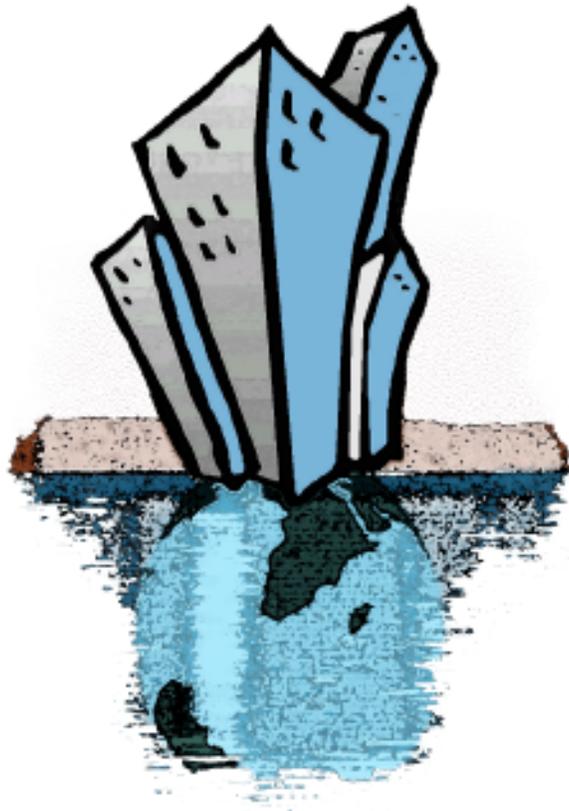


Business and the Environment: Solutions for a Changing World



Business Guide to Waste Reduction and Recycling



THE
DOCUMENT
COMPANY

XEROX

*Business and the Environment:
Solutions for a Changing World*

Business Guide to Waste Reduction and Recycling



The Coin

The words ecology and economy share common roots — both originate from the Greek word “oikos”, meaning “home”. These common origins illustrate the fundamental link between the environment and our economy.

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Business Guide to Waste Reduction and Recycling

As the world enters the new millennium, corporate environments are changing and business is becoming more competitive. Every opportunity to raise corporate profits needs to be examined—from instilling operational efficiencies to reducing large-scale capital costs or providing simple solutions to the more complex.

One important example of these efficiencies is a waste reduction program. Through the implementation of such an undertaking, corporations have been known to save hundreds of thousands of dollars annually—all for relatively small investments in time and energy.

For example, as a result of numerous waste reduction measures, Xerox Corporation was able to generate cost savings of approximately \$47 million in 1999. While Xerox Corporation is a large, international organization, these types of programs clearly increase economic efficiency without impacting product quality.

Waste Reduction Programs are designed to provide economic benefits through the reduction of operational costs by implementing proper waste management in all facilities.

We would like to help you

This **Guide** provides a blueprint to lead you through the design and implementation of reduction, reuse and recycling techniques—the three principles universally accepted as being part of the waste management hierarchy. During the implementation of the following tasks, you will work towards reducing the operating costs of your company as well as implementing a program which will help your company successfully meet the demands of the 21st century.

Using This Guide

The method for developing a waste reduction program has been divided into the following eight steps:

- ① **ORGANIZE** team to develop the waste reduction program.
- ② **ANALYZE** existing waste generation and disposal system.
- ③ **IDENTIFY** alternatives to the existing system.
- ④ **EVALUATE** each alternative group.
- ⑤ **DESIGN** waste reduction program.
- ⑥ **PROMOTE** new program to all employees.
- ⑦ **LAUNCH** program.
- ⑧ **IMPROVE** program on a continuing basis.

Each of these steps is equally important to the success of your program, and has been broken down into the specific tasks necessary.

To assist in the development of a waste reduction program, Xerox has also developed a companion toolbook, the *Business Guide to Waste Reduction and Recycling Workbook*. This second book provides the necessary tools for you to design and implement a waste reduction program in an organized and efficient manner. Specific tools, located in the **Workbook**, are referred to in the text of the **Guide**.

Throughout this **Guide**, you will notice some recurring symbols. Each symbol highlights a specific item, as follows:



Checklist of items to accomplish in this task.

Helpful hints.

Worksheet provided in *Workbook*.

Success stories.

Sources listed in *Workbook* for more information.

We hope you find the **Guide** useful, and helpful in giving you an edge in becoming more competitive.

Organize team — Many hands make light work!

The implementation of a waste reduction program is much easier with the support of a waste management team—both to spread the work around, as well as to build corporate support for the project itself. Following are five steps to help you create a strong, cohesive, effective team—one that can get the job done.

Obtain initial managerial support

Obtaining managerial support for the waste reduction program prior to developing the waste reduction team will facilitate participation, as well as increase future support of the program. To do so, the manager should be presented with the idea to implement a waste reduction and recycling program. Company policy, success stories from other divisions or companies, and relevant environmental mandates and laws may be used as justification.

Any involvement of management should be strongly encouraged, whether it is as dedicated as becoming a waste reduction team member or as simple as providing program support during management meetings. This type of support can be developed by determining the level that management would like to be involved. Successful levels of involvement in the past have varied from membership on the planning committee, to regular reporting, to presentation of a final analysis and recommendation, to a hands-off approach whereby management approves of the initiative but would like to be excluded from the process.

Managerial support is very important to the success of the program. However, even without strong management backing, you can initiate the program. When it becomes clear that the team's efforts are reducing waste, saving money, and increasing employee satisfaction, management will likely join the program.

Form Team(s)

Once you have addressed managerial support, it is time to develop your team. This team will become the nucleus for program planning, implementation, and education. Try to gain grass roots support from the start and seek out committed individuals who are interested in the project from both an environmental and financial standpoint—individuals who take these issues seriously and possess the lasting commitment necessary to make the waste reduction program work. It is also essential that the team represents an appropriate cross section of your organization, including all levels of employees, different departments, union and non-union staff alike. For example, if the facilities group is not spearheading the activity, every attempt should be made to recruit at least one member onto your team. Also, make an effort to include employees in maintenance operations and custodial services; these employees will be directly affected by the program and should help with the program design.

Checklist:

Present waste reduction program idea	<input type="checkbox"/>
Enlist managerial support	<input type="checkbox"/>
Determine preferred level of involvement	<input type="checkbox"/>

Worksheet 1.1

Selected Recycling/Waste Reduction Goals:

Toronto, Canada - 50%
Nurnburg, Germany - 50%
New Jersey, USA - 60%
Furano, Japan - 56%
Guelph, Canada - 57%

Checklist

Seek out appropriate team members	<input type="checkbox"/>
-----------------------------------	--------------------------

Worksheet 1.2

Experience has shown that group dynamics limit the effective size of a team to about 10 or 12 people. With these factors in mind, try not to exclude enthusiastic people even though large teams can become unwieldy.



Helpful Hint

A team leader is necessary to manage the program, and will:

- guide the team in the planning, implementation and operation of the program;
- act as liaison to management, employees, and contractors.

Because of the demanding requirements, the program leader should:

- possess good organizational and communication skills;
- be personally interested in protecting the environment;
- have sufficient time to develop and manage the program.

You may find that your program will require one or more teams depending on the size of your facility—at minimum, you will need a new team for every building complex with 400 or 500 employees. If you have a smaller company, or a facility which performs a wide variety of functions, you may find that one team for every 50 employees is much more effective. If there are many teams at a large site, a central coordinating team should be formed, somewhat like satellite teams around a central hub.

Hold a kick-off meeting

Since the members of your team(s) will represent a cross section of building occupants, individual members may not know one another. You should provide an opportunity for them to meet and share ideas and information before work on the program begins.

Identify Roles

It is important to designate different members to different roles, according to their strengths and interests. Team members should be designated to do the following tasks: team leader, secretary (or scribe) to document decisions, and a person to manage financial responsibility. Other roles the team deems necessary may be introduced now or at a later time.

Communications

Develop your meeting schedule and meeting place(s). It is also important to decide on a means of communication, whether by hard copy, electronic mail or telephone. Be sure that distribution includes all team members, any interested managers, and, if possible, a common network shared by other recycling teams. Copy everyone who needs to be kept informed of your team activities.

During the planning and implementation stages, the team(s) will be very active and require frequent meetings and communication (about 1 to 2 hours per week). After that, monthly meetings should suffice to monitor results and resolve problems. Throughout the process good minutes are essential, and will benefit your team as well as other teams in your facility who are undertaking recycling projects. They will allow the teams to compare notes, as well as to ensure consistency across all waste reduction programs in your company.

Mission

Checklist:

- | | |
|----------------------------------|--------------------------|
| Introduce all members of team | <input type="checkbox"/> |
| Fill team positions | <input type="checkbox"/> |
| Develop meeting schedule | <input type="checkbox"/> |
| Decide on means of communication | <input type="checkbox"/> |
| Develop mission statement | <input type="checkbox"/> |
| Set initial goal | <input type="checkbox"/> |



Worksheet 1.3

During this meeting, consider developing a draft mission statement. This will help the team remain focussed throughout the project, and give the team both form and an objective.

Other groups have also found it useful to create an initial goal. Begin with a group goal that is realistic, such as an office paper recycling program, and then build on that success.

Include both the mission statement as well as the initial goal in the first set of minutes. The ability for all team members to refer back to these statements will help all team members strive to meet the goal at hand. In meeting this goal, your team will become stronger and more able to meet further challenges.

Goals of the US-based *Office Recycling Challenge* include a diversion rate of 76% and a purchasing rate for recycled products of 60%.



The Xerox waste reduction team at the Industrial Centre in Egypt, without any support or guidance from other parts of their organization, has reduced waste going to landfill by 80%—saving US\$103,000 in the first quarter of the program.

Analyze waste generation and disposal systems — Laying the foundation for success

A basic knowledge of your waste stream and the existing management system is essential to create an effective waste management program. This knowledge can be developed through a waste audit.

A waste audit involves two components:

- **Identify the current state** of your waste collection and disposal system, and;
- **Perform a waste composition study** to determine the waste quantities, composition, and characteristics.

The data received through this audit provides a baseline from which to estimate the potential for waste reduction, reuse and recycling. This information is also essential during any vendor negotiations as well as future assessments of the effectiveness of the implemented waste reduction programs.

If you are at a large production facility, you may consider hiring a consultant to perform a waste characterization study. You should expect the consultant to review the waste stream for each facility, document waste management practices at each building, and conduct a field waste sorting and weighing program to provide you with a waste characterization report. The results, whether done by your waste recycling team or by a professional, will provide valuable insight into problem areas.

Determine waste management practices

To familiarize yourself with the current waste management practices at your facility, you may simply need to contact your site's facilities manager, to find out the following:

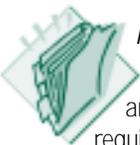
- **Determine who oversees the current waste disposal process.**
- **Familiarize yourself with source reduction initiatives** currently in use, as well as any reuse programs in place.
- **Familiarize yourself with the materials** currently collected (e.g., waste only or are specific materials being segregated for disposal?)
- **Familiarize yourself with the types of containers** in which the materials are being collected (e.g., in 95 gallon wheeled bins, 30 cubic yard front-end dumpster, or 40 cubic yard compacted roll-off containers.)
- **Determine if disposal services are contracted.** If so, document the specific arrangements (e.g., flat fee, fee per "pull", or fee per ton). Also, determine the length of contract, and the quality of service.
- **Determine if any historical records exist** on waste volumes and tipping fees. If they do, note any trends and/or seasonality in the data.
- **Determine the demographics of the facility**, including the number of buildings at your site, the number of employees, the cultural background of the employees, the number of employees where English is a second language, etc.

Checklist:

Contact facilities manager to determine current waste management practices



Worksheets 2.1
2.2



Resource

Hazardous, industrial and special wastes that require handling by trained professionals are beyond the scope of this guide and may be excluded from your waste analysis. The Xerox definitions for these waste classifications are provided in the **glossary**, located on **pg. 43** of the *Guide*.

Knowing the current waste management system is the first step to designing an effective waste reduction program. For instance, if the waste disposal contract at your facility is based on a flat fee arrangement regardless of quantity disposed, some economic benefits of waste reduction will be lost without a contract change—a small fact that could be a major impediment to achieving an increase in operational efficiencies.

Additionally, varying demographics, and corporate and individual cultural backgrounds can create barriers to program effectiveness. A fundamental understanding of these variables will enhance program design and implementation—and ultimately, will increase program effectiveness.

Did you know?

... Enough aluminum is thrown away by Americans every three months to rebuild the entire United States commercial airline fleet, and that British companies throw away enough desks and chairs each year to furnish the House of Commons a hundred times.

Analyze waste management system operations and behaviors

Your waste reduction and recycling program will impact the operation of your current waste disposal system. In developing your familiarity of the system, one of the most helpful things that you can do is a walk-through of the building(s). This will allow you to identify staff behaviors, analyze the amount of space available for containers, and scrutinize the existing locations and types of promotional materials that are used to encourage employees to reduce waste. These kinds of observations are often the source of many of the most simple—and most effective—waste reduction opportunities. Such observations can include the following:

- **Evaluate the location of any existing waste and recycling containers.** For example, are bins located at a convenient distance to normal employee traffic areas? Are bins located close to the point of waste generation (e.g. is there an office paper bin located next to the fax machine and photocopier)? Are they easy to reach, and easy to deposit material into? Is there room available to place another bin?
- **Evaluate the condition of the disposal and recycling bins.** For example, are they clean, or overflowing? Is there any incorrectly-placed material in either the waste or the recycling containers? If there is a recycling container, is it at least the same size or bigger than the waste bin?
- **Evaluate the current flow of material in your facility.** When creating this flow chart, attention should be paid to each person currently handling each segment of the process, from the person who unpacks the material to the person who uses/discards the material to the person who collects the material.
- **Evaluate the types of equipment currently being used for waste handling** (e.g. compactors, shredders, balers, and forklifts).

Checklist:

- Do a walk-through of building(s)
- Note location of bins
- Note bin condition
- Note material flow
- Note waste handling equipment

Worksheets

2.3,
2.4



The existing waste management infrastructure can often be easily adapted to accommodate your waste reduction program. For example, the custodial staff may be able to collect waste and recyclables simultaneously, or your recycling program can utilize the equipment now used to handle solid waste. Perhaps the most important factor in your program will be the space required for consolidating the recyclable material and the space needed for additional containers. If it doesn't all fit, however, don't panic. Some of the space needed for the storage of recyclable material will be offset by reductions in the amount of materials currently being discarded as well as in the amount of space currently being used for waste material storage.

Did you know?

... About 70% of all office garbage is waste paper, which could be recycled.

Analyze promotion and education materials

Promotion and education material detailing waste management behaviors to all employees is essential to the success of the waste reduction program.

Generally, if there is no waste reduction program currently in place, there is also no promotional program. People put everything into the garbage containers without thinking. However, if there is some form of a waste reduction program in place, there should be accompanying signage for that program. During the walk-through, analysis of the effectiveness of this signage is important, and should focus on the following observations:

- **Evaluate the location.** Are signs placed close to the bins for easy reference, or located away from the bins? Are they in an area that is covered up, or located in an area that is clearly visible?
- **Evaluate the aesthetics.** Is it eye-catching, funny, boring, etc.?
- **Note the message.** Is it correct? Clear? Informative?
- **Evaluate the use of graphics.** Are the graphics relevant? Do they convey the intended message?
- **Note other promotional tools** used for the waste management program, including inner-office e-mail messages, employee recognition and rewards, and reminder cards.
- **Note any promotional tools** that are particularly effective when used in other programs in your facility.

In many facilities, the promotion and education program is one of the primary areas which requires improvement. Any enhancements made to promotional materials—even if it is simply an update and change in the graphics that are used—can increase employee participation, decrease contamination rates, and enhance overall waste reduction program results.

Checklist:

- | | |
|---|--------------------------|
| Evaluate use of signage | <input type="checkbox"/> |
| Evaluate use of other promotional tools | <input type="checkbox"/> |



Worksheet 2.5

Perform waste composition study

The process of analyzing your waste stream is often referred to as a “waste composition study”. Waste composition studies provide information on both the quantity and type of the materials in your waste stream and are invaluable in the analysis of the costs and benefits of a waste diversion program. To ensure the success of your waste reduction program, your waste composition study needs to be done carefully and accurately. The level of effort required to conduct a waste composition study depends on the site’s size and business activity and usually involves the following:

- **Arrange for an empty dumpster to be left** at your facility at the beginning of the sampling period, and to pick up the waste bin again at the end of the sampling period.
- **Take representative samples of your waste.** If your site has several departments and/or several buildings, be sure they are all represented during the sampling process. Each sample should be clearly identified upon collection, and recorded according to the point of generation—particularly if different functions are performed in each department or building. This information will be useful during the development of the waste reduction workplan.
- **Sort the waste by material characteristics**, for example, white paper, mixed paper, glass, metal, and corrugated board.
- **Evaluate the quality of the materials collected.** For example, are the bins of paper filled with paper, or do they have general waste thrown in the bin as well? These types of observations will be used later when developing the system.
- **Weigh each category separately.**
- **Find out the total quantity of waste generated** over the sample period. This can be identified by the hauler.

Analyze waste composition results

Once the waste composition study has been completed, the material composition of the waste stream can be predicted and analysis can begin.

- **Calculate the percentage of material** for each waste category, using data from above.
- **Estimate the annual generation rate** using the percentages of material according to the waste composition study and the quantity of waste generated over the sample period, broken down according to each waste constituent.
- **Obtain copies of weigh scale tickets** or the hauler’s run sheets for the waste stream for the previous year. Compare the total weights for the year with those predicted through the waste composition study.

Check list:

- | | |
|---|--------------------------|
| Take samples of waste | <input type="checkbox"/> |
| Sort waste by material | <input type="checkbox"/> |
| Evaluate quality of the materials | <input type="checkbox"/> |
| Identify the total quantity of waste generated over the sample period | <input type="checkbox"/> |

Worksheets 2.6, 2.7, 2.8



Check list

- | | |
|---|--------------------------|
| Estimate annual generation rate | <input type="checkbox"/> |
| Obtain weights from hauler | <input type="checkbox"/> |
| Compare actual weights with estimated weights | <input type="checkbox"/> |
| Predict generation trends | <input type="checkbox"/> |
| Estimate annual material composition | <input type="checkbox"/> |
| Estimate current diversion rate | <input type="checkbox"/> |

Helpful Hint

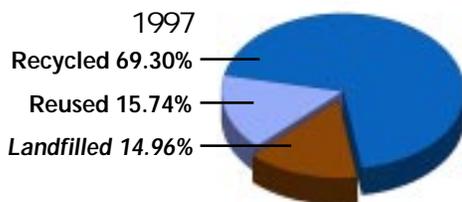
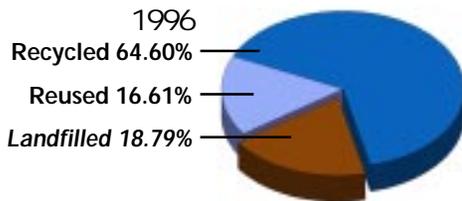
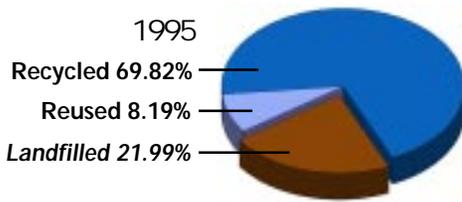
Hauler’s run sheets represent a log detailing when each container was collected from a certain location, and the corresponding weight. Weigh scale tickets are tickets which detail the weight of the garbage truck upon entry and exit from the disposal facility. Weigh scale tickets and/or run sheets are used by haulers when calculating the cost of providing waste collection services to your facility. As such, they are a great help in providing annual weights when conducting a waste composition study.



Xerox reported a 60 percent increase in paper recycling on National Clean Your Files Day.



Xerox Worldwide Waste Reporting



- **Track any trends for high waste-generation periods** (e.g., around holidays).
- **Predict whether the material composition of the waste would change during high-generation periods.** For example, be sure to account for seasonal variations in your extrapolation process (e.g., a waste audit performed in June may yield high monthly estimates of grass clippings if not adjusted for seasonality). If such a modification is required, predict how the representation would change.
- **Find out the quantity of material diverted for each recyclable.** For example, if an informal recycling program already exists, or if a document destruction service is used with documents being recycled following shredding, find out the quantity of diverted material on an annual basis.
- **Determine overall waste generation rates** by compiling the results of the previous two steps.

Often you are not able to estimate the weight of the material but are able to estimate the volume of material. Using the number and level of fullness of containers collected, the size of the containers, and the frequency of collection, you will be able to estimate a total volume of material collected over the generation period. Using these figures and the volume-to-weight conversion tables provided in the **Workbook**, you will be able to estimate the total weight of the material.

The resulting waste analysis data can be used to illustrate graphically to employees and management that valuable resources are literally being thrown away. It will not only ensure team and management support for the waste reduction program, but will also provide some data to be used during the development of the promotion and education material.

Did you know? ... The average company can recycle about half of their existing waste stream.



The elimination or reduction of waste will occur through one of the following three methods:

- **Source Reduction**
- **Reuse**
- **Recycling & Composting**

Since source reduction, or the ability to avoid using a material altogether, is considered environmentally preferable, it is better to first try to create ideas that stress source reduction prior to creating a recycling plan. It is the source reduction ideas that will have the greatest impact upon the environment as well!

Reuse, or the ability to use a material again in its original form, is the second most important type of alternative to using a certain material. Ranging from reusing office furniture to relabeling a file folder to remanufacturing the toner cartridge, there are many alternatives which will eliminate the transportation, energy and resource requirements associated with recycling alternatives.

Recycling, or the ability to use a given material again to make another product, is the third type of alternative to disposing a material. While this in many ways builds upon the collection system already in use for waste management, it is designed to lessen the impacts associated with the disposal of any given product.

Composting, in many ways, is a type of recycling. Either done on site or by using the collection system designed for recycling, composting is the decomposition of organic matter into a nutrient-rich humus. This soil-like material can then be used as a natural fertilizer. In doing so, any impacts associated with the disposal of organic material will be avoided.

In some jurisdictions, recovery—or incineration—is considered a fourth “R” in the waste management hierarchy. Since this method is not universally accepted as a viable waste management alternative, it will not be discussed in this **Guide**. Each of the other three methods—reduction, reuse and recycling—are discussed in further detail throughout the following Section.



Checklist:

Identify processes which avoid waste generation



In Mexico, the Reduce, Reuse and Recycle Program

highlights the importance of conserving resources by requiring that each employee source-separate their paper into the appropriate fiber categories, as well as reuse other office materials such as diskettes.

Identify source reduction opportunities

There is no simple recipe for source reduction initiatives for your facility. Identifying source reduction opportunities depends largely on your facility's waste stream and the creativity of your team members. Look at the waste (including the materials being reused and recycled) generated by your facility, operations, and products and identify what can be avoided altogether. In other words, look at what you purchase, and ask "why do we buy this?".

Reducing waste through source reduction requires changing our way of working. It involves systematic programs that develop or use fewer products and processes, and the dedication of employees, customers, and suppliers. Surprisingly simple ideas can often yield large reductions in waste volumes. Double-sided copying, for example, can eliminate up to 50 percent of the paper waste of single-sided copying, while conserving storage space and reducing mail and handling costs.

While many source reduction opportunities can be done on an individual basis, there are others which require corporate commitment to accomplish. Either done individually or company-wide, taking these measures can lead to cost savings since they highlight non-value-added activities. For example, eliminating unnecessary reports or reducing their distribution will save in preparation time, as well as material and disposal costs.

While many of the following source reduction ideas focus on document management, they can be used as a starting point to brainstorm ideas that might be more suitable for your operational process.

Done by Individuals:

- Wherever possible, **copy and print** on both sides of the paper.
- **Read short electronic mail messages** on the computer screen without printing (saves time and conserves resources).
- **Carefully proofread documents** before printing or copying, to avoid wasted copies.
- **Reduce junk mail**; have yourself removed from unwanted mailing lists for catalogues and promotional material. A request to the Direct Marketing Association can reduce your junk mail by as much as 75 percent.
- **Use the collated printing option** (change the default on the printer icon to "collated" printing) so that a separate cover sheet is not printed with each document.
- **Circulate magazines** rather than buying multiple subscriptions (saves money too!).
- **Make only the number of copies you need** so that there are no excess copies to be thrown away. It is best to "copy on demand".
- **Eliminate unnecessary forms** and reports.
- **Buy in bulk** to reduce packaging waste.

Done by the Organization:

- **Purchase only the quantity of supplies needed**, especially letterhead, envelopes and business cards, to reduce the need to throw away outdated stock.
- **Negotiate service contracts** to maintain (and therefore extend the life of) copiers, computers, and other electronic equipment.
- **Routinely inspect and maintain** valves, pipe joints, pumps, tanks, etc. to prevent resource loss due to leaks and spills.
- **Redesign products and modify processes** to reduce waste and prevent pollution, and limit use of resources.
- **Design for the environment** - design quality and environmental features into your products for a longer life.
- **Establish a quality control program** to reduce manufacturing wastes.
- **Evaluate process performance regularly** to determine efficiency and methods of reducing waste.

Did you know? ... If only half of the company canteens and restaurants in Britain alone reduced their waste by just 10%, they could eliminate over 100,000 tonnes of waste per year.

Identify reuse opportunities

Once again, review your waste stream to identify waste that can be reused and brainstorm ideas for reuse at your facility. Select opportunities that are achievable and will have a measurable effect on your waste generation or enable your team members to see progress from their efforts. For example, reusing your own mug in place of disposable cups for coffee and beverages is a highly visible opportunity that involves all employees. Other reuse ideas include the following:

Done by the Individual:

- **Order, purchase, and use products** that are made to be used many times, for example, rechargeable batteries, reusable dishes/silverware, and cloth towels.
- **Use internal mail envelopes** that are reusable; reuse large manila envelopes by putting labels over old addresses.
- **Reuse office supplies** such as binders, file folders, and paper clips.
- **Reuse cardboard boxes** for packaging and moving.
- **Share magazines** and other publications with co-workers.
- **Use "slide-in" binder cover sheets** instead of specially printed covers so that binders can be easily reused.
- **Bind scrap paper** into scratch pads.
- **Return laser printer and toner cartridges** to suppliers.

Checklist:

Identify waste materials for reuse



Xerox has started a program to reuse packaging and pallets designed for shipping and receiving. By standardizing containers and pallets, the company is able to improve efficiency and reduce waste. When the material is no longer reusable, it is recycled.

Done by the Organization:

- **Sell or donate obsolete equipment** to others who can use it.
- **Work with regular suppliers** to use returnable and reusable containers.
- **Reuse packaging and pallets** for internal transport.
- **Distribute your products** in returnable and reusable containers.
- **Purchase longer lasting items** instead of disposable ones, for example, reusable coffee mugs instead of throw-away cups. Eliminate disposables from your cafeteria services.
- **Buy or rent** reusable glassware, table settings, silverware, table linens and serving equipment for company parties and events.
- **Capture and reclaim** spilled or leaked materials.
- **Design products with reusable parts**; use processes that reuse products.
- **Be proactive** — design a product take-back program.

Did you know?

... In the United States, over half of the paper and glass produced and approximately one-third of the plastic is incorporated into products with a life span of less than one year.

Quantify Impact of source reduction and reuse opportunities

Source reduction and reuse initiatives are the most important programs to implement. Not only will they have the greatest impact on your company's bottom line, but they will also provide the greatest benefit to the environment. For an effective program design, it is essential that **all** source reduction and reuse options are considered **before** designing a recycling program. To do so, estimate how much material will be eliminated through source reduction and reuse initiatives, and quantify how this may change your waste quantities and composition.

If source reduction and reuse initiatives impact the quantity of recyclable material recovered, the economics of the recycling program may also be impacted. Therefore, estimating the impact of these measures is a fundamental step before analyzing the feasibility of the recycling program.

Checklist:

Estimate quantity of material eliminated through source reduction and reuse

Determine impact on waste stream



Worksheet 3.1

Did you know?

... If a million people used their own mugs at work each day, we could eliminate as many as 1.25 billion cups from going to landfill. Lined up end to end, that's a total of about 75,000 miles of garbage.

Identify material substitution opportunities

Less polluting—or even benign—materials can often be substituted without compromising performance. First, you must become informed about the toxicity of chemicals used in your workplace and purchase less toxic alternatives. Then, be sure to properly dispose of products containing toxic chemicals in accordance with the law. Other material substitution ideas include the following:

Done by Individuals:

- **Use water-based “white-out” and white glue** as non-polluting alternatives to rubber cement.
- **Use water-based pens and markers** which are less toxic than those with chemical inks.
- **Order, purchase and use** products that are made from recycled materials.

Done by the Organization:

- Where returnable/reuseable packaging is not feasible, **use molded pulp or corrugated board packaging**, instead of plastic, expanded polystyrene, or any other material which is not as easily recyclable.
- **Use brown packaging and unbleached paper** where these meet your requirements.
- **Ask suppliers to provide** products packaged in recyclable materials such as paper, glass, tin or aluminum.
- **Substitute non-hazardous ingredients** for hazardous materials wherever possible.

Did you know?

... Incandescent bulbs last approximately 750 hours (\$45 worth of energy), while fluorescent bulbs last for up to 10,000 hours (\$10 worth of energy). By using a compact fluorescent bulb instead of an incandescent, you will prevent 2000 pounds of carbon dioxide and 20 pounds of sulphur dioxide from entering the atmosphere.

Identify remaining materials

The materials you choose to recycle will depend on the volume, value, and contamination level of the recyclable materials in your waste stream. The availability of material processors will also influence potential recyclability. When starting a program, the most promising and cost-effective approach is to start with materials that have a high market value, account for a large portion of your waste stream, and/or are easy to separate. Identification of promising materials was done during the waste composition study, while current periodicals will help you identify market values.

Checklist:

Identify alternative materials

Worksheet 3.2



To reduce the use of hazardous waste, Xerox developed a CO_x-based cleaning process to virtually eliminate all related waste products - other than the dirt removed from components.



Checklist:

Identify materials for recycling

Worksheet 3.3



Resource p. 68



Materials classified as hazardous wastes do not lend themselves to conventional recycling programs. They need to be handled according to local, state, and national laws and corporate standards. Industrial and special wastes also require special handling and disposal procedures. While reducing these wastes is important, they need to be handled on a case-by-case basis by the environment, health and safety professionals in your organization.

Infrastructure and markets for post-consumer materials are expanding rapidly. Although market maturity varies between material types, successful commercial recycling programs can reduce waste disposal needs by 80 percent or more. The characteristics of waste generated by different business activities varies greatly.

In general, corrugated cardboard, white paper and aluminum cans are often the first to be recycled, either because they have a high market value or because they are easy to separate from the waste stream. Other materials are then added as the program builds on its success.

Estimate quantities of material that can be recycled

Using the quantity of material generated on an annual basis (calculated in the waste composition study), subtract the relevant quantities of materials potentially diverted through reduction and reuse options. From the remainder, estimate the anticipated employee participation rate, for each material, for the recycling program. Using the remaining quantity of material for each category, multiply this by the participation rate to estimate the quantity of material diverted through a recycling program. A worksheet is provided in the **Workbook** to help you estimate the quantities of material that will be separated for recycling.

Did you know? ... The average 100-person company uses about 250,000 sheets of copier paper per year. That's a stack of paper piled nearly five floors high!

Identify methods for recycling confidential waste

Consult with your current vendor to see if confidential waste is being recycled after it is destroyed.

If not, you may wish to make this one of your requirements, but do not compromise your facility's security program in the process. Before making any changes, get approval from the person in charge of Corporate Data Security for your site.

Identify composting alternatives for green wastes

Grass clippings, bush, leaves, and fruit and vegetable peels and trimmings are all green wastes. As such, they lend themselves to composting. Since this material is quite heavy, diversion of this material will make a significant impact upon the total waste management costs.



Worksheet 3.4

Checklist:

- Estimate participation rates
- Estimate quantity of material diverted through recycling
- Determine whether confidential waste is being recycled

Checklist:

- Investigate composting organic waste

If your facility has the space, look into setting up an on-site composting system for your organic wastes. Otherwise, talk to your service provider to find out if they offer collection programs for food and landscaping wastes, and confirm the materials that are accepted in the program.

Did you know? ... One acre of lawn yields 400 25-pound bags of grass clippings per year.

Identify recycling opportunities for uncommon materials

With most facilities, waste analysis results pinpoint a number of waste materials that are not readily recycled in mainstream recycling markets (for example, mixed scrap material and waste contaminated by non-recyclable materials). For each waste category, determine if markets exist for this material and develop procedures for diverting the material from the waste stream.

While the generation of these uncommon wastes is usually restricted to only a few sources, making material separation and collection relatively easy, it is challenging finding markets to absorb the material. Some items like wooden pallets or scrap metal are easy to sell, while others such as commingled plastics are more difficult.

A waste exchange is another excellent disposal alternative. Waste exchanges match companies with unwanted but usable material, with other companies that can use the material. The **Resource** section of the **Workbook** contains names of some waste exchanges. Others may be available through your local government or recycling organizations.

Did you know? ... It takes a tree 10 years to grow enough lumber to manufacture one wooden pallet.

Prioritize alternatives

Based on volume, value, level of difficulty, and investment, prioritize the recycling of the different categories of material. According to similarities in characteristics, group the alternatives by implementation phase.

Phasing in a recycling program is an effective way of gaining widespread acceptance and participation. Ranking the alternative groups according to how they meet your facility's waste reduction objectives provides a long-range plan for phasing in a comprehensive recycling program.

Checklist: 

Develop procedures for diverting remaining materials

Waste mask strip solution is an environmental hazard. As a result, Xerox developed a reaction process that precipitates the selenium and arsenic with sulfuric acid. The precipitate is crystallized, dried, and used as a raw material in the glass manufacturing industry—eliminating environmental impacts to the air, water, and soil.



Resource p. 66–68 

Checklist: 

Determine implementation priorities

Checklist:

Determine flow pattern for each material

Identify required collection systems

Alternatives can exist, not only in the ability to reduce, reuse or recycle materials, but also in the method of providing the waste service. Decisions will have to be made regarding the type of materials that should be recycled, the type of program that is required, and the preferred level of employee participation (e.g., do employees sort all materials into separate collection bins, or do they mix fibers and drinks packaging, etc?).

For each type of material selected, determine a source separation method and how the material will move from desk to dock.



Separation of recyclables by the employee at the point of generation is an efficient and usually successful method of diverting recyclables from the waste stream. Generally, employees are given a receptacle for recyclables generated at their desk, and are then responsible for depositing the recyclables into conveniently placed intermediate bins. This simplifies the collection process and avoids putting an undue strain on maintenance staff.

Custodial or maintenance staff are logical candidates for moving the recyclables from intermediate bin locations to a staging/loading area. Integrating recyclables collection with waste collection is a logical method of collecting and consolidating material.

At this point, it is enough to identify the alternatives you may already be using for collection of recyclables. The details of selection, placement of containers, and the development of procedures and training is best done after establishing program feasibility.

Assess storage requirements

Based on the quantity of recyclable material identified in the waste composition study, determine the space necessary for each recyclable between pickups.

Implementing a recycling program may require the allocation of additional space, potentially an important issue if space is restricted at your facility. Therefore, you must carefully consider:

- **Consolidation and storage requirements;**
- **Varying pickup times by recycling vendors (typically, vendors specify minimum collection volumes);**
- **Space requirements;**
- **Security access to loading docks;**
- **Required material handling equipment.**

Evaluate local markets for recyclables

Research current prices, historical trends, and growth potential for the recyclable materials in your waste stream. Your government environmental departments and waste exchanges can provide you with much of the needed information.

Your local phone book may also have potential service providers, listed under “Waste Management Services” or “Recycling Services”, and potential buyers listed under “Wastepaper” or “Recycling”.

Did you know? ... Only 10% of building materials are made from secondary or recycled sources.

Evaluate vendors/recyclers

Each recycling vendor offers slightly different services, so it pays to shop around. The major considerations in evaluating vendors are:

- **materials accepted;**
- **price differences;**
- **pick-up schedules;**
- **equipment supplied; and,**
- **any special services offered or community considerations.**

A list of questions to consider is provided in the **Workbook**, (worksheet 3.8, page 20).

Checklist:

Determine required amount of storage space

Worksheet 3.5



Checklist:

Research material markets

Resources p. 1–16
p. 28–31



Worksheet 3.6



The Xerox facility in Webster, NY, avoided landfill disposal costs of nearly \$35,000 by recycling existing asphalt into new sub-base material.

Checklist:

Interview service providers

Arrange for vendors to visit your facility

Worksheets 3.7
3.8





Resource p. 39-54

Interview a number of potential service providers. There is a wide variety of types of services that can be offered, and each and every vendor differs slightly in their presentation, services included, cost of collection, etc.—there is a service provider out there with the right fit for your facility. Your government environmental departments or waste reduction organizations, again, will be able to provide you with some recommendations regarding potential contacts.

When selecting a short list of potential vendors, be sure to request and investigate references. For the liability and reputation of your company—and the success of your program—it is essential that a reputable vendor is selected. Such a vendor is cognizant and respectful of relevant legislation, maintains a high level of customer satisfaction, and is honest.

If possible, arrange for a few vendors to visit your facility and present ideas to the team. Vendors are a good source of information on how to set up a program. Also, if your facility is large enough, you may want to bypass full-service recyclers and deal directly with processors for each type of recyclable. This will require more effort, but the financial returns could be higher.

Evaluate each 4 alternative group

Like any other business decision, the waste reduction program will need to make good economic sense as well as good environmental sense. A feasibility study can help you finalize the design of your program. By analyzing the cost and benefits of the recycling opportunities, you can identify the most practical implementation schedule for your facility.

Determine investment requirements

Determine what investment will be required to successfully implement the program phases identified earlier.

While source reduction and reuse have few—if any—investment requirements, the implementation of a recycling program may require equipment and services to be purchased. Determining how much a program will cost should take into consideration the cost of containers for collecting and storing recyclables, building modifications (for example, added storage space), and training and publicity costs.

Did you know? ... Purchased in bulk, ceramic mugs cost approximately \$2.50 each, while polystyrene cups cost around \$3.35 per employee per year (assuming one use per day).

Estimate ongoing cost of operations

Collecting, storing, and maintaining the waste reduction program will require an ongoing commitment of effort and funding. Estimate the human resources required to maintain the program. This will include labor hours needed for tracking items available for reuse, collecting recyclables, maintaining storage facilities, and administering the program. A Benefit/Cost Analysis Worksheet has been provided in the **Workbook** to help you estimate the operational costs associated with the program.

Quantify savings from avoided disposal costs

Use the estimated diversion rate, (through source reduction, reuse, and recycling alternatives), calculated earlier, along with your waste-generation rates to determine the savings you can expect. The following steps may be helpful:

- **Analyze** waste disposal and tipping fee trends in your locality and project future disposal costs.
- **Calculate** the potential impact of the program on disposal costs.
- **Examine** the waste disposal contract to see if it needs to be renegotiated to capture savings.

Checklist:

- | | |
|-------------------------------------|--------------------------|
| Estimate capital and start-up costs | <input type="checkbox"/> |
| Estimate operational costs | <input type="checkbox"/> |

Worksheet 4.1

Checklist:

- | | |
|------------------------------------|--------------------------|
| Analyze market trends | <input type="checkbox"/> |
| Calculate impact on disposal costs | <input type="checkbox"/> |
| Evaluate waste disposal contract | <input type="checkbox"/> |

Also, the nature of the waste disposal contract will directly impact your potential savings. At this stage, it may be a good idea to inform your waste hauler of your intentions. If the current contract specifies a fixed rate and fixed schedule, check to see if renegotiation is possible.

Calculate potential revenues for each material

Calculate the expected monthly sales revenues based on current market conditions, for the materials you have identified for recycling.

Document environmental and conservation benefits

Quantify how much material will be diverted—i.e., paper, metal, wood, glass, plastics, and so on. Translate this into specific environmental and conservation benefits to enhance employee motivation and enthusiasm. Statistics detailing environmental benefits are provided in the **Workbook**.

Prepare program specifications/justification

Summarize the results of your analysis, documenting the specifics of your program in terms of materials to be diverted through each implementation phase, and the related costs and benefits.

Get senior management buy-in

Successful waste reduction programs require active participation by all employees. Present the program specifications and justification (including policy, local laws, and employee and community concerns) to site and facility management.

Did you know?

... Japan and the Netherlands collect over 50 percent of their aluminum, glass, and paper. In these countries, raw materials are required only every second year for the production of paper and glass!

Checklist:

- Calculate expected revenues
- Determine environmental and conservation benefits



Worksheet 4.2

Checklist:

- Summarize results of analysis
- Present analysis to management

In Brazil, Xerox guaranteed that no toner waste will be disposed of in landfill. As a result, in 1997, 1378 tons of toner waste were recycled.

With managerial buy-in and the feasibility analyses completed, the next step is to actually design the waste reduction program. This design will be based on the information that was discovered during the **Analyze, Identify** and **Evaluate** steps.

Survey premises and identify container locations

Survey each building in your facility to determine locations for intermediate bins and central dumpsters. Identify where each type of recyclable waste is generated and locate bins nearby. Locations for each container will depend on the available space in the building, local building fire codes, and other considerations. For instance, paper bins should be placed near printers and copiers or in general office areas, bins for cans and glass bottles should be located in break rooms and the cafeteria. Corrugated cardboard dumpsters should be near a receiving dock where packages arrive.

Proper placement of containers encourages participation by making it easy for employees to recycle. Select individual receptacles for placement at each workstation. To encourage participation, it is helpful for each recyclables receptacle to be equal to or greater in size than the desktop waste receptacle.

Select and purchase an adequate number of intermediate recycling bins. These bins should be placed in common areas, conveniently close to normal employee traffic areas. While your recycling provider may be able to provide you with bins as part of the service contract, it is important to ensure that the bins meet your specifications. To discourage contamination, clearly mark the bins and be sure a trash can is located nearby.

While it is important that the bins are placed in a convenient location for employee use, it is also important that these containers are placed in an area where it will be easy to collect the recyclable materials. For example, locate bins close to entrances of rooms rather than having them tucked away in far corners. Also, be sure the bin can be handled when full of material (i.e., install wheels if it is too heavy to lift).

Select a central storage location in consultation with the vendor who will pick up the recyclable material. A preferred location is generally by the service entrance, elevator, mail room, on the loading dock, or any other area that meets the collection specifications of the hauler.

Did you know? ... Fifteen percent of all landfill waste in the United States is made up of high-grade printing and writing paper.

Checklist:

Determine locations for intermediate bins	<input type="checkbox"/>
Select central storage location	<input type="checkbox"/>

In one program, floor model waste receptacles are removed from each employee workspace. In return, employees are given a one-litre size desktop garbage pail, and a floor model recycling receptacle. This has proven to be an effective method of encouraging employees to reduce waste, and increase recycling practices.



Helpful Hint

For paper, placing one intermediate bin for every 25 to 40 people is optimal.



In this document, the following words designate the following types of containers:

Receptacle The personal workstation container for the disposal of garbage or recyclables.



Bin The intermediate recycling or garbage container, located at a convenient distance to a number of employees.



Dumpster The central storage container used to hold consolidated material for collection by the hauler.





Worksheet 5.1

Checklist:

- Select and purchase standardized set of collection containers
- Check restrictions with fire marshal and insurance company
- Select dumpsters
- Determine how and when containers will be emptied
- Assign collection responsibility



Worksheet 5.2



Helpful Hint

Keep in mind that material separated at the source is still garbage if it gets mixed with waste during the collection process.

Checklist:

- Assess your material handling equipment needs

Select and procure containers

Select a standardized set of receptacles and bins to be used. You may choose different sizes and colors to denote different recyclables, and serve different purposes. Depending upon the options provided by your recycling handler, your vendor may agree to provide these containers to you.

At this point, order the containers necessary to satisfy the floor plan developed for container locations. Check with your local fire marshal and insurance company and safety and/or ergonomic officer for guidance. Select the type, size, and number of containers (office paper, aluminum beverage cans, PET bottles, etc.) depending upon space availability and pickup requirements. Recycling stickers and program logos which clearly designate acceptable materials should be placed on or near the containers.

Work with your vendors to select central storage dumpsters suitable for both parties. Generally, the generation rate, collection schedule, and storage area should help you determine the type of dumpster best suited to your facility.

Design collection routing system and schedule

Based on the size of the bins selected and the generation rate of recyclables, determine how and when bins will be emptied. Be sure to design your collection system to make it convenient for both your company and the collector. Involve the facilities staff, janitorial service and union reps in the planning and design.

Assign collection activities to certain personnel, and ensure that those people have the necessary tools for collection (e.g., blue plastic bags, collection trolleys, etc).

Did you know?

... In the United Kingdom, businesses throw out almost 2 million plastic toner cartridges every year. Laid end-to-end, that's enough to stretch from London to Milan.

Acquire material handling equipment

Moving and consolidating collected materials may require the use of heavy equipment, such as storage containers (dumpsters and large crates), wheeled canvas bins or barrels, mail carts, handcarts, forklifts, balers, and shredders. Depending upon the requirements of your company as well as the service options offered by your waste handler, this equipment may be supplied by the recycling company. In discussion with your recycling vendor, assess your material handling equipment needs and whether or not any additional purchases are necessary.

Acquire storage space

Arrange for dock space to stage and store recyclables.

Earlier analysis and design of your collection system will provide you with an idea of the quantity and timing of material scheduled to arrive at your loading docks. It is a good idea to arrange for ample dock space because the volumes of recyclables may fluctuate considerably and pickup schedules may not be precise — especially while program schedules are being honed. For some recyclables, security may be an added consideration. Good storage areas usually have the following: ample space; security; and, easy access to loading docks, material handling equipment, and a compactor or baler.

Now that the details of the program specifications have been agreed upon, formal contracts with recycling vendors should be established. Depending on the size of your facility, you may want to use a full-service vendor to pick up all of your recyclables or you may choose to contract out your recyclables individually. The following will help you establish a satisfactory vendor contract and good vendor relations.

Determine pickup frequency

Based on the expected volume of recyclable material, storage considerations, and vendor requirements, determine how often the vendor will collect your material.

Determine length of contract

In many facilities, waste and recycling haulers are collecting the material in absence of a contract. This has both positive and negative aspects, including a tendency for the hauler to provide better service to the client due to decreased security, as well as a greater ability on behalf of the hauler to increase the price structure during low revenue cycles. Contracts can range from no contract to a 25-year contract with an evergreen clause. It is important that the contract you select meets your program and facility requirements and is agreeable to both parties. You may wish to start with either no contract or a short-term contract in order to evaluate program effectiveness.

It is important, however, to be aware of the ramifications of an evergreen clause. This type of clause allows the service provider, in the absence of notification of cancellation of services, to renew the contract for the provision of services. This renewal does not require any type of confirmation from your company.

Agree on pricing mechanism for recyclables

Based on market conditions for the material, determine a pricing structure that is agreeable to both parties.

Checklist:

Arrange dock space

Worksheet 5.3

Checklist:

- Establish contact with vendors
- Determine collection frequency
- Determine period of contract
- Determine pricing structure

When setting up the pricing structure on recyclables, one of the most important points to remember is that recyclable materials are commodities. As with other commodities, prices frequently—and sometimes rapidly—rise and fall. Market conditions affecting these price swings include global trading patterns, economic trends, and major disasters.

The length of the contract should weigh heavily here—the longer the contract length, the more likely a fluctuating revenue ratio can be negotiated. Generally, it is a good idea to use a floating price that is tied to the market value of the material—but has a guaranteed minimum floor price. In this scenario, protection is given to both parties to ensure that the profits based on a fluctuating revenue stream from the sale of recyclables will not negatively affect either the hauler (who would otherwise increase overall service rates to protect themselves from falling revenues) or your own company (who will then share in the revenues when the material becomes valuable).

Develop revenue handling and reporting procedures

Ensure that appropriate controls are in place for receiving revenue from vendors. Set up procedures for accurate record keeping and revenue and expense reconciliation. Make sure the vendor supplies details, quantity, and dollar amounts, and adheres to his/her agreement.

Not only will this ensure that proper audit controls are in place, but it will also help provide information for evaluating the effectiveness of your program and opportunities for continuous improvement.

Develop monitoring network

Assign responsibility for specific areas to individuals on the team. Responsibilities will include:

- **Monitoring quality and quantity of material(s) collected.**
- **Disseminating information.**
- **Interfacing with participants.**
- **Alerting team leader to problems and needs.**

Schedule program roll-out

Based on a time following when program materials are scheduled to arrive, select a day to launch the program. Distribution of promotional and educational materials can be planned around this date.

Depending on the size of your program and the materials you choose to recycle, you may want to run a pilot program to address problem areas before bringing the entire facility online.

Checklist:

- Develop payment procedure
- Develop record keeping and reconciliation procedures

Checklist:

- Assign monitoring responsibilities to team members



Worksheet 5.4

Checklist:

- Select day to launch the program

A successful recycling program requires healthy participation by employees. If employees do not participate or if they do not know what materials to recycle, the waste reduction program will not be as effective as it could be. Employee empowerment, motivation and education are the keys to the success of any waste reduction program, and can be achieved through several venues.

Design and procure educational and promotional materials

Design program logos, slogans, recycling wheels, posters, and stickers. Order the materials ahead of time so they will be available before your anticipated program launch date.

It is a good idea to use promotional materials that exhibit your program's environmental goals. For example, use minimal packaging and print on recycled paper.

Demonstrating senior management's commitment will influence other staff members to participate in the program. This can occur through having a senior manager write the program's kick-off memo and/or by using senior management in the education process. For example, you may include a picture in your promotional materials of top administrators emptying their personal recycling receptacles into the intermediate recycling bins.



Xerox Corporation uses this waste reduction logo in promotional pieces:



Plan and schedule training and education sessions

Training should be a priority in the development of any new program. This will raise individual awareness, and encourage responsibility and pride in the reduction of waste and the conservation of our natural resources. Training should be provided to all employees and facility operations management.

Each team member should be assigned the responsibility of training their own section or department in the facility. Their knowledge and enthusiasm will help generate the interest and commitment of their colleagues.

Checklist:

Design and order program materials

Worksheets 6.1, 6.2, 6.3



Checklist:

Design employee presentation

Worksheet 6.4





Worksheet 6.4



The Venray Xerox RCT team produced a video, outlining the collection, segregation and recycling processes of Xerox component materials, to be used for environmental awareness training and promoting Xerox material recycling initiatives.

Checklist:

Inform new employees of program requirements



Design a short presentation on how the program works. Schedule an initial session to correspond with the launch date. The presentation should include an overview of the program operation, source reduction and reuse opportunities, descriptions of recyclable and non-recyclable materials, displays of collection equipment, and convincing facts about why each employee should participate. Examples of these facts can be found in the **Workbook**.

For the employees, training should generate interest; address personal, global and corporate benefits; and, provide program details. Management should be educated on company policy; understand the value of the program; and be aware of any cost, time, resource, and space implications of the program.

Did you know?

... One British survey showed that only 20% of respondents had received any staff training on relevant environmental issues.

Integrate program education into new hire orientation

The presentation developed for employees is also suitable for new hire orientation. Make sure that all new employees are informed and educated about the operation of the waste reduction program, as well as their roles and responsibilities within the program.

Implementation of the program can be accomplished with or without a pilot program. Starting with a pilot program can be beneficial, particularly if you are recycling a number of materials. Regardless of which method you choose, the activities suggested here will help ensure a successful program launch.

Promote launch of new waste management program

Prior promotion of the waste reduction program is essential. A countdown to the launch of the program is one of the most effective methods of highlighting the requirements of the waste reduction program prior to implementation, and ensuring that a relatively contaminant-free stream is received from the very beginning—before bad habits can be formed.

Distribute personal recycling receptacles

One of the key features of a successful waste reduction program is to make the program as convenient, or more convenient, than the option for garbage disposal. Since it is common practice for employees to discard their garbage at their workstation, personal receptacles for recyclables should also be provided for each workstation.

To minimize the workload impact of recycling on custodial and maintenance services, some facilities require all employees to empty their individual garbage and/or recycling receptacles into central bins. This serves to educate employees, as it enforces the practice of proper recycling.

Begin collecting recyclables and monitor results

When your program begins, it is important to do some follow-up to ensure that your program is running smoothly. This follow-up should include the following:

- **Ensure the regular collection of material** based on the predicted volume.
- **Maintain accurate records** so that financial information can be presented to the team and upper management when you are assessing your program's success.

Checklist:

- | | |
|---|--------------------------|
| Promote launch of waste reduction program | <input type="checkbox"/> |
| Distribute employee recycling containers | <input type="checkbox"/> |

Checklist:

- | | |
|---|--------------------------|
| Ensure material is picked up regularly | <input type="checkbox"/> |
| Maintain financial and generation records | <input type="checkbox"/> |

In 1997, Xerox diverted more than 85% of its waste worldwide as a result of its waste reduction programs.



Checklist:

- Ensure containers are in place
- Ensure promotional materials are in place
- Ensure all employees are informed of program
- Ensure schedules are established
- Ensure monitoring framework is in place

Checklist:

- Develop contingency plans



Worksheet 7.1

Ensure systems and procedures are in place

As a review, when your program is launched the following elements need to be in place:

- **Containers situated according to plan.**
- **Stickers and emblems on containers.**
- **Custodial services have floor plan.**
- **Custodians trained on recycling.**
- **Individual receptacles and kick-off memos distributed.**
- **Dumpsters located at staging area.**
- **Contract established with vendor, including price structure and pick up schedule.**
- **Systems set up for record keeping to track program success.**
- **Employees trained on basics of recycling and provided with team contact information.**
- **Method of sharing program results with all participants.**

Develop contingency plans

Low participation rates, high contamination levels, and unstable markets are all potential threats to your waste reduction program's success. Therefore, you may want to develop some contingency plans that address these possibilities. These plans may include further education, and an understanding with management that the economic benefits of the program may be unstable.

Once the waste reduction program has been implemented, it is important to the program's continuing success to regularly monitor and improve the program. To do so, goals should be set that are as high as realistically possible, and measurable (e.g., 80% reduction in the quantity of material landfilled).

The activities discussed here will help you monitor program success and highlight opportunities for continuous improvement.

Develop ongoing program publicity plan

It is inevitable that your recycling program will need an occasional boost to motivate employees to continue to reduce waste. One of the key methods used by many companies to encourage program participation is to keep promotion and education campaigns dynamic. By continually changing the graphics and/or message of the program, team members ensure that the promotion—and therefore the program—never becomes stale for the employees. Develop ideas at this stage, and determine how they will be phased in over time. Ideas include:

- **Highlight efforts of diligent recyclers.**
- **Encourage employee ideas.**
- **Boost employee participation with incentives and education.**
- **Send regular e-mail messages**, (i.e., “environmental tip of the day”).
- **Create screen savers with a green theme.**
- **Participate in recycling conferences.**
- **Show waste audit video.**

Stabilize program operations

Work with collection crews, team members, and participants to adjust for any problems that may arise in the program's start-up activities. Keep in close contact with vendors regarding the quality of materials, pick-up frequency, and other issues.

Encourage employees to ask questions and report problems to the team network. This will aid in fine-tuning the system and will further encourage employee participation.

Measure and monitor results

Track recovery rates, participation, and program finances. Measurements should be developed to show your program's performance over time since source reduction efforts will decrease recycling revenues. It is important to keep careful records of material quantities, recovery rates (as a percentage of the total waste stream), revenue from recyclables, program expenses, and waste disposal costs.

Checklist:

- | | |
|--|--------------------------|
| Develop ideas to ensure that promotion remains dynamic | <input type="checkbox"/> |
| Determine phase-in schedule | <input type="checkbox"/> |

Worksheet 8.1



Xerox informs all employees regarding the progress of their waste reduction program through regular newsletters, e-mail messages, recognition programs, annual environmental reports, and Earth Awards.



Worksheet 8.2



Checklist:

- | | |
|---|--------------------------|
| Solve start-up problems | <input type="checkbox"/> |
| Keep in contact with vendors | <input type="checkbox"/> |
| Encourage questions and problem reporting | <input type="checkbox"/> |
| Track program results | <input type="checkbox"/> |

Worksheet 8.3



All measurements should be in accordance with any quarterly reporting guidelines established by corporate management. You may wish to monitor additional factors such as employee participation, which can be done via employee surveys (use electronic mail, if possible) and through periodic up-date waste audits.

Develop audit procedures

The recovery and disposal numbers will provide a good indication of how well your program is progressing. However, it is still a good idea to regularly survey or audit your program—perhaps on an annual basis—and note any problems or opportunities for potential improvement. In addition, develop an avenue for employee input. A suggestion form via electronic mail, in a monthly newsletter, or an environmental suggestion box would serve your purpose.

People who manage many sites, such as a regional facilities manager, or those responsible for company or country-wide recycling programs, may wish to do more formal recycling update surveys and facility update audits.

Hold regular team meetings

Progress data should be collected and presented to the team at monthly meetings. Other matters which should be discussed at the monthly meetings include new waste minimization strategies, new markets for recyclables, training new employees, program expansion, and all other important data relating to the constantly changing recycling business. Once the waste reduction program is well under way, the team can focus on more sophisticated environmental issues such as purchasing recycled products, energy conservation, and employee transportation.

Publicize results

Make regular program reports to both participants and site management.

Program success (either financial or otherwise) should be highlighted to all employees. Since each and every member of your company has participated in the success of your program, it is important that all employees receive recognition of their involvement through regular reporting on the quantity of material reduced through the source separation, reuse and recycling elements of your program. This may be done via bulletin boards, newsletters, or memos to building occupants. To demonstrate source reduction, the electronic mail network should be used where feasible. If your results are particularly good, you may wish to involve the public relations staff to give your program more visibility.

Did you know?

... 40% of all UK customers actively seek out environmentally preferred products.

Checklist:

Develop update mechanism

Checklist:

Hold monthly team meetings

Checklist:

Regularly report progress

Reward and recognition

To encourage continued participation in the waste reduction program, it is recommended that employees and teams be recognized and rewarded for their accomplishments. Funding for the program may be provided by the site or facilities management, or by the revenues from the recycling program itself. The reward and recognition program should be kept simple with categories that are easily measurable.

Rewards and recognition are suggested at three levels: local, group/region, and corporate.

LOCAL The local program should recognize individuals, to build interest in the program. Suggested ideas are:

- **Team members given a promotional t-shirt, cap, and/or mug.**
- **Team has an annual recognition luncheon/outing.**
- **Outstanding participant or team member achievement recognized by site management and submitted to corporate for consideration of further acknowledgment.**
- **Supplier/vendor recognized for outstanding accomplishment, innovation, or contribution.**

REGIONAL Teams within a large complex are encouraged to develop friendly competition among themselves. Rewards/recognition should be at a team level. All awards, recipient names, and achievements should be sent to a central coordinator to be considered for further recognition and acknowledgment in company publications. Suggested regional categories are:

- **Most innovative team waste management contribution.**
- **Team with most continuous improvement.**
- **Best site training/team building program.**

CORPORATE From the required submissions on recycling progress and reports highlighting outstanding achievements and/or innovations, corporate management can provide individual/group awards through a recognition program. Also, your team can submit success stories to local/national environmental organizations for additional public recognition.

Evaluate opportunities for continuous improvement

The team should continuously assess the success of the program and plan ways to improve. There are many fronts where improvement can occur, including material quality/purity, participation rates, and types of material collected. Since an increase in the types of material collected should not come at the expense of the quality of materials already being collected, the team should be aware of how these factors interrelate.

Checklist:

Recognize/reward exemplary accomplishments



Xerox recognizes the outstanding accomplishments of both individuals and teams within the company, by giving earth awards for Innovation, Resource Conservation, Community Involvement, Source Reduction, Environmental Leadership, and Energy Conservation.

Earth award criteria include most innovation, direct benefit to company, duration, documentation of results, measurable results, activity within two years, and no previously honored nominations.

Checklist:

Assess and improve program

Undergo benchmarking exercise



Resource p. 69–73

Benchmarking is an excellent way to get ideas for continuous improvement. Find out how other groups in your company are doing, read relevant periodicals, become involved in applicable organizations, learn from the recycling leaders in your community, and adapt the best practices to your situation.

Green Workplace — Waste Free Products from Waste Free Facilities

Implementing a waste reduction program is an important step towards improved environmental performance. Given the numerous ways businesses impact the environment—through purchasing, manufacturing, and resource consumption, waste reduction is just one of many potential environmental measures. This section will highlight further initiatives your business can take towards sustainability by revising existing management practices.

Waste free facilities

Waste free facilities, those diverting 90% of their baseline waste, address a variety of management issues ranging from the reduction of solid waste generated, to the reduction of energy and water usage.

Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.

Many businesses are finding the practice of sustainability to be very profitable, as these measures reduce operational costs and avoid overuse fines. Throughout the following section, you will find many ideas to help increase your corporate profits while reducing your corporate impact on the environment.

Purchasing

Waste reduction and recycling addresses half of the waste problem, by reducing waste going to landfill and ensuring a reliable supply of materials for recycling markets. However, recyclable materials are commodities, and like other commodities, a lack of demand will decrease the value of the recyclable materials. This will, in turn, render the practice of recycling too costly to consider as a viable business option.

In recent years, the popularity and success of recycling programs in businesses and communities has more than doubled the supply of recycled materials available in North America. However, the demand for recycled products has not kept pace with the supply, resulting in a glut of certain recycled materials in many geographic areas.

Two important measures can correct this supply/demand imbalance:

- **Practicing source reduction** to put less pressure on recycling markets from the supply side.
- **Closing the loop** by purchasing products made from post-consumer recycled materials to ensure a demand for recycled products.

The three arrows of the familiar recycling symbol signify the three steps of the recycling process: collection, processing, and resale. For recycling to succeed, there must be a demand for products made out of recycled materials. **If you're not buying recycled, you're not recycling.**

Xerox, in one year, purchased 180,000 pounds of 70 percent recycled-content metal and plastic electrical equipment, and 578 million pounds of recycled-content office supplies.



Buying recycled products also saves resources, such as landfills, virgin fiber, and fossil fuels, as well as the pollution generated in the manufacturing process. Products made out of recycled materials range from all types of paper products, such as bathroom tissue, or printing and copier paper, to building materials such as lumber and carpeting.

Environmental purchasing policies

The best way to encourage people to close the recycling loop is to develop purchasing policies and guidelines which specify products with recycled materials and that are produced in an environmentally friendly manner. Here are some potential guidelines:

- **Give preference to products** with as high a proportion of recycled content and post-consumer waste as feasible.
- **Choose products that contain little or no toxic substances** and minimize pollution in the manufacturing process (e.g., water-based markers and aqueous cleaners).
- **Precycle** — choose products that are more easily recyclable. For example, white paper instead of colored paper and corrugated board instead of plastic packaging.
- **Buy products that are designed for reuse** as opposed to one use. For example, rechargeable batteries and reusable mugs.
- **Choose products that consume fewer resources** in their manufacture, use, and packaging. For example, two-sided copying and printing equipment, more fuel-efficient vehicles, and bulk purchases that require less packaging.

Undertaking a “purchase/recycle” program does not necessarily mean you must pay more for material of lesser quality. Some recycled materials do cost more, but others cost less and are of higher quality.

Energy conservation

The U.S. Environmental Protection Agency (EPA) has initiated the Green Lights program to promote energy conservation. The program, which Xerox has joined, develops partnerships among consumers, utilities, and manufacturers of lighting equipment to conserve energy. According to the EPA, every million dollar savings in energy, on average, reduces carbon dioxide emissions by 16 million pounds, sulfur dioxide emissions by 117,000 pounds, and nitrous oxides emissions by 62,000 pounds. While your government may not sponsor such a program, the implementation of energy conservation measures makes good business sense.

Some successful energy conservation techniques include use of compact fluorescent lighting, installation of motion detectors to control lighting, and general upgrading of heating and air conditioning systems. Other energy conservation measures include:

- **Turn off lights** whenever a room is unoccupied.
- **Power down** your workstation and other equipment when not in use (overnight, weekends).
- **Use stand-by modes** on all equipment, whenever possible.
- **Take public transit**, vanpool, carpool, or ride a bicycle to work whenever possible.
- **Carpool** while travelling on business.
- **Take the stairs** rather than the elevator. (It's good exercise!)
- **Close window shades** at night to minimize heat loss.
- **Have the heating/air conditioning system regularly serviced** to ensure efficient operation.
- **Lower the thermostat** on the hot water tank to a maximum of 41°C (106°F).
- **Seal any cracks or holes** in your building to minimize heat loss in the winter.
- **Install revolving doors** in areas of high traffic.
- **Review all lighting requirements** and remove any lamps that are not required.

Did you know? ... Up to 90% of the energy consumed by office equipment can be saved by turning the equipment off when it is not in use.

Water conservation measures

Areas with water shortages have inspired water conservation measures through the examination of their manufacturing processes. While current rates are very low, a leak as small as a pinhead can cost your facility as much as \$200 per year.

To help combat these costs, many corporations have installed motion-sensors in their washroom faucets. This ensures that all faucets are fully turned off after use. Other successful water saving ideas include:

- **Following the principles of xeriscaping**—the use of drought-resistant, native plants and waste conservation techniques in all landscaping designs, (see *Glossary*—page 49).
- **Maintain all lawns and gardens properly**, by regularly aerating, top dressing, and following proper mowing procedures (i.e., by cutting grass to no less than 5–8 centimeters or 2–3 inches in length).
- **Revise maintenance contracts so that gardens and lawns are watered only when needed** (i.e., when the leaves begin to curl).

Resource p. 73



The Xerox Green Power Supply Team redesigned an existir switch circuit to enable the 5028F to shut down to minimal power after a user-defined time period—thereby using considerably less power at customer locations.



By improving cleaning, lighting, security around the bike sheds and adding more capacity for bike parking, the Venray Cycling Promotion team encouraged a growth of approximately 30% in the number of people cycling to work in 1995. This has saved at least 550,000 miles worth of air pollution that would have been caused by car exhaust emissions.





In Webster, New York, Xerox realized that they were disposing 15,000 pounds of Methyl Ethyl Ketone per month. By installing a molecular sieve to capture this material, reclaimed MEK could be used in place of virgin MEK. This program has reduced MEK waste disposal to 5,600 pounds per month, resulting in savings of \$247,000 from September 1995 to December 1996.

- **Review the frequency and timing of automatic sprinkler systems**, and ensure that the system is turned off following rainstorms.
- **Use mulches on all gardens to reduce water loss** through evaporation, and mulch grass directly onto the lawn for further fertilizing.
- **Install toilet dams in all toilet reservoirs, or install low-flow toilets.**
- **Install water-efficient dishwashers in cafeterias** and, if applicable, laundry machines—and only run the machines when there is a full load.

Hazardous waste reduction

General hazardous waste issues have already been addressed in Section 3 (p. 18) of the **Guide**, through the identification of opportunities for material substitution. While the proper management of all hazardous waste is an issue that must be addressed, there recently has been a particular emphasis on the elimination and management of chlorofluorocarbons (CFCs) and other ozone-depleting substances. These substances are commonly used in manufacturing, product packaging, refrigeration, and air conditioning systems. CFCs, and other chlorinated solvents, contribute to the rapid destruction of the ozone layer in the upper atmosphere, a layer which protects the planet by filtering out harmful ultraviolet radiation from the sun. There are many alternatives now available which help avoid the use of these chemicals. For example, soap and water or other aqueous cleaners can be used in some applications.

Xerox has taken many steps to eliminate the use of ozone-depleting chlorofluorocarbons in packaging and service materials. Plans call for the complete phase-out of such substances in manufacturing and service operations well ahead of regulatory deadlines. By replacing chemical solvents with citric acid and water-based cleaners, Xerox is able to avoid 1.5 million pounds of chlorinated hydrocarbon waste annually, with an associated one-half million pounds in air emissions. In the spirit of continuous improvement, Xerox has developed a carbon dioxide (CO₂) based cleaning process which appears even more effective than citric acid-based cleaners. In addition, CO₂ by-product used in the cleaning process is generated from a different, existing production process.

The pervasive use of CFCs in refrigeration and air conditioning systems is an industry-wide problem for which the air conditioning and refrigeration industry is actively pursuing substitutes. The best the average business or consumer can do at this time, without sacrificing convenience, is to minimize usage through conservation, and ensure that the CFCs in the systems you use (such as vehicle air conditioners) or your business are recycled responsibly, in accordance with the law. You can also be on the lookout for improved recycling systems and technologies, as well as for substitutes to CFCs.

Did you know?

... Each year, industry generates approx. 100 pounds of hazardous waste per person.

Waste free products

Sustainable development extends beyond the physical boundaries of your facility. By focusing efforts outwards, resulting product stewardship initiatives will prepare your company to meet the needs of the future, while increasing your marketability in the present.

Product stewardship is a growing concept, on the verge of becoming a business norm. However, Xerox has been practicing product stewardship for years. Through initiatives such as designing their products for the environment, using effective labelling, and developing a returns channel, Xerox has found that environmental and economic sustainability can be co-dependent.

Following are descriptions of some of the areas where product stewardship is possible. While each product will differ according to the types of stewardship programs that can be implemented, the following discussion may give you some ideas for implementation by your company.

Did you know? ... In Britain alone, about 8.4 million tons of packaging waste is generated per year. That's enough to fill almost 19,000 jumbo jets.

Designing products for environmental performance

To decrease the impact a particular product has on the environment, it can be assessed according to life cycle analysis procedures, by examining its environmental impact from raw materials and production to use and final disposal. By adopting a life cycle approach, you can design environmental quality into the product at conception. This uses a cleaner manufacturing process, minimizes the product's impact on the environment and can provide savings through remanufacturing, parts recovery, and recycling. Xerox has built this type of environmental design into a number of their products, including paper, toner cartridges, and packaging.

Paper High-speed, cut-sheet copiers and printers require high-quality paper to avoid paper jams and to maintain high image quality. In response to the worldwide demand for recycled paper, Xerox has developed several recycled papers for use in Xerox equipment. The Xerox recycled papers range from a paper with 50 percent recycled fibers and 10 percent post-consumer waste in North America to a European paper that uses 100 percent recycled fibers (and produced without bleaches or optical brighteners).



In 1994, 25% of new Xerox products were designed with environmental features. By 1995, this had increased to 70%.

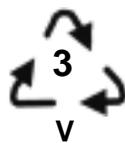
Plastics The market for recycled plastics is still in its infancy. To stimulate the demand for recycled plastics, Xerox has tested plastics for toner containers and is planning to utilize commercially-sourced, recycled plastic in its consumables packaging. Xerox is also working to make its plastic packaging recyclable by adding the Society of the Plastics Industry recycling symbols to recyclable containers. Each symbol has a number which identifies the type of plastic used.



Polyethylene Terephthalate
A rigid, transparent plastic resistant to chemicals and moisture; common usage is soft drink bottles. Can withstand heat; used in stovetop bags. Also abbreviated as PET.



High Density Polyethylene
Commonly used for milk jugs, heavy-duty trash bags, butter tubs, bleach bottles, and base cups for large soft drink bottles. Opaque and stronger than LDPE.



Polyvinyl Chloride
Used in shampoo bottles, detergent bottles, food wraps, cooking oil bottles and water bottles. PVC is an excellent barrier to gas and liquid. Burning produces toxic gases.



Low Density Polyethylene
Commonly used as clear wraps or bags, supermarket produce bags, and breadwraps.



Polypropylene
Commonly used in syrup bottles and yogurt containers and some containers for detergents, shampoos and medicines, as well as screw-on caps and food lids.



Polystyrene
Two types: crystal (clear plastic cups) and foam (coffee cups, packing material, fast food clamshells). HCFC and pentane are used as blowing agents for the foam type.



Other mixed resins
All other resins.

NOTE: The Benelux countries (Belgium, The Netherlands, and Luxembourg) have a slightly modified symbol to comply with trademark laws. The number is enclosed in a circle.



Packaging Perhaps nothing is more ripe for environmental innovation than packaging. Environmentally friendly packaging is available today that includes post-consumer waste content, is made from easily recyclable materials, and is reusable. In addition, expanded polystyrene products are now available that are both recycled and CFC-free.

Xerox has spearheaded several packaging innovations. By working with suppliers, Xerox has developed environmentally friendly packaging that includes recycled content and is reusable. For the outside printed surface of white supply cartons, Xerox pioneered the use of "Eco-White", which is made from repulped office waste paper. Xerox corrugated brown cartons are made, in part, from recycled mixed waste paper. In addition, Xerox has standardized all supplier packaging and pallets company-wide. This facilitates their reuse and avoids up to 10,000 tons of waste annually.

Environmental labelling

With the current enthusiasm for protecting the environment, many suppliers claim that their products are environmentally friendly or “green”. In the absence of environmental labelling standards, however, it is often difficult to determine which products truly are environmentally safe. In response, government agencies such as the United States EPA and FTC have proposed regulating the use of the recycled and recyclable symbols. A California labelling law requires that any product sold as recycled include at least 10 percent of post-consumer waste.

It can be complicated and time-consuming to define environmentally friendly criteria and then determine which products meet them. The European Community has finalized an eco-label to promote “green” products. Modeled on the German Blue Angel program, chosen products will be produced with a cradle-to-grave approach to reduce their environmental impact at all stages of the product lifecycle. Canada, Japan, Scandinavia, and New Zealand have similar environmental labelling programs. The United States initiatives include Scientific Certification Systems (formerly Green Cross) and Green Seal labels. These environmental labels objectively supplement the specific labelling claims, such as recycled content, recyclability, and so on. They also minimize the amount of research required by individual consumers to identify products which are truly environmental.



Xerox, in an effort to increase the sustainability of their products, has designed their photocopiers, copy and print cartridges, fax machines, and printers for disassembly so that parts can be reused in new products. Through the reuse/remanufacturing of their copiers alone in 1996, Xerox conserved over 75 million pounds of metal.

Environmental Labels:



UNITED STATES
Green Seal
Product life cycle approach



EUROPEAN ECONOMIC
COMMUNITY
EcoLabel



UNITED STATES
EPA's Energy Star



CANADA
Environmental Choice



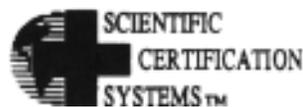
INTERNATIONAL
Soy Ink Symbol



JAPAN
EcoMark



NORWAY, FINLAND,
SWEDEN
White Swan



UNITED STATES
Certifies environmental claims



GERMANY
Blue Angel

Recycling Labels:



Means contains
recycled material



Means recyclable



Means contains
recycled material and
is recyclable



By designing products and packaging for the environment, Xerox's manufacturing team has designed a returns system whereby 35% of plastic containers and inserts are returnable, 10% of carts are either returnable or eliminated, 43% of corrugated is returnable, and 11% of vendor packaging is recyclable.

Returns channel

By designing products for disassembly, a pool of inexpensive components and materials is thus created. To access this pool, however, materials have to be returned to the producer.

Return and recycle programs for commonly used copy cartridges are in place in the U.S. and Canada, as well as in many European and Latin American countries. Many Xerox products are now being designed for disassembly and reuse by Xerox. Such products range from toner cartridges to digital copiers.

By retaining this type of control over their own products, Xerox can assess any returned equipment according to the original equipment specifications and, according to their evaluation, channel these components for reuse or recycling. In this way, Xerox can maintain their high quality standards while protecting the impact of their products on the environment.

Glossary

Asset recovery	At Xerox, the process of recycling excess/surplus, obsolete, cancelled, used or unserviceable assets to the most economical level of demand, while assuring that the functional and cosmetic quality standards are achieved.
baler	A machine in which materials are compacted to reduce volume and transportation costs.
bin	In this document, a bin is the intermediate recycling or garbage container, located at a convenient distance to a number of employees.
biodegradable	Capable of being broken down by bacteria into basic elements and compounds.
bleaching	The process of chemically treating paper pulp to alter its color so that the pulp has a higher brightness.
Blue Angel	A German initiative to establish categories, set guidelines, test products, and grant the use of its “environment friendly” logo. Helps consumers identify products that are energy-efficient, use recycled or recyclable materials, minimize use of hazardous substances, and reduce pollution (including noise pollution).
chlorofluorocarbons (CFCs)	Chlorine-based compounds used commonly as aerosol propellants, as coolants in refrigerators and air conditioning, in fire extinguishers, in solvents, and in the production of insulating foam packaging. CFCs contribute to destruction of the protective ozone layer in the stratosphere.
commercial waste	The waste, including trash and garbage, generated by businesses.
commingled	Recyclable wastes that are mixed together for collection purposes. Commingled material is not recyclable unless separated after collection.
compactor	Any power-driven mechanical equipment designed to compress waste materials. Usually attached to an enclosed roll-off container.
composting	Natural breakdown of organic matter such as leaves and yard waste into humus, a soil-like product rich in slow-release nutrients.
conservation	Activities designed to increase the efficiency of using a resource or to protect it; may refer to material, energy, and water conservation, or wildlife protection.
contaminant	An unwanted or undesirable component of a product or process that diminishes its recyclability or utility.
corrugated	Paper products made from stiff pasteboard formed into fluted ridges and grooves, including kraft paper with ruffled inner liner. Corrugated does not include paperboard such as cereal boxes.

CRUs	Customer replacement units such as copy and print cartridges.
cullet	Glass that has been processed for reuse by crushing into small pieces and removing paper and metal contamination.
deinking	A process in which some portion of the ink, filler, coating and other extraneous (non-cellulose) material is removed from printed and/or unprinted paper.
densification	Processing of materials to make them more dense, such as compacting trash, crushing glass, and baling paper.
disposables	Consumer products, items, and packaging used once for a few times and discarded.
disposal	Discarding of materials, waste, or environmentally controlled material that has no significant recyclable value.
diversion	The redirection of materials from disposal by reduction, reuse, recycling and composting programs.
diversion rate	The percent of waste diverted from landfills or incineration via reduction, reuse, recycling or composting.
drop-off recycling center	A facility that accepts solid waste or materials from a solid waste generator for the purpose of recycling or composting without paying a fee to the solid waste generator.
dumpster	In this document, a dumpster is the central storage container used to hold consolidated material for collection by the hauler.
dunnage	Packaging material used to contain and protect parts prior to use in the manufacturing process. Specifically, corrugated containers that may be reused and recycled.
ecosystem	A self-sustaining and self-regulating community of organisms interacting with each other and the environment.
energy recovery	A process in which waste material is burned, reducing the volume of the waste and producing steam for heating or generating electricity.*
environment	Combination of external conditions influencing the life of an individual or population.
environment-friendly products	Products that do not have a negative impact on the environment; should include consideration of production, packaging, use, and disposal.
Environmental Choice Program	A Canadian initiative to establish categories, set guidelines, test products, and grant the use of its ecologo. Helps consumers identify products that maximize energy efficiency, use recycled or recyclable materials, and minimize use of hazardous substances.

environmental labelling	A distinct mark, writing, or symbol that helps consumers identify products that are energy efficient, use recycled or recyclable materials, and minimize use of hazardous substances. Examples are recycled or recyclable marks, and the Blue Angel, Green Seal, and EcoMark certification labels.
expanded polystyrene (EPS)	A polystyrene foam commonly known by the trade name Styrofoam™. It is very light and bulky, therefore more difficult to recycle unless compacted.
fiber	The unit cell of vegetable growth derived from wood, cotton, and so on. Usually many times longer than its diameter. The basic physical unit of paper pulps.
food waste	All animal and vegetable solid wastes arising from food facilities, or from residences, that result from the storage, preparation, cooking, or handling of food.
green consumerism	“Green” is a term coined in Europe to refer to environmentally conscious politics and lifestyle. Green consumerism involves making purchasing decisions based on environmental concerns, and implies a rejection of wasteful consumption.
Green Cross	See Scientific Certification Systems.
Green Seal	A U.S. product labelling initiative to identify environmentally-friendly products, set standards, and certify products that meet established criteria for low life cycle impact.
green waste	See yard waste.
hauler	A transporter of material from one location to another (for example, recyclable material from a collection site to a recycling facility).
hazardous waste	Waste material in a form and quantity which may pose a hazard to human health or the environment and therefore, has been classified as a hazardous waste by an applicable regulatory agency. Hazardous wastes are subject to special handling, recycling and disposal requirements.*
high-density polyethylene (HDPE)	A type of plastic commonly used to make milk jugs and other rigid, plastic bottles.
hydrochlorofluorocarbons (HCFC's)	One of the replacement chemicals for chlorofluorocarbons (CFCs); ozone-depleting potential only a fraction of CFC-12.
incineration	The process of waste volume reduction by combustion.*
industrial wastes	Waste material that is generated at a manufacturing or production facility, which has not been designated by an applicable regulatory agency as hazardous. However, its form and quantity may pose a hazard to human health or the environment and is therefore subject to special handling, recycling and disposal requirements.*

integrated solid waste management	The practice of disposing of solid waste by using several complementary components, such as source reduction, reuse, recycling, composting, energy recovery, incineration, and landfilling.
kraft	A process for making virgin fiber by a chemical digestion process, used in the manufacture of “kraft” products such as grocery bags, corrugated boxes, and milk cartons.
landfill or landfilling	Disposal of a waste material in or on the land at a designated or licensed location, where it is permitted to dispose of non-hazardous waste.*
low-density polyethylene (LDPE)	A type of plastic commonly used in plastic wraps.
life cycle analysis	An analytical process that quantifies environmental impact (including resources and energy used and released to the environment) for the entire life of a package or product, starting with raw materials and including all processing and transportation, as well as product use and disposal.
material recovery facility (MRF)	A solid waste facility which sorts or separates solid wastes or materials for the purposes of recycling, reuse or composting.
mixed paper or mixed waste paper	A variety of waste paper that has not been separated by type and does not contain food waste or other major contaminants. It can include unsorted office papers, newspapers, magazines, envelopes, direct mail items, and so on.
multi-resin	A multilayer product consisting of several layers of plastic. The squeezable ketchup and mustard containers are made this way and may contain up to 10 layers of plastic.
municipal solid waste (MSW)	All the garbage your community has to handle.
non-recyclable waste	Waste not included in the categories of hazardous, industrial, special, or recyclable, which is generated by a facility and cannot readily be recycled in a given geographic area. This includes, but is not limited to, garbage, food waste, cafeteria waste, and mixed packaging.*
ozone (stratospheric)	Layer of gaseous ozone in the stratospheric atmosphere that protects life on earth by filtering out harmful ultraviolet radiation from the sun.
ozone (tropospheric)	A chemical oxidant and major component of photochemical smog. Ozone at this layer can seriously affect the human respiratory system. Ozone in the troposphere is produced through complex chemical reactions of nitrogen oxides, which are among the primary pollutants emitted by combustion sources.
ozone-friendly products	The term industry uses for products no longer containing ozone-destroying CFCs. Chemicals substituted for CFCs may still deplete the ozone layer or have other negative environmental properties.
packaging	Materials such as plastic, foam, corrugated board, molded pulp, and paper that are used to contain, protect, and transport products.

pallet	A platform used in connection with a forklift for moving shipments, bales, or other large items. (Also known as a "skid").
polyethylene terephthalate (PET or PETE)	A type of plastic commonly used in transparent plastic soda bottles.
polystyrene	A plastic composed solely of hydrogen and carbon atoms, which is made from a by-product of the petroleum and natural gas distillation process. It is formed as a solid glass-like resin that can be made into a transparent sheet, containers, or formed into shapes (also see Expanded Polystyrene).
post-consumer waste	Any product that has been used by a consumer and has served its intended purpose. Post-consumer waste may or may not be recyclable.
pre-consumer waste paper	Recyclable waste from the production of preprinted forms, greeting cards, folding cartons, or other publications such as books and magazines.
product life cycle	Complete product cycle including manufacture, packaging, transportation, use and disposal.
receptacle	In this document, a receptacle is the personal workstation container for the disposal of garbage or recyclables.
recovery rate	the percent of usable recycled materials removed from the waste stream in a specific area or by a specific business.
recyclable	A product or material that can be reused or recycled.
recyclable wastes (or recyclables)	Waste generated by a facility, not included in the categories of hazardous, industrial, or special recyclable, which can be readily recycled. It includes, but is not limited to, paper, plastic, corrugated cardboard, wood, glass, and metal.*
recycle	The process of reusing an item by converting it to another state or by reclaiming valuable resources for another use.*
recycled fiber	Cellulose fiber reclaimed from waste materials and reused, sometimes with a minor portion of virgin materials, to produce new paper.
remanufacturing	At Xerox, the manufacturing process of recycling a machine or part by disassembling to a predetermined standard with defective components replaced by new, reprocessed, or used components. Before being tested, inspected and tested to newly manufactured machine test standards, the equipment is cleaned and refinished and all retrofits deemed by Xerox as field mandatory installed.
resin	Additives which transform a polymer into a plastic resin include colorants, flame retardants, heat or light stabilizers, antioxidants, and lubricants in addition to plasticizers. A plastic type such as PET/PETE.

resource recovery	The extraction and use of materials and energy from the waste stream. Materials are used in manufacturing new products or converted into some form of fuel or energy.
reuse	Using an item again for its original purpose or for a new purpose, rather than throwing it away without any treatment or modification.*
sanitary landfill	A method of disposing of refuse on land that is designed to minimize hazards to public health and safety.
Scientific Certification System (formerly Green Cross)	A U.S. product labelling initiative that certifies the environmental claims of manufacturers and identifies environmentally friendly products.
separation	The sorting of mixed recyclable materials. <i>See source separation.</i>
solid waste	Any garbage, refuse, trash, dry sludge, or material that is discarded or abandoned and is intended for disposal.
solid waste management	The systematic administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of solid waste.
source reduction	Any action that prevents the generation of solid waste, such as purchase or production of items in just the quantity needed, and items that use less material, have a longer life and can be readily recycled.*
source separation	The segregation of various potentially recyclable materials from the waste stream, usually at the point of waste generation or at a materials recovery facility (MRF) or transfer station.
special recyclable waste	Waste which requires special handling in order to be recycled. This includes, but is not limited to, toner, developer, CRUs, photo-receptors, and nonserviceable parts.*
sustainable development	Defined by the International Chamber of Commerce as meeting the needs of the present without compromising the ability of future generations to meet their own needs.
tipping fee	The charge to waste transporters to dispose of solid wastes at landfills or other solid waste facilities. The trucks “tip” their garbage into the landfill.
toxic substances	Substances that can cause serious harm, injury, impairment, illness, or even death.
virgin materials	Resource materials as they are extracted from the earth, mined, grown, refined, and/or synthesized for the first time.
waste audit	An analysis of a company's processes, waste stream, and disposal costs to produce detailed information on the solid waste management system.

waste exchange	A service organization that provides information on the availability and demand for specific waste materials. Waste exchanges set up in many countries, states and provinces typically serve the function of linking up a waste generator with a manufacturer who can utilize the waste. Also called “material exchange” and “waste information exchange”.
waste free facilities	A facility which is diverting 90% of their baseline waste.
waste reduction	The prevention of waste via source reduction or reuse.
waste stream	A general term used to describe all the garbage generated in a certain area, location, or facility.
wood waste	Solid waste consisting of wood pieces or particles which are generated from the manufacturing or production of wood products, harvesting, processing, or storage of raw wood materials, or construction and demolition activities.
xeriscaping	The practice of landscaping to conserve water. This type of landscaping follows seven basic principles: developing a landscape plan which considers the regional and micro climatic conditions of the site, as well as the existing vegetation and topographical conditions of the site; analysing soils for any given site to ascertain the need to add soil amendments; selecting plants according to the existing climatic conditions; placing turf in areas which can be irrigated separately from the remainder of the plants and/or in areas that naturally receive more moisture; watering plants only when they need water; use of mulches to retain moisture, reduce weed growth, and prevent erosion; and, using a minimal quantity of fertilizers and pesticides to maintain the landscape.
yard waste	Solid wastes generated as a result of commercial or residential landscaping operation including, but not limited to, yard clippings, leaves, tree trimmings, prunings, brush, and weeds.

**Defined by the Xerox Facility Waste Reduction, Reuse and Recycling Standard*

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