-up a major proportion of litter on land, shorelines and in waterways - unsightly to us and hazardous to wildlife. One answer is to reduce the volume of waste plastic through recycling. As well, recycling plastics will reduce both the consumption of non-renewable petrochemicals, from which plastics are made, as well as the volume of hazardous by-products that are created during the manufacture of virgin plastics.

Degradable plastics may be useful in specific circumstances. However, a large-scale switch to degradable plastics would not reduce the overall volume of plastic waste nor decrease the demand on petrochemical resources for new material. This is why recycled content should be emphasized for products that are made from plastic. The Environmental Choice Program Guideline for recycled plastic products is:

ECP-03: "Products Made from Recycled Plastic"

ECP Certification Criteria:

- If made from mixed recycled plastics, must contain over 90% by weight of recycled plastic.
- All products made using generic (single resin) recycling must contain a minimum of 25% by weight of recycled plastic.

PRINTERS, DESKTOP

Laser jet printers use a laser light to "write" a transmitted image onto a photosensitive drum. The sensitized areas around the drum attract the toner to print the characters onto the page. This process can release ozone gas into the atmosphere contributing to the poor air quality found in many offices. The certification criteria includes minimum ozone emission standards, forbid the use of CFCs in the manufacturing process, and incorporate US EPA EnergyStar® energy efficiency standards among other considerations. The Environmental Choice Program Guideline for paint is:

PRC-013: "Laser Jet/Desk Top Printers"

Certification Criteria:

- Must not be manufactured using CFCs in any phase of the manufacturing process.
- Must meet the following energy consumption requirements when tested in accordance with EPA's Testing Conditions for Energy Star Measurement Printers.

PRINTING CARTRIDGES

Many components of a conventional single-use toner cartridge remain in perfect condition at the end of the cartridge's service life. Discarding the empty cartridge is simply a waste of resources. The environmental choice is remanufacturing. Remanufacturing involves disassembling the cartridge, inspecting it thoroughly, cleaning and adjusting the components, refurbishing or replacing the organic photoreceptor cell, and topping up the supply of toner. What's more, the energy used to remanufacture single-use cartridges is less than that consumed in their original manufacture, not to mention the savings of raw materials, such as steel, aluminum and petro-chemicals. The Environmental Choice Program Guideline for printing cartridges is:

ECP-42: "Remanufactured Printer Cartridges"

Certification Criteria:

- Manufacturers must direct waste metals, plastics and cardboard to appropriate recycling facilities, where available.
- Products must meet or exceed all applicable governmental and industrial safety and performance standards.
- Products must meet or exceed the requirements of CAN/CGSB-53.148, *Rejuvenation of Laser Printer Cartridges*.
- Must include educational materials with installation and maintenance procedures.

RECHARGEABLE BATTERIES

Canadians are huge consumers of batteries; over 150 million each year! Over 90% of these are single-use batteries. The good news is, one rechargeable battery can replace many single-use batteries and deliver other advantages such as: lower resource consumption, decreased disposal burdens, lower release of harmful substances, and ultimately savings to one's pocketbook. The Environmental Choice Program Guideline for batteries is:

ECP-64: "Rechargeable Consumer Batteries"

Certification Criteria:

- The rated capacity of the rechargeable consumer battery, by model, must be equal to or greater than the following minimum values: AAA: 300 mAh; AA: 750 mAh; C: 1800 mAh; D: 3000 mAh; N: 270 mAh; and 9V: 180 mAh.
- The cycle life capacity of the battery, by model, must be equal to or greater than the following minimum values: AAA: 7 Ah; AA: 16.5 Ah; C: 48 Ah; D: 70 Ah; N: 5 Ah; and 9V: 3 Ah.
- No electrolyte, sealing compound, or other internal component may appear on any external surfaces of the battery during or following any of the tests specified in the above requirements.
- The battery must be labelled as required in the International Electrotechnical Commission Standard applicable to the model, when available or with at least the following information: safety-related prohibitions, use-related instructions to prevent hazards, promote maximum battery life, and utility.
- The batteries must be manufactured so that none of the effluents or wastes discharged to the environment in the manufacturing process are acutely lethal.
- The batteries must not be manufactured or formulated with mercury, cadmium, or their compounds, except where such substances are present as naturally occurring trace contaminants associated with other battery components.

PAIN T

Paint normally has some quantity of oil based solvents as part of their content. These solvents give off levels of volatile organic compounds (VOC) which are harmful to the environment as well as posing a health hazard during their application. The VOCs are much lower in water based (latex) paints than in solvent based (alkyd) paints. Today's solvent-based paints are now virtually free of lead and mercury content both of which also presented health hazards.

Water based paints should be given preference over oil based paints wherever the choice is available because they contain a smaller amount of a non-renewable resource (oil), or none at all; they contain less VOCs (such as petroleum distillates); they contain volatiles with a lower flashpoint; and they only require soap and water for clean-up as opposed to cleaning with solvents or turpentine. Technological advances have produced water-based paints for applications where traditionally solvent-based paints have been used.

The latest advancement is the development of a paint that contains no solvents and therefore no VOCs. This solvent free paint also gives off less odour than traditional latex paints and any odour dissipates very quickly. This type of paint is currently only available in pre-formulated neutral colours. Tinting may soon be available which is expected to add trace levels of solvent to the paint, but will still be much lower than existing water based paints.

In most types of paints there are low grade and high grade qualities. High grade paint generally has higher solids content than low grade paint. Paint with higher solids content has a lower solvent base.

When purchasing paint, performance specifications should be required to ensure higher grade paint is selected. This will not only be the environmentally preferred choice but will likely be a more economically viable decision as the paint will last longer.

An Environmental Choice^M Program guideline currently exists for water based paints and there are numerous latex paints which have been approved under these guidelines which are readily available in the marketplace. In addition, there are some latex alternatives available where traditionally solvent based paints and coatings have been used. Paints meeting this guideline are suggested whenever possible and appropriate. The Environmental Choice Program Guideline for paint is:

ECP-76: "Surface Coatings"

Recycled paint is available for various applications and in various ratios of recycled content. A 50/50 blend recycled interior/exterior latex paint is available which is suitable for traditional requirements. These are relatively new products and should be reviewed to ensure they meet performance requirements. The material safety data sheets should also be requested and reviewed.

Procurement Recommendations

1. Solvent free paints should be selected first, particularly in applications where odour could pose a problem (e.g., schools in session).
2. Water based (latex) paints are the next preferred purchasing choice and should be substituted wherever possible in place of a solvent based paint for suitable applications.
3. When latex paint is not practical, solvent based paint with a low VOC content should be specified.
4. Purchase higher grade paints whenever practical.
5. When contracting for painting services, specify a preference for paint meeting the Environmental Choice^M Program guideline and have the bidder indicate the paint to be used. A preference for solvent free paint should be stated whenever possible.
6. Purchase naturally formulated shellacs and varnishes to replace those containing high VOCs.
7. Purchase the largest container size suitable for the application in order to minimize disposal of packaging material.
8. Paint purchases should specify that they shall meet or exceed the requirements of the Environmental Choice^M Program guideline in addition to the applicable Canadian General Standards Board (CGSB) standard. A suggested purchasing clause follows:

"The paint products to be used and/or supplied against any contract resulting from this tender shall meet or exceed the requirements of the Environmental Choice Program (ECP) guideline ECP-76. In addition, the paint products shall meet or exceed the performance requirements specified in the applicable Canadian General Standards Board (CGSB) standards (specify the applicable CGSB standard against each product line)."

3-R Recommendations

- Plan requirements carefully in order to minimize leftover paint, consolidate leftovers for future use and store properly to maximize shelf life.
- Paints should be completely used up in order to minimize disposal. Excess paints of the same type may be mixed together, especially where colour is not important. Precautions should also be made to avoid spillage.
- Extend life of painted surfaces by following instructions for application of paint.
- Solvent based paints, wood preservatives, stains and finishes that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner in accordance with hazardous waste regulations. Empty paint cans are to be dry prior to disposal or recycling (where available).
- Participate in paint can recycling initiatives where they are available.
- Programs to recycle unused paint and surplus paint cans are available in some areas and users are encouraged to use these programs as much as possible. Paint is regarded as a hazardous product and is subject to regulations for its disposal. Information on these controls can be obtained from the Ontario Ministry of Energy, Science and Technology.

PAPER

Paper products make up the largest single component of the solid waste stream. Purchasing recycled paper instead of conventional paper products will not only promote a more efficient use of the forest resource, it can save energy and also help to stimulate markets for the recovery of paper, reducing the quantity of material entering the solid waste stream.

The Ontario Ministry of Environment and Energy invited a group of representatives from industry, labour, interest groups, municipalities and government to share views on ways to keep paper fibre out of Ontario Landfills. This group, called the Ontario Paper Fibre Strategy Team, issued a report in October, 1993 titled: "Keeping Paper Out of Ontario Landfill: Progress and Action". This section includes some of the findings of the report, however, the report is no longer available.

For general applications, the market provides a wide variety of products containing recycled content. Where Environmental Choice guidelines are specified, purchasers are advised to review the latest requirements and ensure suppliers meet the most recent guidelines. This is important in cases where suppliers claim to meet Environmental Choice guidelines but are not licensed to display the EcoLogo. Another option to consider is average or aggregate recycled content specifications. A blended approach would measure the average recycled content of the paper consumed would allow flexibility to the supplier while still providing incentive for all mills to recycle.

Revised in the spring of 1998, the Environmental Choice guideline for Printing and Writing Paper (ECP-77) presents a multi-parameter approach which identifies the most important environmental stressors from all stages of the product's life cycle. These environmental stressors have been translated into pulp and paper-related criteria that will result in lower environmental impacts through:

- a) reductions in air emissions;
- b) reductions in water emissions;
- c) efficient use of fibre, preferably recycled fibre; and, a
- d) reduction in energy use.

It should be noted that a requirement for a minimum content of recycled material is not specified in this guideline. This parameter has been incorporated into the calculation of resource consumption and solid waste production. Performance in these areas improves as the amount of recycled material increases.

Procurement and 3-R Recommendations

PRINTING AND WRITING PAPER

Fine Papers, as identified in Environmental Choice guideline ECP-77, include printing papers, business (office) papers, exercise and related papers, covers and bristol, and envelope papers (for more detail, please refer to the ECP guideline). The finest grades of printing and writing paper are made from recycled rags but most commercial grades are made from chemical wood pulps. De-inking this waste paper produces high quality fibre and for this reason, the current supply is used in recycling operations.

Prior to purchasing fine paper products, consideration should be given to the application. For special applications, specifications will have to reflect the end use, for example:

- Will the paper be required to be archived? (acid-free archival quality paper should be considered)
- What type of equipment will be used for printing on the paper? (test/pilot programs may be useful to verify performance with the printing equipment)
- Optical scanning devices may be affected by some of the impurities found in some recycled papers.

A trade-off may have to be made in the appearance of paper, however, the market does provide a wide selection of high quality paper products which satisfy colour and brightness aesthetic needs.

Procurement Recommendations

- Requirements for fine paper products should specify the Environmental Choice guideline ECP-77, Printing and Writing Paper (please see guideline for details).

3-R Recommendations

- Markets and infrastructure exist in large urban areas to recycle fine paper products. Source separating the high grade office papers will yield a higher price from recyclers.

Refer to the end of this section for more 3-R recommendations.

CONTAINERBOARD AND BOXBOARD

Containerboard is available in multi-ply, solid and corrugated board and is used to make boxes and other containers for shipping goods. This material is comprised of a corrugating medium - the wave-like material used as the middle ply, and linerboard - the material used on the top and bottom. Secondary or recycled fibres may be used in the manufacture of corrugating medium. Almost half of the corrugating medium is made from secondary or recycled fibre. Linerboard may also contain up to 100 percent secondary fibre.

Boxboard is a low grade board made up of short fibres and is used for folding cartons (e.g., cereal boxes, detergents), set-up boxes (for more rigid applications, e.g., shoe and candy boxes), and miscellaneous boxboard uses. Boxboard is usually made from 100 percent recycled fibre (boxboard trim, used office papers, old corrugated containers and newspapers). The amount of post-consumer boxboard that can be used to make new boxboard is unknown, but boards that are made with 20 percent post consumer boxboard are performing well.

Procurement Recommendations

1. Purchases of containerboard for first time use should specify a minimum recycled content of 40% (post-use content), with flexibility to take into account regional shortages of old corrugated containers. When buying other products that are shipped in containerboard, requirements should include a minimum of 40% recycled content for the containerboard (with similar provision for regional shortages as in previous sentence).
2. Purchases of boxboard should specify a minimum recycled content of 20% (post-use content)

3-R Recommendations

- Markets and infrastructure exist in large urban areas to recycle old corrugated containers. Efforts should be made to ensure all old corrugated containers are either reused or recycled.
- Old corrugated containers are used to make new corrugated containers, boxboard, construction products and possibly fine papers in the future. Waxed corrugated containers are now being composted on a commercial scale.

NEWSPRINT

Recycling old newspapers is not new -- what is new, however, is the use of increased quantities of post-consumer used newspapers and other fibres (such as magazines) in producing newsprint. Most old newspapers are recycled into newsprint. While newsprint is used to make a variety of paper products, over 95 percent of the newsprint consumed in Canada goes into the printing of newspaper.

Procurement Recommendations

1. Requirements for newsprint should specify the Environmental Choice Guideline ECP-11, Newsprint From Recycled Paper.

3-R Recommendations

- Markets and infrastructure exist in large urban areas to recycle old newsprint and newspaper. To maintain product quality, a clean, source separated supply is essential.

SANITARY PAPER

Sanitary paper products include bathroom tissue, facial tissues, paper towels and paper table napkins. These products are almost all made for the domestic market, over half of this is made from recovered paper.

Procurement Recommendations

1. Environmental Choice Program Guideline ECP-09, Sanitary Paper From Recycled Paper, is currently in discussion draft stage but may be obtained for review. When finalized, requirements for sanitary paper should specify ECP-59, ECP-60, ECP-6, ECP-62 and ECP-63.

3-R Recommendations

- Switching from paper towels to linen or electric hand dryers should be decided after a comparative cost analysis is performed based on the individual organization's requirements. This analysis should also take into consideration the life cycle environmental considerations.

Additional 3-R Recommendations

The following suggestions should be encouraged to all staff within an organization:

1. Keep correspondence and memos to one page (Note: personal computer word processing allows flexibility to easily fit more on one page, e.g., changing margins and font size). When responding to a memo, write your response on the bottom of the memo, rather than using a new form.
2. Rather than making copies of a memo for distribution to each staff member, circulate one copy, utilize (electronic) E-mail, or post it in an accessible location.

3. Periodically verify distribution lists, eliminating those that no longer need information. The same applies to direct mail lists; make sure paper and postage is not being wasted on recipients who will throw the material out. When receiving constant unwanted or inappropriate information from the same source, request the sender to remove your name from the mailing list.
4. When replacing a photocopier or a computer laser printer, opt for one that prints two sides of the paper and/or reduction features to fit several pages on one page, and encourage staff to use the duplexing feature whenever possible.
5. Assign a printer/photocopier that is dedicated to using scrap printer/photocopier paper.
6. Use the backs of old letters, calendars, etc. for scratch pads.
7. Copy a blank face from an interoffice envelope and tape or glue this blank to a used envelope after all spaces have been filled.
8. Avoid use of multi-part forms with carbon paper. Carbon paper is non-recyclable. Make one copy of a form and then photocopy only the necessary number of copies, after revisions are final.
9. Reuse envelopes and corrugated boxes where possible.
10. Use pencils (particularly mechanical) as this allows for erasing and reusing.
11. Establish (paper) communication standards aimed at minimizing the use of paper.
12. Encourage staff to ask themselves on a regular basis: "Do we need this piece of paper?", both employees and the organization will quickly recognize that if they don't use paper, they will save energy, reduce the amount of paper going to landfill sites, as well as achieve a significant financial savings in the cost of that paper.
13. Establish a paper recycling program.
14. **Envelope paper:** The use of water soluble glues for labels and adhesives should be considered in order to make envelopes better suited to being recycled. In addition, the use of a cellulose-based transparent material (which can be recycled with paper) for the window portion of the envelope should be considered, provided it meets Canada Post specifications for opacity (opacity must not exceed 15%) in order to pass through the Optical Character Recognition (OCR) machines.

Prior to the acquisition of envelopes, the supplier should be requested to provide evidence of acceptance to Canada Post requirements. Canada Post clearance can be requested through the Manager of Commercial Customer Service, Canada Post Corporation, 20 Bay St., Toronto, Ontario M5J 1A1, Telephone (416) 594-4074.

15. **Fax Paper:** Use of bond paper fax machines should be considered, especially where the paper is subject to lengthy retention periods and where thermal fax paper would normally be additionally photo copied. The added time and increased paper consumption (through photocopying) that may occur through the use of a thermal fax machine may make the economic gap between the thermal paper and bond paper fax machines closer. Purchases of thermal fax paper should specify recycled content base paper containing a minimum of 50% recycled paper including 10% post-consumer fibre.

Additional suggestions from Canadian Government Printing Services (Public Works and Government Services Canada) on making a printed product less harmful to the environment are summarized as follows:

16. Avoidance of cosmetic type surface coatings and laminations. These include UV gloss and matte, mylar, oriented propylene and certain varnishes. Most products such as kit folders and booklets, where any coating is cosmetic, are useable without it. However there are applications when the coating is for protection rather than aesthetics (such as books used by navigators on vessels).
17. Solid areas of ink increase the difficulty and amount of chemicals required within the de-inking process. An alternative is to use screened areas to obtain desired colours. Dark shades of blue, purple and red create difficulties when de-inking and require additional treatment. The choice of colours should be given careful consideration if the printed product is likely to be recycled.
18. Vegetable oil based inks are less harmful to the environment than inks that are petroleum based. Metallic and plastic based inks should be avoided to eliminate the difficulties they cause during de-inking, disposal or incineration.
19. Plastic bindings create problems when mixed with waste paper and should be avoided.
20. Utilize both sides of a sheet of paper wherever possible (e.g., double side your copies).
21. Designs that waste as little "white space" as possible and the careful choice of typeface sizes may assist in reducing the number of pages or the overall size of a printed piece.
22. Glues that are used on self-adhesive labels cause problems in the de-inking process and should not be included with waste paper that is being collected for recycling.
23. Keeping the intended end-use in mind, it might be possible to utilize a lighter weight of the chosen paper. With recycled papers, the pulp fibres in the recycled content are shorter than those in virgin pulp papers, and therefore the finished papers are naturally somewhat opaque. For example, in some grades it is possible when using recycled content paper, to use a 120M basis weight in place of a 140M basis weight virgin pulp comparable paper, and retain opacity.

PLASTICS

Approximately 8% by weight, or 20% by volume of municipal solid waste is plastic. Furthermore, packaging constitutes approximately 30% by volume of municipal solid waste, of which 20% is plastic. Recycling will reduce the amount of plastic entering the waste stream and will help save natural resources. Plastics use approximately 2% of Canada's production of crude oil and natural gas. Additionally, chemicals can leach from the plastics into the landfill site.

The Environmental Choice Program has published Guideline ECP-03 for plastic products using recycled plastic which stipulates 60% by weight for construction materials and 90% by weight of post consumer plastics for other categories to qualify for the EcoLogo. The ECP has also published Guideline ECP-69 for plastic film products which stipulates products have to be manufactured with a minimum of 20% recycled products with 10% of that being from the Blue Box.

Only a limited number of recycled plastic products currently carry the EcoLogo. Not all plastic products can utilize recycled plastic in the minimum amounts specified in the Guideline and some manufacturers are introducing recycled plastic content to their products in incremental stages and by starting at low levels (e.g. 10%).

Procurement Recommendations

1. When purchasing products with plastic content, request that they meet ECP-03 or ECP-69, where applicable. Alternatively, request bidders to state the recycled content in the products offered. Suggested wording for tenders might read:

- Bidders shall state total recycled content _____ %
- Bidders shall state total post consumer content _____ %
- Bidders shall state total pre-consumer content _____ %

2. Where possible, purchasers should allow for alternates to be offered made of or containing recycled plastics, where the item being tendered is made of some other material (e.g. wheelbarrows, pails, copper piping, etc). Suggested wording to include for a tender of this type might read:

"Consideration will be given to (name of product), made of plastic and which contains recycled plastic. All other requirements shall be as stated in the (quotation, tender, specification).

- Bidders shall state total recycled content _____ %
- Bidders shall state total post consumer content _____ %
- Bidders shall state total pre-consumer content _____ %

Note: Definitions for recycled, post consumer and pre-consumer are those defined in ECP-03

3. If requested, bidders shall provide verification of recycled content and compliance with the (quotation, tender, specification) requirements. This may include stating supply of recycled materials and recovered plastics, manufacturer's phone number and address, availability to allow audit or review of manufacturing facilities to verify claims, and test results from an accredited independent laboratory for features such as: drop, ESCR (Environmental Stress Crack Resistance), crush, stiffness, gauge uniformity, tensile strength and odour.

4. As with other products, whenever possible samples made of and/or containing recycled plastic should be requested in advance for evaluation. Sufficient quantities and a reasonable assessment period should be used to achieve a meaningful evaluation. This would assist in establishing tender requirements, as well as introduce the products to the users.

5. Wherever possible in tenders (or specifications), include a requirement for the packaging material to contain post consumer recycled content (e.g. cleaning product bottles, engine oil bottles).

6. Avoid multi-layer packaging that may contain many different types of resins and materials and which may not itself be recyclable. However, multi-layer packaging is a construction that can significantly reduce the amount of material used and/or provide a package with significant in-use advantages (e.g. longer shelf life or improved protection). The purchaser must carefully assess the technical considerations here.

3-R Recommendations

Plastic is a high value, durable material and is therefore, ideally suited for the manufacture of durable products. Look for durable products that can be reused.

- If the product contains no recycled material, ask the bidder if it has been reused or can be reused or recycled or require the bidder to accept it back for recycling/reuse with an explanation as to what will be done with it.
- "Biodegradable" plastics are not recommended as these plastics do not break down in landfills. These plastics may also have a detrimental affect on finished products containing recycled content when mixed with other plastics for recycling.
- Care should be taken to accurately separate waste plastics for recycling. For example, the uses for and processing are different for recycled plastic beverage containers, polystyrene foam protective packaging and stretch or PVC shrink wrap and thus these wastes should be kept separate where possible in order to facilitate value added recycling.
- When purchasing polyethylene plastic film products (e.g. Garbage bags) refer to ECP-69 guideline.

RUBBER

Scrap tires can be retreaded or made into many useful products

Ontario motorists dispose of an estimated eight million tires each year in Ontario. That's the equivalent of 120 million kilograms of rubber -- by far the largest proportion of rubber waste being produced in the province every year.

In response to the problems associated with tire management, the Ministry of Environment and Energy has regulated tire storage sites, and many municipalities have banned tires from landfill sites or are charging high tipping fees to discourage the practice although this trend is now being reversed in some municipalities.

Purchasing agencies can play a major role

As a result of efforts by the tire and recycling industries, 40 per cent of tires are now being retreaded, reused or recycled, and the stockpile of tires in the province - about 3.7 million in 1990 - has been reduced to two million.

More has to be done, however. The willingness of purchasing agencies to support the use of recycled rubber will have a major impact on the success of rubber recycling efforts.

Retreading saves money

One of the most important ways to reuse scrap tires - and save money - is through retreading.

Retreading is a recapping process that puts a new tread on worn tires. Retreaded tires come with most or all of the same features as new tires including safety standards, fuel efficiency, performance ratings and tread designs, and cost around \$125 as opposed to \$275 - \$350 for brand new truck tires.

Retreads have been used for decades on large trucks and off-road vehicles. Truck tire life, with retreading, can exceed 700,000 kilometres.

Retreads are now being evaluated for use on pick-up trucks and passenger vehicles. At this time, purchasing agencies are encouraged to use retreads on all large vehicles and evaluate retreading opportunities for light trucks and cars.

Remember: Worn tires can be retreaded if the casings are useable. If the casings are not useable, scrap tires should be sent to a recycling facility; not landfilled or exported.

Contact the Ministry of Transportation in Toronto (MOT) for advice on setting up a retreading program. Contact your regional Works Department for recycling options in your area.

Look for recycled tire products

Rubber from scrap tires can be used in products which require the whole tire for such things as floating breakwaters and ferry bumpers, or tire cutouts for blasting mats, entrance mats, dock bumpers and dunnage spacers.

Scrap tire crumb can be incorporated into moulded rubber products such as maintenance hole collars and risers, playground surfaces, speed bumps, and into asphalt products for use in paving blocks, sport tracks and crack sealants. It can also be mixed with plastic to make composters and Blue Boxes, sheeting, and utility product handles (e.g. ice scrapers).

Rubber modified asphalt, used for paving roads, parking lots and composting pads, is used widely in the United States. With provincial government funding, municipalities are testing rubber asphalt for large-scale use in Ontario. These and other transportation related applications are being evaluated by the Ministry of Transportation (MOT) and the Ministry of Environment and Energy.

For more information, an interim status report, PAV-92-08, has been published by the MOT. (see References section)

Some of the products made of or containing recycled scrap tire rubber are identified in the list below. Note that some items are made from a mixture of recycled plastic and recycled rubber.

Where possible, purchasers should request rubber or plastic-rubber containing or made from recycled rubber or rubber crumb. For suggested format and wording for requesting recycled content and verification, see the Plastics section of this guide. Note that the presence of tire crumb is usually simple to verify and automatically indicates post-consumer content in the product.

The list of available products changes frequently as new products are continually being developed.

Contact Access Toronto (416) 338-0338 for an updated list of suppliers of these products.

Asphalt	Recycling bins, buckets
Carpet undercushion	Retaining walls
Composters	Retreaded tires
Delineator cone bases	Roofing (in development stage)
Garden soaker (underground)	Sealants (i.e. pavement filler, water proofing)
Gaskets	Shoe heels
Maintenance hole collars and risers	Sport surfaces
Marine accessories - dock fenders, breakwaters	Traffic cone bases (moulded or sidewall cuts)
Mud flaps	Truck dock bumpers
Noise barriers (in development stage)	Truck mats, flaps and liners
Novelties (ties, purses, bulletin boards, desk accessories, swings)	Utility product handles
Parking blocks, speed bumps	Various mats (fatigue, stables, etc.)
Paving blocks	Wheel chocks
Playgrounds and tracks	

MOE funds recycling projects

Under the 3-Rs diversion program, the Ministry of Environment, the tire industry and recyclers are working together to create ways in which scrap tires can be recycled.

The ministry gives grants to companies, organizations and municipalities to research and develop recycling technologies. Grants also go towards developing products that use recycled rubber and other materials from scrap tires.

Researchers are investigating:

- whole tires as reinforcement in engineered retaining walls;
- a roadway noise barrier wall using panels made of crumb;
- tire shreds as a lightweight fill in place of gravel or sand;
- used rubber crumb to enhance soil properties for heavy pedestrian use; and
- chipped tires as an absorbent to be used in oil spills.

For information on tire recycling projects and funding, call the Ministry of Environment's Waste Reduction Office in Toronto.

PACKAGING

Packaging materials constitute a major portion of municipal waste, i.e. it is estimated at 30 per cent by volume. In order to address this problem, a National Packaging Protocol was developed by a National Task Force on Packaging commissioned by the Canadian Council of Ministers of the Environment (CCME) that was endorsed by them in March 1990.

To guide industry in achieving the goals of the Protocol, a Canadian Code of Preferred Packaging Practices has been developed by the National Task Force on Packaging. It is intended to promote excellence in packaging as defined by two fundamentally and equally important principles. Packaging must have a minimum negative impact on the environment while fully preserving the integrity of the product it contains. The Code provides details on Guiding Principles, packaging practices, implementation action plan, and a detailed questionnaire (developed by the Institute of Packaging Professionals). To obtain a copy of the Code of Practice refer to the references section for contacts.

The Canadian Code of Preferred Packaging Practices takes into consideration the following questions that are geared towards industry for evaluating packaging choices. They are listed here to assist the purchaser in understanding the various environmental implications/improvements of packaging. The purchaser may also wish to ask these questions of suppliers:

Without compromising health, safety or product integrity standards or violating regulatory requirements, can the following preferred packaging practices be implemented?

1. **Toxics in Packaging**

- 1.1 Are there toxic materials or agents in the content of the package?
If toxic materials or agents are present:
- 1.2 Can the toxic agents or materials be eliminated otherwise?
- 1.3 Can non-toxic agents or materials be substituted?

2. **Packaging Elimination, Reduction and Reuse**

- 2.1 Can the package be eliminated?
If the package cannot be eliminated:
- 2.2 Can the packaging be minimized through:
 - product design changes?
 - packaging design changes?
 - use of new or different types of lower volume packaging?
 - lightweighting with a reduction in volume?
 - elimination of secondary packaging or wrapping material?
 - decreasing size of packaging to product ratio?
 - other volume reduction?
- 2.3 Can the package be made so that it is eliminated in using the product?
- 2.4 Can the package be made returnable for reuse and redistribution?
- 2.5 Can the package be made to be refilled by a customer or consumer either from bulk or larger containers?

- 2.6 Can the package be made to have an identifiable and valuable consumer reuse for another purpose?
3. **Packaging Recyclability**
 - 3.1 Is the packaging recyclable? (Packaging is recyclable if there is a widely available, economically viable collection, processing and marketing system for the material.)
If the packaging is not presently recyclable:
 - 3.2 Can the packaging be made easier to recycle by composing it predominantly of a single material for which an economically viable collection, processing and marketing system could be developed?
 - 3.3 If the packaging is made of more than one material, can the non-homogeneous material be eliminated?
 - 3.4 If non-homogeneous materials cannot be eliminated, can they be made to be removed easily so as not to prevent, interfere with or add cost to the recycling process?
4. **Recycled Content of Packaging**
 - 4.1 Does the package contain the maximum feasible amount of post-consumer recycled material content?
If additional post-consumer material cannot be added to the packaging:
 - 4.2 Can additional in-plant or mill scrap which is normally destined for disposal be added to the packaging?
 - 4.3 Do purchasing specifications hinder the use of recycled materials in the packaging?
 - 4.4 Can purchasing specifications be modified so as to encourage the use of recycled materials in packaging?

PURCHASING PROCESS & PRACTICES FRAMEWORK

The following section on Purchasing Process and Practices Framework is a synopsis of a report commissioned by the Federation of Canadian Municipalities (FCM). The FCM, as an active member of the GIPPER Committee, contracted The Delphi Group to develop a series of purchasing practices, through the Subcommittee on Packaging, directed at reducing packaging waste. The practices are intended for eventual distribution to senior managers, administrators and purchasing managers in all orders of government, and the private sector at large. For more detailed information, refer to the full document available through the FCM (see reference section). Eliminating some of the details from the full document has resulted in changes to the numbering scheme as well as re-ordering of some information.

How to Read & Apply the Packaging Practices

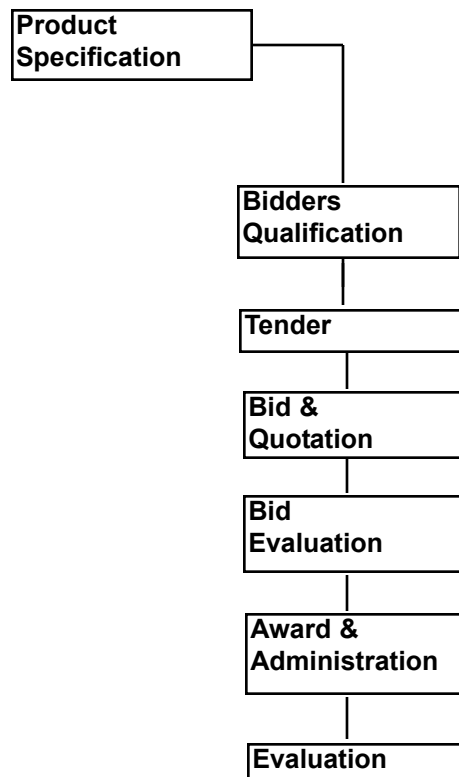
The purchasing practices recommended in this report correspond to the procurement process model described in the following section. The purchasing practices have been written to be extracted from this guide and inserted into the purchasing department such as a municipality, government department, school or hospital's purchasing policy manual, tender or contract. Effort has been taken to make things easy for the purchasing officer or materials manager who already has many responsibilities. The practices will also be of value to senior management and administrators in terms of waste management and cost reduction in their organizations, as well as overall corporate environmental responsibility.

Efforts to reduce packaging waste are designed to be on a trial and error basis, gradually introduced into an organization. However, it is preferable that the procurement process move soon to more rigorous practices as presented in this guide.

Procurement Process Model

The purchasing process can be represented within the material life-cycle - beginning with the specification of needs, and ending with an evaluation of the performance of the supplier and the quality of their products and/or services. To affect a significant impact on the generation of packaging waste through procurement, it is necessary to introduce appropriate **purchasing practices** through all stages of the procurement process model. The way in which the practices are used will depend on the size of the organization, its purchasing profile, and the number of purchasing personnel, among other factors. The practices have been developed to achieve a number of objectives at different stages of the purchasing process. The first step is to review the Canadian Code of Preferred Packaging Practices and the associated National Packaging Protocol, and then decide as an organization, which of the practices should be introduced into a purchasing department.

This process is illustrated as:



I BIDDERS APPLICATION STAGE

The practices proposed in this stage are intended to engage suppliers in meeting the organization's goal in packaging waste reduction and to educate both staff and suppliers how to meet the National Packaging Protocol's target.

Practice #1: Packaging Waste Reduction Objective

A Packaging Waste Reduction Objective to reduce waste is of critical importance in making the organization's interest clear to bidders. Such a statement should be part of a Bidder's Application Form when suppliers are registering to be part of a roster which receives tenders, a suppliers' guide or applying for a specific one-time tender.

Packaging Waste Reduction Objective

All packaging should be reduced to minimize solid waste contribution to landfill sites while complying with all legal and regulatory requirements. In attaining this Objective, greater emphasis must be placed on reducing packaging waste, followed by actions which involve the reuse and recycling of packaging waste. It is noted that the Canadian Code of Preferred Packaging Practices is available to help guide industry in the achievement of this objective.

If this Objective was included in a Bidder's Application Form many suppliers may ask why. Since waste disposal costs an organization money, it is logical that suppliers realize that efforts taken to reduce packaging waste are valued and may be an important aspect of the bid evaluation process.

Practice #2: Questions Addressed to Suppliers

Posing certain key questions to suppliers and noting the response can provide an indication of a supplier's current practices on packaging waste reduction, and the supplier's capacity to respond to the specifications of various tenders. The questions are intended for use with all suppliers; during bids, quotes or proposals.

1. Are all possible steps taken to minimize the packaging in which your product(s) are delivered or sent to the end user?
2. Have all requests or stipulations by customers for changes in the type of packaging or form in which your product(s) are delivered been responded to positively?

3. Would you be open to making alterations to your product(s) packaging and/or packaging systems to conform to the provisions of tenders or put your company in a more advantageous position on tenders, in the following areas:

Shipping by bulk rather than individually packaged products (if applicable)?	Y	N
Take back empty packaging (at your cost)	Y	N
Delivering products in reusable containers?	Y	N
Do you have a copy of the Canadian Code of Preferred Packaging Practices?	Y	N

4. Does your company have an environmental policy statement? Could you give us a copy?

II TENDER & QUOTATION STAGE

The practices developed for the Tender and Quotation Stage are directed at making suppliers aware that the way in which they propose to reduce packaging waste (or do not) will be a factor in the evaluation of bids, and may be a consideration in the actual awarding of contracts.

Practice #3: Pre-Bid Talking Points

The previous section relates to the process of informing and educating potential suppliers about the interests of the organization in reducing packaging waste. The next step involves emphasizing these interests at the time of a Pre-bid meeting or process to increase the likelihood that the bids submitted will respond to the organization's interest to reduce packaging waste.

Any pre-bid discussion or exchange should, after the substantial and procedural aspects of the bid are covered, bring to the attention of potential bidders on a tender that they should note the organization's Packaging Objective and statements on various product categories. In certain instances there may also be specific clauses in a tender addressing the packaging and packaging waste issue that should be covered in the bid instructions.

Pre-Bid Points

1. Cover all substantive and procedural elements of the tender first.
2. When identifying the criteria on which a contract will be awarded, include the following points with respect to packaging waste.
 - Bidders should be aware that their bid will be improved if they address how they will conform to the organization's Packaging Objective, statements by packaging category and specific clauses (if any) on packaging waste in the tender.
 - Due consideration will be given to those bidders that respond to reflect the buyer's interest in reducing packaging waste in their bid.

- A bidder's response on packaging provisions is only one aspect of the evaluation of the bid along with factors such as price, time, performance, product(s) quality, etc. These other factors will be given higher priority.

Practice #4: Tender Disclaimer on Packaging

Once the tender has been issued, the process to reduce packaging waste takes on an added dimension. The purchasing manager or officer must be very clear and precise about what information regarding packaging waste reduction is required and state, in legally defensible terms, how this aspect of the tender will affect the awarding of a contract and its administration.

First and foremost, it is important to state in a tender that [while responses a bidder makes] with respect to reducing packaging waste will be an evaluation criteria - it may play a part in the award stage. If an organization has instituted any packaging waste reduction policies with respect to suppliers, or included related specifications in a tender, the disclaimer below should be part of the qualifying clauses in tenders.

The following Tender Disclaimer on Packaging is recommended as Practice #4:

Tender Disclaimer on Packaging

The reduction of packaging waste may be one of the criteria in the evaluation process of bids. Packaging waste reduction may be a factor in the awarding of a contract along with price, time, performance, product(s) quality and other substantial factors.

Practice #5: General Statement on Packaging

Suppliers should be willing to work with an organization to reduce packaging waste and take a "life-cycle" or product stewardship responsibility for the packaging materials they use for their product(s). packaging waste are, in part, dependent on the category (or categories) of packaging a product utilizes. It is, therefore, valuable to make a statement of an organization's openness to various ways of reducing packaging waste, in general and by category of packaging. For more information and sample clauses to use for the specific packaging categories, please refer to the FCM report on Purchasing Practices for the Reduction of Packaging Waste (see reference section for information on obtaining this document).

The general statement and the statements by packaging category emphasize an organization's interests in reducing packaging altogether or reusing packaging material ahead of the suitability of packaging for recycling. Simply put, reducing and reusing packaging are the most economic approaches for both the supplier and the customer.

The following General Statement for inclusion in all tenders is recommended as Practice #5:

General Statement (For all Packaging Categories)

Our organization prefers that suppliers who deliver and supply their product(s) minimize the amount of packaging. It is preferred that packaging either be reduced or reused, with recycled packaging being the last resort. Durable, long-lasting forms of reusable packaging must be used, where appropriate. Where packaging can be recycled the associated recycling system must be at minimal or no cost to our organization. Where applicable, the packaging must utilize a high proportion of post-consumer (i.e., recycled) products. Suppliers should be willing to work with our organization to reduce packaging waste and take a "life cycle" or product stewardship responsibility for the packaging materials they use for their product(s).

Practice #6: Packaging Description/Product(s) Sample Clause

One of the most constructive actions an organization can take to reduce packaging waste is to actually make this objective a feature of tenders being issued. There are two types of clauses on reducing packaging waste that can be inserted into a tender. The first is a general clause which requests certain general information about the product(s) as it pertains to packaging waste and packaging redesign. The second involves clauses that are tailored to apply to various packaging categories.

The general packaging description clause seeks to gather information on the environmental profile of the packaging, and the package waste reduction potential it carries. The following Packaging Description/Product(s) Sample clause is recommended as Practice #6:

Packaging Description/Product(s) Sample Clause

For all products that are offered under bids responding to this tender, the following information will be provided with respect to packaging accompanying the product shipped to the customer and/or delivered to the end user.

- The net weight (in kilograms) of packaging material per shipping unit (i.e. carton, crate, plate, container);
- The amount of packaging materials that are used, by percentage (i.e. plastic, wood, paper and board, glass, metals, multi-materials);
- The recycled content (post consumer) of packaging materials;
- What proportion (provide descriptions for illustrations), if any, of packaging materials will be reused, including method, cost and location;
- Where packaging materials are recyclable, specify what recycling system they will employ in this region, and at whose cost.
- What potential is there to redesign the packaging system to reduce packaging waste, and to what extent is the bidder willing to implement these changes.
- Please provide a sample of the product and all related packaging material.

Practice #7: Model Clauses by Packaging Category

The model clauses below are written to correspond to the spectrum of packaging categories. For each tender, clauses would be inserted according to the expected packaging categories that would be used for the products being quoted.

In some instances only one packaging clause would be inserted. In most cases, however, two or more clauses may need to be included in tenders, given differences in packaging systems employed by suppliers, and packaging which uses materials from several categories.

The following Model Clauses by Packaging Category are recommended as Practice #7

Multi-Material Packaging

Where multi-material packaging is used to ship or deliver product(s), the bidder must state how the packaging can be separated and to what extent can the components be reused or recycled.

Plastic Packaging

Where plastic packaging is used the following questions must be answered by the bidder:

- Can the bidder utilize a superior packaging technology or product design to reduce the amount of plastic packaging?
- Will plastic containers be reused by the bidder?
- Will the supplier manage and cover the cost of recycling plastic packaging?
- Is the plastic packaging used suitable for the normal recycling systems for these materials, including consideration of the contents contained in the packaging?

Wood Packaging

Where wood packaging or wood shipping material is used the following questions must be answered by the bidder:

- Will wood packaging and shipping materials be reused by the supplier?
- Will the bidder make the necessary arrangement, at their cost, to recycle wood packaging and shipping materials?

Paper & Cardboard Packaging

Where paper and cardboard packaging is used the following questions must be answered by the bidder:

- Will cardboard cartons be reused by the bidder?
- Are there alternative means of packaging that are more durable and reusable than cardboard that the bidder is willing to use?
- Is the paper and cardboard packaging suitable for the normal recycling systems for these materials?

Glass Packaging

Where glass packaging is used the following questions must be answered by the bidder:

- Will glass containers be reused by the bidder?
- Can the bidder use a superior packaging technology to reduce the amount of glass packaging?
- Is the glass packaging suitable for the normal recycling systems for these materials?
- Are the contents contained in the packaging suitable for normal recycling of these materials?

Ferrous Metals & Aluminum

Where ferrous metals and aluminum packaging is used the following questions must be answered by the supplier:

- Will metal containers be reused by the bidder?
- Can a superior packaging technology or product design reduce the amount of metal packaging required?
- Is the metal packaging suitable for the normal recycling systems for these materials?
- Are the contents contained in the packaging suitable for normal recycling of these materials?

III BID EVALUATION STAGE

Practice #8: Elements of the Evaluation Process

A number of elements should be considered in the actual evaluation of a bid with respect to packaging waste reduction. Building on the synopsis of the Canadian Code of Preferred Packaging Practices and the Protocol, several key evaluation elements can be identified; the reduction level of packaging in one bid versus another, or the level of commitment to reuse packaging on the part of potential suppliers. It is difficult to quantify how all the elements will be weighed against each other, however, some means of comparison is important for the purpose of bid evaluation.

Features in a bid that would Score HIGH since the Reduce principle has been applied.

A commitment by the bidder to:

- Completely eliminate packaging waste;
- Change packaging geometry, or the structural design to minimize packaging;
- Change the form of their product(s) to reduce packaging;
- Change the nature of the transportation system to reduce packaging waste;
- Supply products in bulk versus individual packaging units;
- Eliminate toxic or hazardous materials in their product(s) so as to make the packaging more easily reusable or recyclable;
- Use a high level of recycled (post-consumer) content; more than 50% in packaging materials

Features in a bid which would Score AVERAGE since the Reuse principle has been applied.

A commitment by the bidder to:

- Reuse a substantial portion of their packaging materials as many times possible;
- Change the packaging materials, structure or design to make it more reusable;
- Reuse delivery pallets;
- Work with the customer to develop secondary markets for packaging that is reusable but not by the bidder, or for packaging that can be recycled;
- Cover costs associated with reusing packaging or creating a market for recycling packaging;
- Use a moderate level of recycled (post-consumer) content (25%-50% in packaging material).

Features in a bid which would Score LOW since the Recycle principle has been applied.

A commitment by a bidder to:

- Use packaging that can be recycled;
- Change the packaging materials, structure or design to make it more recyclable;
- Make outer and inner packaging used for shipment recyclable;
- Use a low level of recycled (post-consumer) content (25%-50% in packaging material).

Through experience, a purchasing department should develop a system of evaluating bids with respect to reducing packaging waste, tailored to their needs, fast, simple, and cost-effective.

IV AWARD & ADMINISTRATION STAGE

The purpose of the Award and Administration Stage is to inform bidders if their proposed means to reduce packaging waste was a factor in receiving (or not receiving a contract), and how the provisions for reducing packaging waste will be administered through the course of the contract.

To reinforce at the time of awarding a contract that bidders who made a more significant commitment to reducing packaging waste may have been considered more favourably, some feedback should be provided to the bidders. Sample award and rejection letters are detailed in the FCM document.

Practice #9: Quality Control Statement & Charges

A supplier's settlement in the contract and the actual performance of the supplier is not always similar, especially in the area of packaging waste reduction. To ensure all stipulations and conditions of the contract are met, there is a need for an ongoing relationship between the purchasing manager supervising the contract and the operational manager(s) using the suppliers product(s). A **Quality Control Statement** can improve the level of performance of a supplier since it is an ongoing standard day-to-day operation. The ability to apply charges to the non-compliance of contract standards is the prime motivator of the Quality Control Statement. Such charges can be set out in the tender, the award contract, or negotiated between the customer and the supplier in determining operating procedures.

Quality Control Statement

The compliance of the supplier with all provisions related to packaging and packaging waste in the awarded contract is one element of their quality service, following the time, cost, performance criteria. The supplier is responsible for recording and ensuring that the required measurements monitor adherence to the packaging waste standards in the contract. The supplier will provide to the customer any of this information, on request.

Charges

Where the supplier is in contravention of packaging and packaging waste standards in the contract, the customer may choose to apply such penalty charges against the supplier, which reflect the additional economic and/or environmental cost to the organization for this non-compliance, and other reasonable charges that may apply.

V SUPPLIER EVALUATION STAGE

The *Supplier Evaluation Stage* seeks to obtain the input of suppliers in the packaging waste reduction process. In effect, creating a continuous feedback mechanism that would strengthen the quality of future tenders and bids on this issue. Further measures, systems and partnerships between suppliers and customers can lead to a greater reduction of packaging waste over time.

Practice #10: Questions to Suppliers & Users on Packaging

The relationship between customers and supplier is not a one-way street - for the relationship to work over the long-term it needs to be a form of partnership where either party is helping the other meet their objectives and, therefore, both parties benefit. By using the customer-supplier relationship effectively, an organization can generate the goodwill and good ideas to reduce packaging waste. One way to do this is to solicit the input of suppliers through the course, and the end, of a contract.

The following *Questionnaires to Suppliers* and end users on Packaging is recommended as Practice #10. It can be used either at the conclusion of the contract submitted with the final invoice as a required element, to be done by telephone interview, or be attached to the contract itself and submitted by the supplier voluntarily.

Questionnaire to Suppliers on Packaging

- In the course of this contract, was it feasible to meet all of, or a substantial majority, of the packaging and/or packaging waste conditions?
- Which packaging and/or packaging waste conditions were the most difficult to attain?
- Which costs did you incur in implementing various packaging waste reduction provisions?
- Were there packaging conditions which gave you other benefits than those related to this contract (e.g. cost reductions)?
- Has the development of systems to meet the packaging and/or packaging waste conditions of this contract made your company more competitive on other bids?
- If future tenders included similar packaging and/or packaging waste conditions as this contract would be a bidder? If not, could you explain why not?
- Are there any suggestions or pieces of advice you can offer us for tenders and contracts with packaging and/or packaging waste conditions?
- Are there any suggestions you can offer us about how to continue to reduce the amount of packaging waste?

Thank you for your assistance.

Questionnaire to Users on Packaging

- Did you find that all aspects of packaging waste reduction specified in the contract were followed? Identify any of the aspects that were not followed.
- Did you incur any costs in adhering to the packaging waste provisions?
- Did you note any areas of potential improvement in how packaging waste can be reduced in any subsequent contracts? Please identify them.

Thank you for your assistance.

VI NEXT STEPS

A Procurement Strategy to Reduce Packaging Waste

This report has provided a number of practices that a purchasing department can implement to reduce packaging waste. Procurement practices which reduce packaging waste should be part of the organizations overall waste management program which in itself should be part of an organizational environmental management initiative. The net result of all these "cutting edge" management techniques is that they represent one of the best ways to reduce cost since they also are of benefit to the environment.

The strategy to reduce packaging waste should be gradually introduced into an organization. The initial measures will largely be voluntary on the part of suppliers. It is preferable, however, that the procurement process move soon to more rigorous practices as presented in this report. In time, too, other measures to reduce packaging waste can be considered, including:

- One of the facets of pre-qualification on tenders for critical products (e.g. involving hazardous waste) based upon packaging criteria,
- A requirement that all suppliers audit their products in terms of packaging and prepare packaging reduction workplans (Bell Canada already requires suppliers to do this) with bids.
- A more defined quantification of the value of various packaging waste reduction measures in bid evaluations.
- A product life cycle or stewardship responsibility on the part of suppliers for their products and associated packaging.

The above measures may arise downstream. The first step is to review the Canadian Code of Preferred Packaging Practices and the associated National Packaging Protocol, and then decide as an organization, and as a purchasing department, which of the practices in this report should be introduced into your organization.

REFERENCES

(Specific contact information is available via most web sites)

1. Environmental Choice^M Program

Environmental Choice was created by Environment Canada to help consumers find products that ease the burden on the environment. The EcoLogo, consisting of three doves intertwined to form a stylized maple leaf, signifies that a product or service meets the requirements of the relevant certification criteria. The Environmental Choice guidelines and Panel Review Criteria (PRC) contain a full description of the certification criteria, specific to each type of product, which examine environmental aspects of the product's life cycle.

The Environmental Choice^M Program revises, revokes and introduces new certification criteria on an ongoing basis. It is recommended that, in order to keep abreast of these changes, procurement professional subscribe to the program's *EcoBuyer Newsletter*.

Further information may be obtained from:

Environmental Choice^M Program

c/o TerraChoice Environmental Services Inc.

1280 Old Innes Road, Suite 801

Ottawa, Ontario K1B 5M7

Phone: (613) 247-1900 / Toll Free: 1-800-478-0399

Fax: (613) 247-2228

Email: ecoinfo@terrachoice.ca

Web site: www.terrachoice.ca

Environmental Choice^M Program

Web site: www.environmentalchoice.com

2. Principles and Guidelines for Environmental Labelling and Advertising

Industry Canada, in partnership with associations representing public interest groups, manufacturers, distributors, retailers, and advertisers, produced the Principles and Guidelines to provide guidance in the provision of accurate and meaningful information relating to the environmental impacts of products. The Consumer Packaging and Labelling Act and the Competition Act both contain broad prohibitions against false or misleading representations. In the context of these two acts, the Guiding Principles provide recommendations that, if followed, will ensure that consumers are provided with the necessary information to make informed product comparisons. For copies of the Guiding Principles, or additional information, contact the nearest district or regional office of Industry Canada as listed in the Blue Pages of the phone directory, or:

Industry Canada

Competition Bureau

Place du Portage, Phase I

50 Victoria Street, Hull, Québec K1A 0C9

Phone: (819) 997-4282

Web site: www.ic.gc.ca

3. Canadian Code of Preferred Packaging Practices

In April 1989, the Canadian Council of Ministers of the Environment (CCME) commissioned a National Task Force on Packaging to develop a national policy for the management of packaging. The CCME endorsed a protocol March 1990, which set specific waste reduction targets and schedules that would reduce the burden on packaging waste through three achievable targets: 20% in 1992, 35% in 1996, and 50% by the year 2000.

In addition, **A Canadian Code of Preferred Practices** was prepared to guide industry in achieving the goals set. In 1996, the National Packaging Task Force released its second milestone report documenting the results of a packaging survey conducted by Statistics Canada. The results indicated that both the 1996 and year 2000 targets had been exceeded. The Task Force recognizes that while the year 2000 target has been achieved work must continue on other aspects of the Protocol. It will continue activities aimed at further reductions in the amount of packaging sent for disposal. For copies, or questions regarding the Code of Preferred Packaging Practices or the National Packaging Protocol 1996 Milestone Report, please contact the Canadian Council of Ministers of the Environment.

CCME documents
c/o Manitoba Statutory Publications
200 Vaughan Street
Winnipeg, Manitoba R3C 1T5
Phone: (204) 945-0470 Fax: (204) 945-7172
Web site: www.ccme.ca

4. Guidelines for the Production and use of Aerobic Compost in Ontario

This is a document issued by the Waste Management Policy Branch of the Ontario Ministry of the Environment which was prepared to assist composting proponents, ministry staff and staff of other agencies in the selection and/or approval of appropriate aerobic composting methods and the production of quality compost based on good operating practices, compost characteristics, and current Ministry of the Environment legislation. It provides a review of regulatory requirements for aerobic composting and a brief overview of the process, highlighting parameters critical to the success of composting. The information will aid in the attainment of high quality compost product. Value added markets for the product may require development, but offer the best long-term potential for rendering the process economically viable. For copies, contact:

Ontario Ministry of the Environment
Public Information Centre
135 St. Clair Avenue West, Main Floor
Toronto, Ontario M4V 1P5
Phone: (416) 325-4000
Toll Free: 1-800-565-4923
Fax: (416) 325-3159
Web site: www.gov.on.ca

Waste Management Policy Branch
Phone: (416) 325-4440 Fax: (416) 325-4437

Waste Reduction Branch
Phone: (416) 314-4635

5. Recycling Markets and Depots

Specific information related to location of recyclers, recycling depots, landfill bans, disposal fees, and municipal recycling programs should be obtained from your local municipality.

6. Canadian Standards Association (CSA)

The CSA publications referenced in this Guideline may be obtained from:

Canadian Standards Association
178 Rexdale Boulevard
Rexdale (Toronto), Ontario M9W 1R3
(416) 747-2620 Fax: (416) 747-4292
Toll Free: 1-800-463-6727
Web site: www.csa-international.org

7. The Composting Council of Canada

The Composting Council of Canada is a national non-profit organization that serves as a forum to advocate and advance the use of composting as a means of reducing Canada's waste stream while reclaiming the organic fraction for beneficial purposes.

The Composting Council of Canada
16 Northumberland St
Toronto, Ontario, M6H 1P7
Phone: (416) 535-0240 Fax: (416) 536-9892
E-mail: ccc@compost.org
Web site: www.compost.org

8. Illuminating Engineering Society of North America (IESNA) Lighting Handbook

A copy of this handbook can be obtained from:

(IESNA) Illuminating Engineering Society of North America
120 Wall Street, 17th Floor
New York, New York 10005-4001
Phone: (212) 248-5000 Fax: (212) 248-5017
Web site: www.iesna.org

9. The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Information/publications can be obtained from:

(ASHRAE) American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.
1791 Tullie Circle, N.E.,
Atlanta, GA 30329
U.S.A.
Phone: (404) 636-8400 Fax: (404) 321-5478
Web site: www.ashrae.com

10. American Society for Testing and Materials (ASTM)

Publications referenced in this Guideline may be obtained from:

ASTM
100 Barr Harbor Drive
West Conshohocken, Pennsylvania 19428, U.S.A.
Phone: (610) 832-9500 Fax: (610) 832-9555
Web site: www.astm.org

11. Ministry of Transportation (MOT)

MOT publications referenced in this Guideline may be obtained from:

Ministry of Transportation
1201 Wilson Ave.
Main Floor, East Building
Downsview, Ontario M3M 1J8
Phone: (416) 235-5102 Fax: (416) 325-5104
Web site: www.gov.on.ca

12. Environment Canada Publications including Canadian Environmental Protection Act (CEPA) and National Pollutant Release Inventory (NPRI)

Environment Canada publications referenced in this Guideline may be obtained from:

Inquiry Centre
Environment Canada
Environmental Protection Publications
351 St. Joseph Boulevard
Hull, Quebec K1A 0H3
Phone: (819) 997-2800 / (819) 953-6457
Environment Canada Library: Phone: (819) 997-1767
Web site (general): www.ec.gc.ca; (CEPA): www.ec.gc.ca/CEPARRegistry/gene_info
(NPRI): www.ec.gc.ca/pdb/npri/npri_home_e.cfm

13. Federation of Canadian Municipalities (FCM)

The FCM document "The Packaging Waste Reduction Guideline: Minimizing Solid Waste Through Efficient Procurement Practices" is available from:

Federation of Canadian Municipalities
24 Clarence Street
Ottawa, Ontario K1N 5P3
Phone: (613) 241-5221 Fax: (613) 241-7440
Web site: www.fcm.ca

14. Ministry Of Environment (MOE)

(See also 4. Above)

Ontario Ministry of the Environment
135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5
Web site: www.gov.on.ca

Ministry of Energy, Science & Technology (MOEST)

Ministry of Energy, Science & Technology
Hearst Block
900 Bay Street
Toronto, Ontario
M7A 2E1

15. Forest Stewardship Council (FSC) *Accredited Certification Bodies*

These organizations are accredited by the Forest Stewardship Council to certify forest management enterprises that comply with the FSC Principles and Criteria for Forest Stewardship. Accreditation covers plantation and natural forest certification.

Canada

Silva Forest Foundation
P.O. Box 9, Slocan Park, BC VOG 2E0
Phone: (250) 226-7222 Fax: (250) 226-7446
Web site: <http://www.silvafor.org>

United States

Rainforest Alliance Smart Wood Program

1 Millet Street, Goodwin Baker Building, Richmond, Vermont 05477 U.S.A.

Phone: (802) 434-5491 Fax: (802) 434-3116

Web site: <http://www.smartwood.org>

Scientific Certification Systems

Park Plaza Building,

1039 Harrison Street,

Suite 400,

Oakland, California 94612-3532

U.S.A.

Phone: (510) 832-1415 Fax: (510) 832-0359

Web site: <http://www.scs1.com>

16. Agency for Toxic Substances and Disease Registry (ATSDR)

Lists are published on a 2-year basis with an annual informal review and revision.

ATSDR Information Centre

Division of Toxicology

Mail Stop E-29

1600 Clifton Road, NE, Atlanta, GA 30333, U.S.A.

Toll free: 1-888-422-8737

Web site: <http://www.atsdr.cdc.gov/>

17. Canadian Solar Industries Association (CanSIA)

Information may be obtained from:

CanSIA

2415 Holly Lane, Suite 250

Ottawa, ON K1V 7P2

Phone: (613) 736-9077; Fax: (613) 736-8938

Web site: <http://www.cansia.ca>

18. Canadian Wind Energy Association (CanWEA)

Information may be obtained from:

Canadian Wind Energy Association

3553 31 Street NW, Suite 100

Calgary, AB T2L 2K7

Phone: 1-800-922-6932; Fax: (403) 282-1238

Web site: <http://www.canwea.ca>

19. Workplace Hazardous Materials Information Systems (WHMIS)

Information and publications contained in this Guide are available by calling:

Health Canada

Product Safety Bureau

Phone: (613) 957-2342

Web site: <http://hc-sc.gc.ca/ehp/ehd/psb/whmis.htm>

20. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

Information referenced can be obtained by contacting

CITES Secretariat

International Environment House

15, chemin des Anemones

CH-1219 Chatelaine, Geneva

Switzerland

DEFINITIONS

Ballast: A device used with fluorescent and high intensity discharge lamps to provide the conditions for starting and operation. This device has inherent electrical losses that add to the power consumption of the overall system.

Biodegradable¹: Capable of biological breakdown by micro-organisms.

Colour Rendering Index (CRI): CRI describes the effect of a light source on the colour appearance of objects, compared with the effect produced by a reference light source of comparable colour temperature.

De-inking: The process that removes inks, clays, coatings, binders and other contaminants in preparing waste paper to be recycled.

Efficacy: The ratio of the light output to the power input (lumens/watt). The higher the efficacy of a lamp, the more efficient it is.

Fibre: The smallest units of organic growth used in producing pulp due to characteristics of stiffness and tensile strength. In recycling, the fibre strands are recovered from waste paper and reprocessed on the paper machines.

Hazardous Material²: A hazardous material (solid, liquid, gas) is a substance or a combination of substances with properties which, if not adequately controlled, could result in human illness or injury. Hazardous materials may contain hazardous chemical agents and or hazardous biological agents (e.g., micro-organisms).

Lamp Life: Number of hours for 50 percent of an average batch of lamps to burn out on a well-defined operating schedule. In practise, some lamps will burn out before this time while others will operate much longer.

Life-cycle³: All stages of the "life" of any process, product, or activity, including raw material, extraction, processing, manufacturing, filling, packaging, transportation, use/reuse, maintenance, recycling, recovery and disposal.

Life Cycle Costing: The process of economic analysis to assess the total cost of system investment and ownership, taking into consideration the operational constraints and performance requirements of the system or product under study.

Lumens: Total quantity of light emitted per second by a light source.

Mill Broke: Waste generated during the paper making process which is regularly re-pulped and put back into finished products.

Post-Commercial and/or Pre-Consumer Waste: Waste generated after the product leaves the manufacturer, but before the final end use of the product. Example, printers off cuts and trimmings.

Post-Consumer Material¹: Material or item generated by households and commercial and institutional facilities which has served its intended purpose and can no longer be used.

Post-Use Material¹: Material generated by industry, commercial and institutional facilities, and households which has served its intended purpose and can no longer be used. This does not include the in-plant utilization of materials such as re-work, re-grind, re-pulp, scrap materials, generated within the plant and capable of being re-used within the process that generated it.

Reclaimed⁴: Useful products recovered from waste materials.

Recyclable¹: Products made from materials which after use can be diverted from the waste stream and recycled into a new product. For the purposes of environmental labelling and advertising, a product or package may be deemed recyclable where at least 33% of the population across Canada has convenient access to collection or drop-off facilities for recycling for that product, or where a product is produced for a regional market that 33% of the population in that market has access to convenient access to collection or drop-off facilities for recycling.

Reprocessed manufacturing scrap: Material generated as a result of the manufacturing process which is re-used by the same generator.

Re-refining⁵: The use of refining processes during recycling to produce high quality base stock for lubricants or other petroleum products. Re-refining may include distillation, hydrotreating, and/or treatments employing acid, caustic, solvent, clay and/or other chemicals.

Reuse³: The direct reapplication of a product/package for the same or different purpose, in its original form.

Sustainable Development⁶: Sustainable development is growth that makes use of our earth's resources without impairing the ability of future generations to enjoy life on this planet.

Volatile Organic Compound (VOC)⁴: A group of organic compounds that evaporate easily and contribute to air pollution, mainly through the formation of secondary pollutants.

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- 1: From a document titled "Guiding Principles for Environmental Labelling and Advertising" by Consumer and Corporate Affairs.
 - 2: From Ontario Hydro's Corporate Code of Practice on the Management of Occupational Health Pertaining to Hazardous Agents.
 - 3: From "Environmental Profiles, Guidelines to help Industry Meet the Goals of the National Packaging Protocol", 1994.
 - 4: From Environmental Glossary, Pira International, 1993.
 - 5: From "Compilation of ASTM Standard Definitions", ASTM
 - 6: This term was coined in the Bruntland Report from the United Nations Commission.

APPENDIX

Verification of Environmentally Sound Attributes of Product Content

This document forms part of our quotation number:

<p><i>This form is intended to establish environmentally sound attributes of product content and/or certification of product by EcoLogo Symbol. The firm assumes all responsibility for integrity of the information provided.</i></p>			
<p>Product Name:</p>			
<p>1. Product carries EcoLogo Symbol: Yes ECP Guideline No.(s) No *** Complete item 2 or 3 or 4 as applicable ***</p>			
<p>2. Product Recycled Content is made of: *** Complete if answer to Item 1 is No ***</p>			
<p>Post Consumer Material</p>		<p>Pre-Consumer Material</p>	
<p>% Composition</p>	<p>Type of Material</p>	<p>% Composition</p>	<p>Type of Material</p>
<p style="text-align: center;">DEFINITIONS</p> <p>Post Consumer Material means only products that have served their end uses and which have been separated or diverted from wastes for collection, recycling and disposition.</p> <p>Pre-Consumer Material means materials and by-products recovered or diverted from waste but does not include materials and by-products generated from and commonly reused within an original process such as mill broke or processing scrap. Recovered Paper Material may include waste generated in envelope making, trimmings, rejects in printing operations, butt rolls, mill wrappers, obsolete inventories and unused stock.</p>			
<p>3. Product: *** Complete and submit supporting evidence only if answer to item 1 is No ***</p> <p>a) Conforms to: _____ Performance Standards (print name of standard) Set By: _____ (print name of government, issuing agency, etc.)</p> <p>b) Meets specific environmentally sound attributes:</p>			
<p>Attributes</p>		<p>Environmental effects</p>	
<p>c) Test Data attached; (Specify):</p>			
<p>4. Environmental Seal of Approval: ** EcoLogo ** The official Mark of Environment Canada is an Environmental Seal of approval awarded by the Environmental Choice Program (ECP) to products or services considered environmentally preferable compared to similar products or services and carries with it a marketable environmental image. Please answer YES or NO if your firm:</p> <p>a) Applied for EcoLogo: __; Date: __; ECP Guidelines No.: b) Plan to apply for EcoLogo: __; ECP Guidelines No.:</p> <p>If answer is NO, briefly state reasons:</p>			
<p>I have knowledge to certify and do so certify that our product(s) content, certification, standards, environmental attributes and effects are as shown on this form and that, where applicable, our products content conforms to the definitions as shown above.</p>			
<p>Firm name:</p>			<p>Telephone #:</p>
<p>Mailing Address:</p>			<p>Postal Code:</p>
<p>Title of Person Signing:</p>		<p>Name of Person Signing (print):</p>	
<p>Date:</p>		<p>Signature:</p>	

