

# **Waste at Work:**

## **Prevention Strategies for the Bottom Line**

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# TABLE OF CONTENTS

## FOREWORD

## ACKNOWLEDGMENTS

## INTRODUCTION 1

## PART I: DEPARTMENTAL WASTE PREVENTION STRATEGIES

<b>1. OFFICE AREAS</b>	<b>5</b>
Paper Waste	5
Conferences and Other Events	17
Equipment and Furniture	18
Office Supplies	22
<b>2. SHIPPING AND RECEIVING</b>	<b>26</b>
Shipping Containers	27
Shipping Pallets	30
Other Packaging	33
<b>3. FOOD SERVICES</b>	<b>34</b>
Inventory Waste	34
Food Preparation Waste	35
Waste from Food Prepared but Not Served	37
Plate Waste	39
Food-Related Waste	40
Packaging Waste	43
Kitchen Maintenance Waste	45
<b>4. FACILITIES</b>	<b>46</b>
Building Maintenance	46
Janitorial Services	50
Vehicle Maintenance	52
Landscape Maintenance	54
Remodeling and Renovation	57

**PART II: PURCHASING FOR WASTE PREVENTION**

- 1. BUYING, STORING, USING, AND DISPOSING OF PRODUCTS 65**
  - Efficient Buying 65
  - Efficient Inventory Management 66
  - Efficient Use 67
  - Efficient Disposal 68
  
- 2. ATTRIBUTES OF PRODUCTS THAT PRODUCE LESS WASTE AND ARE LESS TOXIC 69**
  - Durability 69
  - Reusability/Repairability 70
  - Upgradable Products 70
  - Remanufactured Products 71
  - Concentrated and Less Toxic Products 71
  - Packaging: None, Less, or Reusable 72
  
- 3. USERS, PURCHASERS, AND VENDORS: MAKING THE CONNECTION 74**
  
- 4. ADAPTING THE PURCHASING POLICY FOR WASTE PREVENTION 78**
  
- 5. ADAPTING PURCHASING DOCUMENTS FOR WASTE PREVENTION 80**
  - Specifications 80
  - Purchasing Contracts 81
  - Monitoring and Reporting 82
  
- NOTES 83**
  
- APPENDICES**
  - Waste Prevention Products 90
  - Model Procurement Policy 94
  - Model Implementation Guidelines 98

## FOREWORD

Throughout the 1990s, initiatives such as the Rio Earth Summit, the passage of this country's first pollution prevention law, and the launching of the President's Council on Sustainable Development and the World Business Council on Sustainable Development have focused the attention of government, business, and environmental leaders on shaping an "environmentally sustainable" future. A central challenge is using natural resources with the greatest possible efficiency and preventing wastes and pollution at their source. Accomplishing these goals means revisiting the ways in which our industrial facilities and our business and government institutions conduct business: the feedstocks they use, the operations they perform, the products they provide, and the ways those products are delivered. Only by doing so can we create an efficient and waste-free economy that ensures a healthy and resource-rich world for generations to come.

The good news is that business and citizen leaders have become aware of the need for resource conservation, and the process of change has begun. But it has *only* begun. In the United States, rates of resource consumption remain unparalleled in the world, as is our generation of waste and pollution.

Leadership by US business is crucial. Why? Because 35 to 45 percent of our waste stream is commercial in origin, because business leaders have the waste and resource consumption statistics to see the writing on the wall, and, finally, because the United States is the wealthiest and most technologically advanced economy in the world, and much of the developing world looks to us for an example. By now, nearly every American business has done something in the name of waste and pollution prevention. But something is not enough.

This report is concerned with the myriad practices that make up the daily operations of the typical business—from disseminating documents and shipping out products to providing food for employees and collecting trash. It shows how nearly all these activities present opportunities to strip away waste and save money at the same time: by implementing changes in procurement, in how materials are used, and in what is done with supplies and equipment that are no longer needed.

At INFORM, we specialize in identifying and publicizing strategies for a better environment. We hope that the case studies and strategies contained in this report will provide the basis for comprehensive waste prevention programs at businesses large and small, as well as in government agencies and other institutions. And we hope you will share the results of your initiatives so we can pass them along through our publications, Web site, and outreach, as we seek to broaden corporate leadership in shaping a waste-free world.

*Joanna D. Underwood*  
*President*  
*INFORM, Inc.*

## ACKNOWLEDGMENTS

Identifying opportunities for businesses to reduce their use of goods and materials has meant gathering examples from a wide variety of sources. I was greatly aided in this effort by the work of the researchers and writers cited in the text, and by all those who generously provided information on their companies' waste prevention efforts.

I extend special thanks to the following waste prevention experts who were kind enough to read parts or all of the manuscript: Clint Allen, senior environmental, health, and safety specialist, Bristol-Myers Squibb; Margaret Gerber, environmental specialist, Procter & Gamble; Steve Hammer, president, Hammer Environmental Consulting; David Kleckner, deputy director, Bureau of Waste Prevention, Reuse, and Recycling, New York City Department of Sanitation; David Saphire, environmental educator, Council on the Environment of New York City; and Nancy Vandenberg, president, Markets for Recycled Products.

Thanks also to the following members of INFORM's staff who contributed to the successful completion of this project: Joanna D. Underwood, president, offered encouragement and many valuable suggestions throughout the research, writing, and production of the book; Sharene Azimi, former director of publications, conducted much preliminary research that contributed to the case studies; Nevin Cohen, director of research, helped make the book more readable, relevant, and usable; Alicia Culver, senior research associate, provided the final technical review; Gina Goldstein, senior editor, contributed endless organizational and editorial direction; Emily Robbins, production editor, provided the expert design and layout.

I also wish to thank INFORM senior fellow Bette Fishbein and Mark Dorfman, consultant, for their invaluable technical assistance over the years. In addition, I am grateful to many other INFORM staff members for their friendship, guidance, and support. Finally, I thank my wife, Elisa, who challenges, supports, and encourages me not only in my work, but in my life.

*John P. Winter  
INFORM, Inc.*

My work on this handbook is a product of the waste prevention studies conducted by the Council on the Environment of New York City's Waste Prevention and Recycling Service (WPRS) for organizations in New York City.

I would like to extend special thanks to the Andrew W. Mellon Foundation, Laurance Rockefeller, and Marian S. Heiskell, who have supported our years of research and promotion of waste prevention. Generous support was also received from the Empire State Development Corporation and the New York City Department of Sanitation.

I am grateful for CENYC Executive Director Lys McLaughlin's vision, encouragement, and support during the writing of this handbook and the work that led up to it, and for WPRS Assistant Gail Yeager's help in researching and reviewing the manuscript.

*Anne Marie Alonso  
Council on the Environment of New York City*

## INTRODUCTION

**Between 1952 and 1992**, the world's population nearly doubled, to 5.5 billion. If current trends continue, that number will reach 8.5 billion by 2025. In the United States, population growth is among the highest in the industrialized world – at 3 million more people a year, the equivalent of adding another Connecticut annually.<sup>1</sup> And US rates of consumption are unparalleled around the world. Maintaining the lifestyle of the average American consumes 120 pounds of raw materials every day, extracted from farms, forests, rangelands, and mines.<sup>2</sup>

In addition to depleting the earth's resources at a frightening rate, our patterns of production and consumption result in unsustainable amounts of waste and pollution. In 1996, some 210 million tons of solid waste were generated by homes and businesses in the United States, the equivalent of 4.3 pounds per person per day.<sup>3</sup> Managing this waste is expensive: by 2000, the costs could exceed \$41.5 billion, up from \$31 billion in 1994 and \$5 billion in 1970.<sup>4</sup> And since 35 to 45 percent of the US waste stream is commercial in origin, a significant proportion of the management costs is borne by private business and ultimately passed on to consumers.<sup>5</sup>

*Waste at Work: Prevention Strategies for the Bottom Line* offers businesses a variety of common-sense strategies that can help them reduce waste and save money at the same time. It shows how employees can avoid or reduce the common types of waste generated in the course of a normal workday – from copy paper to shipping cartons to plastic cutlery. It provides case studies of companies large and small that have succeeded in reducing their procurement, labor, and disposal costs, as well as the environmental impacts of day-to-day activities, through straightforward changes in purchasing and workplace operations.

Today, the prevailing wisdom holds that environmental problems are frequently best solved locally – one household, one company, and one community at a time. Reducing waste in the workplace is one way to relieve both a business and a social burden, with the ultimate goal of increasing the efficiency with which resources are used by business and society alike. In this sense, good environmental performance provides an opportunity to increase not just business value but other assets as well, such as community goodwill.

The idea that environmental performance can help companies gain a competitive edge is hardly new, but it is increasingly recognized as an essential component of business value. Today, companies from DuPont and Dow Corning to Eastman Kodak and Home Box Office are realizing that they can obtain an advantage by finding innovative ways to eliminate or minimize their impact on the environment. As Charles O. Holliday, Jr., chairman and CEO of DuPont, explains, “We view ‘sus-

tainable growth' as an integrating concept and focus that will allow us to prosper as a company...."<sup>6</sup> For DuPont and for many other companies, environmental opportunities are driving business planning and becoming fundamental to profits and growth.

One of the most immediate ways to reduce both consumption and waste is for businesses to cut down on the total amount of materials moving through their facilities. *Waste at Work* lays out strategies that can be applied in each of the different work areas making up the typical business, from offices and shipping to maintenance, food services, and purchasing. These strategies include:

- ☞ **Avoiding the use of materials in the first place.** For example, using e-mail instead of traditional paper memos can eliminate the use of large amounts of paper, at the same time saving on purchasing, filing, storage, and disposal costs.
- ☞ **Cutting down on the materials involved in accomplishing a task** (such as the packaging used to protect goods in transit) reduces the need to recycle or dispose of these materials when they are no longer needed.
- ☞ **Buying products and equipment that are durable, repairable, and upgradable.** Because these products need to be replaced less frequently, they reduce both waste and the amount of energy and materials needed to manufacture new products; at the same time, they can bring down a business's purchasing costs.
- ☞ **Buying products in bulk and in concentrated form whenever possible.** This minimizes the shipping and packaging waste associated with delivery and defers the need to buy new products.
- ☞ **Leasing instead of buying a product.** Leasing office furniture or a piece of equipment that is used only occasionally can eliminate the need to buy, maintain, and ultimately dispose of a great deal of material.
- ☞ **Postponing the replacement of products for as long as possible.** Businesses that use products as long as they function obtain maximum value from their purchases.
- ☞ **Ensuring that maximum value is extracted from products at the end of their useful life.** More and more alternatives to the landfill are becoming available, from textile manufacturers that offer recycling programs for used carpet to remanufacturers that clean and resell unneeded computers, reuse the parts in other machines, or recycle the components as scrap.

The case studies included in *Waste at Work* demonstrate the savings in avoided purchasing costs, as well as in reduced labor and disposal costs, that companies can realize through simple changes in purchasing and operations. For example:

- ☞ BellSouth Telecommunications reduced paper use by 1.3 million pounds and purchasing costs by \$535,000 by printing its customer bills double-sided.

- ☞ Eastman Kodak saved \$380,000 by changing product stacking patterns to use fewer pallets and redesigning pallets to use less wood.
- ☞ Bell Communications saved \$50,000 in purchasing costs and \$5,000 in disposal costs by replacing throwaway lunch trays with reusable trays.
- ☞ BankAmerica saves 70 percent in avoided renovation, demolition, and disposal costs by using modular wall systems every time its offices are reconfigured.

Business operations will always generate some waste because even the most durable goods eventually have to be discarded. But when all materials are viewed as having value, it becomes clear that potential revenue is squandered whenever waste is generated or a by-product disposed of. Whether workplace Dumpsters are filled to overflowing with copy paper, wooden pallets, plastic packaging, or paper napkins, it makes no sense to pay to dispose of waste that could have been prevented in the first place.

The first step in developing a successful waste prevention program is for senior management to make an explicit commitment to minimizing waste and to communicate the company's goals consistently and clearly. Active participation by middle managers is equally important, because their knowledge and ingenuity are crucial to taking advantage of whatever waste prevention opportunities exist. Purchasers in particular, by applying pressure throughout the supply chain, can help reduce a company's costs and environmental impacts while stimulating the market for environmentally sensitive products and materials.

The sampling of strategies and case studies contained in *Waste at Work* can be used by managers to encourage support for waste prevention efforts by top management, and it can lead other businesses to reduce their costs and improve their operations through waste prevention. Not every idea discussed in these pages will be suitable for every workplace, but each is worth considering in the context of an overall effort to reduce waste. Perhaps more important than any specific measure is the underlying strategy of preventing waste through more efficient use of materials, rather than dealing with waste after it already exists.



# PART I

# DEPARTMENTAL WASTE PREVENTION STRATEGIES

**Every part of a business** presents its own waste prevention challenges and opportunities. Part I of this handbook presents some of the specific strategies for preventing waste in each part: in the office area, in shipping and receiving, in food service operations, in building maintenance and janitorial services, and in more specialized areas like vehicle maintenance, landscape maintenance, and remodeling and renovation.

## 1. OFFICE AREAS

### Paper Waste

In many offices, paper is among the largest components of the waste stream. It is used at a rate of nearly 1.5 pounds per person per day, according to a study done by the City of Los Angeles.<sup>1</sup> Despite the widely touted idea of the “paperless office” brought about by widespread computerization, paper consumption in the US is rising, in large part because of the ease of reproducing information with computer printers and high-speed photocopiers.

All of this paper consumption has a significant environmental impact, not only in the waste it generates but also in the natural resources and energy used and the air and water pollution created by its manufacture, its recycling, and its disposal.

#### *Office Paper: The High Costs of Use*

The typical office paper, says Bruce Nordman, a researcher at Lawrence Berkeley Laboratories, has a 20-pound basis weight and is 8.5 x 11 inches in size; a ton comprises nearly 200,000 sheets, with 100 sheets in a pound and about 6 per ounce. At 500 sheets and 5 pounds per ream, 400 reams of such paper equal a ton.

The costs of any “paper-using activity” include buying the paper as well as photocopying, viewing, transporting (i.e., mailing/faxing), storing, and disposing of it. Hence, Nordman says, if a business

spends \$1,000 per ton of paper — that is, \$2.50 per ream or .05 cent per sheet — and if a worker earning \$12 per hour spends 30 seconds handling each sheet, its paper-handling costs will be roughly 10 cents per sheet or \$20,000 per ton. Some money may be saved later on by having the paper waste recycled; otherwise, disposing of it in a landfill or incinerator will cost anywhere from \$50 to \$100 per ton or more, depending on where the business is located.

Nordman's estimates show that these costs add up. In fact, he calculates that the cost per ton of handling paper — and thus the savings generated from not using it — are 20 times the cost of purchasing it and 200 times the cost of throwing it away.<sup>2</sup>

In general, the goal in a business's office area should be to avoid using paper by substituting electronic technology or face-to-face communication whenever possible. To foster an environment where waste prevention is valued, include paper use reduction practices in an employee orientation guide or handbook. Promote a "think before you copy" attitude by asking employees to consider whether a paper copy is really needed and to estimate their needs carefully before printing.

Most strategies to reduce paper waste fall into one of three, sometimes overlapping, categories:

- ☞ **Eliminating paper use entirely** — communicating by e-mail instead of by interoffice memo or replacing printed documents with on-line postings
- ☞ **Reducing paper use whenever possible** — distributing documents to fewer people, cleaning up mailing lists, or eliminating unnecessary business forms
- ☞ **Using paper more efficiently** — making double-sided copying the norm or condensing documents so they use less space on a page

take  
a page out  
of their  
book

### **Multiple Strategies Add Up to Big Savings**

*During the first 11 months of 1994, Crowley Foods in Binghamton, New York, purchased approximately 26 percent less computer and white office paper than during the same period in 1993. This reduction of 1.4 million pages cut paper costs by 39 percent, with further savings in equipment wear and tear, equipment lease charges, and labor costs associated with printing, distributing, and filing the paper. The company employed a variety of strategies to reduce paper use: eliminating unnecessary reports, modifying their format to eliminate wasted space, routing reports and memos to more than one person at a time, providing information on-line, using rubber stamps on faxes instead of sending a cover letter, and dedicating a copier tray to paper used only on one side.<sup>3</sup>*

## Category #1: Eliminate Paper Use

\$\$ Use e-mail and intranet (internal computer communication) systems. These enable employees to convey information electronically and are therefore an excellent way to cut down on office paper use.\*

☞ Use e-mail instead of sending a memo to every employee, or post announcements on a bulletin board or in a binder kept in a well-trafficked area.

☞ Encourage employees to save e-mail documents on their hard drives instead of printing them out, and provide technical support so they know how to do so.

☞ Put company policies, technical manuals, employee directories, job postings, and expense vouchers online, and save paper and labor by eliminating the continual printing of updates.

### Going Paperless

- *Owens Corning, a fiberglass manufacturer, designed its Toledo, Ohio, headquarters to be paper-free. The company conducts almost all of its internal business over an intranet, using identically configured personal computers and uniform software to send out memos, news, and personnel and policy announcements. According to Computerworld magazine, Owens Corning estimates that its corporate intranet will save \$50 million a year, mostly by reducing the need for filing and faxing. \$30 million of those savings are expected to come from filing cabinet space alone. The company has also eliminated 60 percent of its fax machines and half of its photocopiers and printers. Not surprisingly, its paper costs have plummeted as well.<sup>4</sup>*

- *E.I. DuPont generated \$40,000 per year in savings through the use of e-mail.<sup>5</sup>*

### Information, Please

- *In 1994, San Francisco's BankAmerica slashed paper use by 25 million sheets by eliminating company procedure manuals at its branch offices. Instead, the bank set up a centralized reference library and provided telephone support to answer employees' procedural questions.<sup>6</sup>*

\* Throughout this book, waste prevention strategies with large savings potential are indicated by dollar signs (\$\$).

- ☞ Make computer-generated reports and other documents available on-line instead of printing them out.

- ☞ Store company records and financial reports on microfiche, optical disks, or CD-ROMs instead of in paper form.

- ☞ Use fax modems, which cut down on paper use by allowing employees to send and read faxes via personal computer without printing them out.

- ☞ Use plain-paper fax machines, which eliminate the need to photocopy the unwieldy (and difficult to recycle) thermal-coated paper used in older machines.

- ☞ Print fax confirmation sheets for failed transmissions only.

### **Reports On-line**

- *At Mattel, Inc., the ability to retrieve documents on-line saves more than a quarter of a million dollars annually, and in 1993 reduced paper use by almost 8.5 million pages, or 23 percent. Employees also save time and effort by no longer having to bind, file, and discard paper reports.<sup>7</sup>*

### **Digital Storage**

- *The Village Voice, a New York City newspaper, archives financial reports on CD-ROMs. This practice saves the company \$1,000 in paper and printing costs and reduces paper waste by 2 cubic yards per year.<sup>8</sup>*

### **Faxing and Faxing and Faxing**

The speed and ease of use of fax machines have dramatically increased the paper trail. Some facts on the fax will make you think before you feed: if placed end to end, the estimated 41.65 billion sheets of paper used in fax machines in 1996 would circle the globe 289 times, up from 243 times in 1995.<sup>9</sup>

## Category #2: Reduce Paper Use

Pare down your internal distribution lists for reports and other documents to those who really need them. Employees often order documents they think they need and then forget about them or find they don't need them once they're delivered. Sometimes reports continue to be sent to individuals who have changed jobs and are already receiving the material at their new office.

☞ Implement a “negative response” routing system for internal documents. Documents are delivered with a notice asking the recipient whether he or she wishes to continue receiving them. Remaining on the distribution list requires a positive response; failure to respond brings automatic removal.

☞ Instead of printing out multiple copies of draft reports, ask people to add their corrections to a single circulating copy and pass it along. Route single copies of in-house memos and other documents in the same way.

☞ For recipients who do not need to see a document in its entirety, print out only the summary or other selected portions.

### **Computer Software Reduces Labor and Procurement Costs**



*Good Samaritan Health & Medical Center, part of the nonprofit Legacy Health System in Portland, Oregon, now prints only selected portions of its daily 3000-page census/financial report, reducing paper waste by 16 percent. Previously, temporary workers hired for about two hours a day would manually separate the lengthy report into some 340 parts, label the sections, and deliver each one to the appropriate department managers. Of course, many sections remained unread, and some were never delivered.*



*To eliminate this waste, the health center's information services department first purchased a \$4,000 computer system that would allow it to customize the financial report. It then conducted a survey of recipients, asking whether they would prefer not to receive the census and whether they would view it on-line. The resulting reduction in printing needs initially saved more than \$9,000 a year, primarily from avoided labor and paper procurement costs. And the computer program can be used to customize the distribution of other reports as well.<sup>10</sup>*



☞ If your photocopier has an on-demand printing option, discourage excessive copying by storing documents in memory and printing them out only as needed.

☞ Reduce in-house distribution by charging for both photocopies and computer printouts. This can be done by installing a recording device and assigning copy charges by employee, department, or project.

☞ Set up a centralized filing system for documents; this will free up filing space and cut down on the costs of cabinets and folders.

☞ When printing out computer-generated documents, avoid having a separate cover sheet generated with every copy.

☞ Set up a centralized reference library with a telephone support center for materials like computer software manuals.

### **Distribute with Thrift**

- *The data processing unit at Kinney Shoe Corp. in New York City compiled a list of all the reports distributed to approximately 180 employees over a one-month period and the number of pages contained in each. The employees were given the option of receiving summaries instead of a full report, receiving reports on-line instead of in hard copy, or removing their names from the distribution list altogether. Now, Kinney employees throughout the country can choose from among those options by filing an electronic form with the data processing department, a measure that has reduced paper purchasing costs by an estimated \$200,000 per year.<sup>11</sup>*

### **Off with Their Headers**

- *By allowing data center employees to separate print jobs mechanically, special computer software at Kinney Shoe Corp. eliminated the need to insert blank sheets between jobs. The result: 160,000 pages were eliminated from the department's 20,000 monthly print jobs, a 53-cubic-yard reduction in waste and a savings of over \$32,000 per year in purchasing costs.<sup>12</sup> Kinney also stopped including cover, or header, pages in reports generated by 34 laser printers, saving nearly 250,000 sheets of paper and \$4,500 a year.<sup>13</sup>*
- *Simply changing the default setting on 18 of its 45 mainframe computer printers to eliminate header pages enabled New York City's Columbia University to save 75,000 sheets and approximately \$2,250 a year in paper and toner costs.<sup>14</sup>*

- ☞ Order subscriptions by department rather than individual. Circulate each copy and establish a central location for storage and future reference.
- ☞ Subscribe to on-line versions of newsletters and other publications, when available.
- ☞ Determine the number of telephone directories you need and reduce the number ordered. Directory distributors often deliver many more copies than necessary.
- ☞ Eliminate unnecessary or obsolete business forms by evaluating them on a regular basis.
- ☞ Forms generated directly from word processing templates will eliminate the cost of purchasing preprinted forms that go out of date. (Companies that supply business forms frequently offer a computer design service, as well as electronic filing, routing, and distribution.)

### **Paperless Software Manuals**

- *By ordering software manuals on CD-ROM and copying them for distribution to staff, Columbia University's computer department saves on the \$3,000 to \$4,000 formerly spent each year on 8300 manuals containing 1.6 million pages.<sup>15</sup>*

US companies file 120 billion sheets of paper annually.<sup>16</sup>

### **Weed Out Unnecessary Forms**

- *The executive vice president of Commonwealth Hospitality, Ltd., Toronto, took an inventory of the company's business forms and came up with 450 varieties. He laid these out in a Commonwealth hotel ballroom and invited a group of general managers to tell him which ones they used. If a form was needed, he asked if it could be replicated on a hotel computer system. Any form that wasn't needed was discontinued. In one day, the company eliminated 200 forms.<sup>17</sup>*

- ☞ Eliminate obsolete letterhead by using computer software templates that can be changed at any time to incorporate new titles and address changes.

### **Letterhead on Demand**

- *At BankAmerica in San Francisco, computer software generates preprinted, two-color corporate letterhead with names, titles, and addresses left out. Users enter this information onto a PC-based template that's printed out with the text of their letters. The software allows employees to update information as necessary and print out only the exact quantity required. Benefits include a 56 percent cost savings over preprinted letterhead, and zero waste when address, title, or other information changes.<sup>18</sup>*

- ☞ Cut down on catalogs and other direct mailings sent out by your company. This will help reduce the environmental pollutants contained in printing inks as well as potential paper waste.

### **On-line Viewing**

- *General Motors saves 2.3 million pages a year by providing Material Safety Data Sheets (MSDS) through a computer network of all its dealers. In the past, the company sent out 8000 binders containing this information whenever product changes were made.<sup>19</sup>*

- ☞ Limit the number of catalogs sent to customers and consider supplying an on-line version. For minor product information changes, explore whether updates can be sent instead of a full-sized new edition.

### **Virtual Catalogs**

- *BT Office Products, an office supply distributor in New York City, produces two types of product catalogs: a printed version and a CD-ROM version. Each printed catalog costs \$5.00 to produce, whereas each CD-ROM catalog costs \$1.50. The CD-ROM version can also be used to place orders electronically.<sup>20</sup> Many companies now offer on-line catalogs, which are even more efficient than CD-ROMs.*

- ☞ Reduce printing and postage costs by keeping your customer mailing lists current and targeting recipients as precisely as possible. Review your control mailings constantly to eliminate duplicate and incorrect addresses and unwanted and undeliverable mail.

### *Cleaning Up Your Mailing Lists*

The Direct Marketing Association ([www.the-dma.org](http://www.the-dma.org)) has these tips for cleaning up mailing lists:

- ☐ For house lists (those generated by your business), ensure accuracy by using change of address information available from the US Postal Service, correct zip and zip + 4 codes, and the standardized address format required for automated sorting at the post office. (You can even have service bureaus licensed by the USPS correct your lists for you.) Provide incentives such as discounts so customers will notify you of duplicate mailings and incorrect addresses. Give customers options like “do not rent” and “do not mail,” and provide periodic opportunities to change them.
- ☐ Subject outside lists to the same procedures as house lists. Test a small portion of a list first to see whether it contains correct names and addresses, few or no duplicates, and is well-targeted to potential customers. Merge and purge lists thoroughly by matching them against each other and against house lists, and by comparing them with suppression files — the names of customers who have requested to have their names removed. Use computer software that searches for and eliminates similar-sounding addressee information to minimize duplicates, and use carefully targeted mailings to eliminate unlikely customers.<sup>21</sup>

- ☞ Request address corrections on correspondence to save on postage and labor costs as well as paper.

### **Cleaner Is Cheaper**

*Seventh Generation, a Burlington, Vermont, retailer of “environmentally friendly” personal care products and housewares, saved more than \$56,000 in production and postage costs by using national change of address data, in-house suppression files, the Direct Marketing Association’s own suppression list (called the Mail Preference Service), and zip code corrections to keep its mailing lists clean.<sup>22</sup>*

☞ Remove your name from duplicate or unwanted advertiser mailing lists:

- Call, e-mail, or send a postcard to list-marketing companies or to advertisers themselves. Have preprinted cards prepared, distribute them to administrative assistants, secretaries, and mail-room personnel, and keep a batch on hand.
- Alternatively, call the toll-free numbers listed on mailings and ask to be taken off the company's list.
- Send notes along with applications, warranties, and subscription forms asking that your business not be placed on other mailing lists.
- Return mail addressed to employees who have left the company; it can be rubber-stamped RETURN TO SENDER; NO LONGER AT THIS ADDRESS and returned to the post office.

☞ Write to companies with which you do business and tell them that you do not want their solicitations and you do not want them to share your name with other marketers.

☞ Alert marketers when you receive duplicate mailings, known as "dupes."

☞ Check the labels on dupes carefully for variations in addresses or the spelling of names. Most catalogs provide space on the order form for making such corrections; in magazines, the address to which you can send corrections is often provided on the masthead page.

### **Bulking Down**

- *When Northeast Utilities Service Co. took a look at its mail, a whopping 42 percent turned out to be "nonessential." First, the company weighed its daily deliveries for a week, separating out nonessential items such as consumer products catalogs, mail addressed to former employees, and duplicate pieces of bulk mail. This amounted to 42 percent of the 3200 pounds of mail received weekly. Next, it called or wrote to hundreds of trade associations and product suppliers, asking them to update their mailing lists. At the same time, employees received preprinted cards requesting removal of their names from mailing lists. Six months later, another inventory showed that the company was receiving 1500 fewer pounds per week of nonessential bulk mail. Northeast Utilities had succeeded in reducing mail waste by 39,000 pounds over the course of the program so far. What's more, the savings from avoided disposal and handling more than outweighed the operational costs of the program.<sup>23</sup>*

### Category #3: Use Paper More Efficiently

\$\$ Two-sided copying, or duplexing, is perhaps the single most effective way to reduce office paper waste. Purchase or lease equipment with duplexing capability, and always ask for two-sided copies from in-house copy centers, outside copy shops, and printing companies. For in-house copy centers, include a message on order forms informing users that two-sided copies will be provided unless they specifically request otherwise. Ask outside copy shops and printing companies to change their own forms in the same way.

According to INFORM's estimates, any organization that does not use two-sided copying could realize about a 20 percent reduction in office paper use simply by shifting completely to duplexing.<sup>24</sup> (Reductions of 50 percent are not possible because of the quantity of odd-numbered and single-page documents produced.)

- ☞ Make double-sided copying the default option on photocopiers and laser printers with two-sided printing capability.
- ☞ Collect paper that has been used on one side and reuse it as draft paper in copiers, laser printers, and fax machines. For photocopiers and laser printers with multiple trays, stock one with one-sided paper (this tends to work best with ink-jet printers).
- ☞ Use outdated letterhead and half-sheets of paper for in-house memos.

#### Duplexing, S.O.P.

- *The copy center's policy of automatically duplicating two pages per sheet of copy paper contributed to a million-sheet reduction per quarter at First Chicago NBD Corp. For smaller jobs not done in the copy center, the corporation's 37,000 employees are encouraged to duplex whenever possible.<sup>25</sup>*
- *Two-sided photocopying is also standard practice at Columbia University's two high-volume copy centers, unless one-sided copying is specifically requested. To encourage duplexing, there's a per page discount on a sliding scale based on the number of copies ordered. An estimated 60 percent of copy jobs at the centers are two-sided, saving approximately 21 million sheets and \$105,000 per year in paper purchasing costs.<sup>26</sup>*
- *In Grand Rapids, Minnesota, the Itasca County Courthouse saves \$740 a year by routinely photocopying on both sides of the sheet.<sup>27</sup>*

- ☞ Convert scrap paper, obsolete forms, and paper that has been used on one side into cardboard-backed writing pads. If your business has a print shop, you can easily turn old paper into notepads instead of purchasing new ones.
- ☞ Condense the format of documents. For documents likely to be read infrequently, image size can be reduced to fit on a single sheet of paper. Single-spacing, small fonts, and narrow margins all help to fit more words on a page.
- ☞ Redesign paper forms to use only half a sheet of paper and/or to facilitate double-sided printing.
- ☞ Combine similar forms into a single generic format with check-off boxes at the top to indicate the specific use.
- ☞ Use two-way envelopes for billing, into which checks can be folded and mailed back. Besides reducing waste by eliminating the use of separate envelopes for billing and payment, two-way envelopes also cut down on lost payments: because they can only be used to pay bills, employees are less likely to mistake them for other correspondence.

### **New Uses/New Jobs**

- *An unusual paper reuse and recycling program created seven full-time jobs in the neighborhood of Dow Corning's headquarters in Midland, Michigan. In 1995, the company reduced the quantity of office paper sent to the landfill by 150,000 pounds. The dramatic reduction resulted from duplexing, the elimination of header sheets, and another, more original, strategy: Dow Corning sends its paper waste to a rehabilitation center for the physically and developmentally disabled, where seven adults convert paper that's used on one side into notepads with cardboard backing. The remaining waste paper is sorted, shredded, and baled in preparation for recycling.<sup>28</sup>*

### **Condensed Bills**

- *Working with its customers, AT&T designed a condensed format for the billing statements of PRO WATS, its long-distance and international discount service for businesses. Using less white space, the new format conserved more than 3 million sheets of letter-sized paper, or about 16 tons, in one year. AT&T also offers its largest customers a monthly bill on computer disk — replacing hundreds or even thousands of pages for a single customer.<sup>29</sup>*

- ☞ Donate old but valuable books, journals, magazines, newspapers, and other publications to local libraries, schools, hospitals, nursing homes, and other organizations. Businesses discard tons of excess or obsolete reading material, often because of limited storage space.

### **Big Savings from Double-Sided Billing**

- *Printing customer checking account statements on both sides of the page reduced BankAmerica's paper procurement needs by about 300,000 pounds in 1994.<sup>30</sup> That same year at NYNEX (now Bell Atlantic), double-siding customer invoices brought the northeastern telecommunications company a total savings of \$2.5 million in postage as well as paper costs.<sup>31</sup>*
- *BellSouth Telecommunications, a southeastern communications company, began printing two-sided customer bills in 1995, reducing paper use by more than 1.3 million pounds and paper purchasing costs by \$535,000. In addition, linking the company and its customers through an electronic data interchange (EDI) increased electronic billing by 6 percent; it also reduced paper consumption by 7500 pounds and saved the company \$54,000.<sup>32</sup>*

## **Conferences and Other Events**

- ☞ Use e-mail to announce meetings and conferences, and post agendas and program information instead of handing out individual flyers.
- ☞ Establish an on-line registration service for training and development classes and employee surveys.
- ☞ Inform meeting participants that waste prevention is a priority, and let them know how they can contribute, such as by bringing their own mugs instead of using paper cups.
- ☞ Instead of preparing information packets in advance, let participants take only the handouts they want and provide collection boxes so people can return what they don't wish to keep.
- ☞ Make information provided by speakers available on-line rather than distributing handouts to all participants. For materials that must be provided in paper form, print or copy on both sides and save leftover handouts for reuse.
- ☞ Use collection boxes for name-tag holders. Place them at the exits of conference rooms, remove the paper inserts, and save the plastic badges for the next event.

## Equipment and Furniture

Using equipment, furniture, and fixtures efficiently is mainly a matter of making intelligent choices about acquisition and disposal.

For example:

- ☞ When considering a new purchase, are refurbished items or models with environmental features an option?
- ☞ Is equipment available that can be upgraded as needed instead of replaced?
- ☞ Does buying make the most sense, or should you consider leasing?
- ☞ When something breaks, should you replace it or consider making repairs?
- ☞ When replacing photocopiers and computer printers, look for models that support double-sided imaging, and teach your staff how to use them. Make sure the double-sided copies are produced quickly and reliably by comparing the duplexing speed to the single-copy speed; if the single-side speed is more than twice as fast, the duplexing mechanism may have been an afterthought in the design process.<sup>33</sup>

### *Repair-Related Questions*

When buying for repairability, keep the following questions in mind:

- Is the product manufactured to be repairable?
- If so, does the manufacturer the product, or is repair work done by independent service firms?
- Are repair parts readily available?
- For how many years are parts guaranteed to be available?
- What is the product's repair warranty?
- Are extended warranties available for a reasonable price?
- Is repair cost-effective?

### **Retoned Cartridges**

- *Home Box Office, a New York City-based entertainment company, saves used laser-printer toner cartridges and returns them to the supplier, eliminating about a ton of waste each year. The vendor supplies HBO with remanufactured cartridges, each costing \$25 less than the price of a new one. This saves HBO about \$12,500 per year.<sup>34</sup>*

- ☞ Ask copier manufacturers to change the default setting on duplex copiers from single-sided to double-sided copying.
  
- ☞ Instruct employees on the correct way to change paper and toner cartridges in all computer printers, check printers, and photocopiers, and post instructions next to each machine. Improper loading can waste large amounts of paper as well as time and money.
  
- ☞ Use remanufactured toner cartridges for laser printers and some varieties of copiers and fax machines. These are used cartridges that have been inspected, repaired, and refilled with toner fluid. Common repairs include refurbishing or replacing the organic photoreceptor cell (OPC) drum and any worn or broken parts. Refillable ink-jet cartridges and re-inked printer ribbons are also available. Encourage remanufacture by establishing a procedure for collecting used cartridges.

Every year, American businesses throw out 15 million plastic toner cartridges, each weighing approximately 2.5 pounds.<sup>35</sup>

### *Buying Refurbished and Remanufactured Furniture*

Most interior designers can help you find quality used furniture. If you're doing it yourself, you'll need to know about the following people: brokers, who buy and sell used furniture; refurbishers, who take your office furniture and restore it on-site or off; and remanufacturers, who stock used furniture and refinish it to order. The most economical approach is to buy used furniture and use it in tandem with your current furniture. Brokers can usually find what you need at a fair price.

Another option is to refurbish your current furniture. For example, office cubicles can be refurbished by changing their size and the dimensions, fabric, and trim of the surrounding panels. Changes can also be made to accommodate computer support and communications and electrical system enhancements. Remanufactured furniture is available in a number of designs that provide a "like new" look at a price much below that of never-used items. Remanufactured furniture is also specified like new.

When buying remanufactured furniture, keep the following questions in mind:

- Will the manufacturer take the product back for remanufacture?
- If not, will other businesses remanufacture the product for reuse?
- If the whole product cannot be remanufactured, can parts of it be used for repairs to others?

- \$\$ When redecorating offices, consider buying refurbished or remanufactured furniture.
- ☞ Consider renting rather than buying items needed for one-time or even short-term use.
- ☞ Offset the purchase cost of new equipment more quickly by renting it out when not in use rather than letting it sit unused.
- ☞ Consider purchasing computers and other equipment with modular features that will allow you to upgrade instead of purchasing a completely new machine.
- ☞ When an appliance or piece of equipment breaks, find out whether an adjustment or new part could make it usable again. Often, repair is less expensive than replacement.

### Refurbishing Yields Savings...

○ As different areas are remodeled at Bristol-Myers Squibb Co., existing furniture (cabinets, desks, bookcases, etc.) is refurbished for use elsewhere in the facility. In 1993, the company generated an estimated \$500,000 in savings from this alternative to disposal.<sup>36</sup>

### Computer Graveyards

Researchers at Carnegie-Mellon University in Pittsburgh estimate that at the current rate of 10 million discards a year, around 150 million old computers will have been put to rest in landfills by the year 2005. Disposal costs by that point will have reached \$1 billion, and the space required will be equivalent to an acre of land dug 3.5 miles deep.<sup>37</sup> For every three computers purchased today, two are thrown away. Within a few years, the ratio will be one to one.<sup>38</sup>

Most obsolete equipment finds its way to landfills, where any hazardous materials it contains – lead, radium, mercury, and cadmium in the case of computers – can pose environmental risks and liability issues. Consider redeploying, selling, or trading unneeded equipment, furniture, and fixtures or making a donation to a nonprofit organization.

- \$\$ Set up an internal surplus materials program to collect and redeploy equipment, furniture, and fixtures to other departments or facilities.

Businesses in North America save an estimated \$27 million yearly by taking advantage of materials exchanges.<sup>39</sup> For a comprehensive list of materials exchange programs, contact the Institute for Local Self-Reliance at (202) 232-4108, or find a summary of their report, *Creating Wealth from Everyday Items*, on the Web at [www.ilsr.org](http://www.ilsr.org).

- \$\$ Reclaim usable parts from old equipment, such as electric motors, and establish an investment recovery program for items you can no longer use but that still have value.
- ☞ Advertise unneeded materials items through a commercial materials exchange.
- ☞ Earn a tax deduction by donating unneeded items to a not-for-profit organization. Local charities with which your company has an established relationship may be willing to collect donated materials on short notice.
- ☞ Ship unneeded computers to remanufacturing or demanufacturing companies, which clean and resell them, reuse the parts in other machines, or recycle components as scrap. Contact computer hardware manufacturers to find out about remanufacturing programs in your area.

### *Donating Yields a Tax Break...*

The National Association for the Exchange of Industrial Resources (NAEIR) accepts donations of unsold inventory from businesses and redistributes the goods from its 10-acre Galesburg, Illinois, warehouse to a network of 8000 member schools and charities throughout the US. First, a business contacts NAEIR with a list of proposed donations. Then, after confirming that the merchandise is acceptable, the organization sends shipping instructions and labels along to the donor. The donor has to pay shipping costs but these are tax deductible, as is the donation.

Although NAEIR accepts only new merchandise, there's no limit on donation size: donations ranging from a single small box to 60 semi-trailer loads have been accepted. The items most sought by schools and charities are office supplies, but other high-demand goods include computers and accessories; clothing; books; toys; hardware; plumbing, janitorial, and electrical supplies; paper products; shoes and purses; and shampoos and other personal care items.

NAEIR's members include schools and nonprofit organizations throughout the 50 states and several US territories, as well as nonprofit nursing homes, hospitals, orphanages, senior citizen centers, homes for abused women and children, alcohol and drug rehabilitation centers, church groups, and YMCAs and other boys' and girls' clubs. Merchandise is listed in a 250-page catalog and is distributed to members through a computerized allocation system.

Each member organization pays dues ranging from \$275 to \$575, plus shipping and handling costs, for the goods it chooses. Those funds support NAEIR's warehouse and 115-person staff. The merchandise itself is free. Members who take full advantage of the service can receive more than \$10,000 worth of goods each year.<sup>40</sup> For more information, call NAEIR at (800) 562-0955 or see their Web site at [www.naeir.org](http://www.naeir.org).

### ○ **...And Asset Recovery Yields Revenue**

○ *During a move of 3000 employees at E.I. DuPont in Wilmington, Delaware, the redeployment of furniture and office equipment contributed to an estimated savings of \$3 to \$5 million in one year.<sup>41</sup> In 1993, a DuPont facility in New Jersey realized \$350,000 from the sale of office furniture, computers, and equipment.<sup>42</sup>*

○ *The company's Corporate Asset Management group handles the redeployment and sale of tens of millions of dollars worth of equipment the company no longer needs. Redeployment within the company saves on disposal and procurement costs, while selling unneeded assets goes one step further by generating cash. DuPont reuses process equipment, furniture, computers, and office equipment, and sells unneeded items at a surplus center in New Castle, Delaware.<sup>43</sup>*

## Office Supplies

When it comes to smaller office items, the goal is to use products that are long-lasting and toxin-free, to reduce packaging waste as much as possible, and to reuse and recycle routinely.

- ☞ Make it clear that efficient use of supplies is a priority by unpacking and storing popular items in limited quantities so employees can't take more than they need.
- ☞ Encourage employees to use up the supplies they take and avoid discarding unused items.
- ☞ Store paper in areas with low humidity to preserve it and prevent it from curling up and jamming photocopiers and computer printers.

### ○ **Reusing Office Supplies**

○ *Aetna, Inc., an insurance company based in Hartford, Connecticut, saved \$144,000 from an interoffice supply and equipment recapture program; employees reused more than 128,000 pounds of supplies and equipment such as calculators and fax machines.<sup>44</sup>*

- ☞ Buy paper with lower basis weights for use in photocopiers and computer printers. Try switching to 18 or even 16 pounds. Refer to equipment manuals for the minimum weight appropriate for each machine.
- ☞ Reduce shipping waste by purchasing unwrapped paper packed in half-cartons (5 reams instead of 10).
- ☞ If you have a publications department, consider replacing illustration boards with cover stock, at about one-eighth the weight, for pasteup.
- ☞ Use narrow-ruled notebooks and notepads.
- ☞ Use erasable boards instead of paper for posters and signs, and use perpetual calendars that can be wiped clean and reused year after year.
- ☞ Use nontoxic typewriter correction fluid and glues, pastes, and glue sticks that are free of toxic solvents. For instance, use wax adhesive instead of rubber cement, which contains hexane, a highly flammable and toxic solvent. Even better, paste up graphic materials on the computer whenever possible.
- ☞ Use colored pencils, crayons, or colored wax instead of solvent-based markers.
- ☞ Use solar-powered calculators, rechargeable batteries, and battery rechargers.
- ☞ Supply fountain pens and pens with refills and encourage employees to use them instead of disposables.

### *I Use A Lot of Paper – What Kind Should I Buy?*

There are several environmental factors to consider when buying paper. Besides the thickness (or basis weight), these include recycled and “tree-free” content, bleaching method, and coloring agents and other chemical additives. Look for the highest recycled content available that will meet your needs. Consider buying paper with tree-free content such as kenaf, agricultural waste, or other nonwood fibers. These often require fewer chemicals to process into paper products and reduce the pressure to cut down trees.

Buying paper made without chlorine bleaching agents helps reduce the amount of toxic chemicals discharged into waterways. Chlorine by-products from paper mills are hazardous to fish and wildlife and can be harmful to humans who eat fish caught in waters polluted with these chemicals. Currently, the pulp and paper industry is making the transition to bleaching processes that use less chlorine or none at all. Paper labeled “elemental chlorine-free,” or ECF (now required by the US EPA), means bleaching technologies were used that rely on chlorine derivatives such as sodium hypochlorite or chlorine dioxide instead of more toxic elemental chlorine. ECF processes generate lower levels of pollutants than traditional bleaching methods using elemental chlorine. Even lower levels can be achieved with “totally chlorine-free,” or TCF, technologies. These processes use no chlorine derivatives, relying instead on oxygen, hydrogen peroxide, or ozone.<sup>45</sup> When buying paper, choose TCF over ECF paper, and choose unbleached paper products (such as brown paper towels) whenever possible. In particular, avoid brightly colored papers (and inks) that contain toxic heavy-metal pigments such as cadmium (yellow) and cobalt (blue).

Conservatree, a consulting firm on paper issues, publishes an *Annual Guide to Environmentally Sound Papers* that lists the attributes and contact information for approximately 500 environmentally preferable papers available in North America. To purchase a copy, contact Conservatree at (415) 883-6264 or find them on the Web at [www.conservatree.com](http://www.conservatree.com).

☞ If your company has its own print shop, combine excess inks to make black ink instead of discarding them. Also, use inks with low levels of volatile organic compounds (VOCs), such as vegetable oil- or water-based inks. Water-based inks have the added benefit of eliminating the need for solvents during cleanup.

☞ Instead of maintaining an inventory of manila or other single-use mailing envelopes, use reusable mailbags and boxes for shipping to branch offices, stores, and warehouses. Save on postage costs by using lightweight, waterproof, reusable nylon pouches for consolidated mailings.

☞ Use reusable interoffice routing envelopes, and extend their life by pasting on blank routing forms after all the spaces for names have been filled in.

☞ Retrieve the supplies of employees who leave or relocate. Too often when a desk is vacated, items in good condition are routinely discarded. Instruct employees to divert reusable items to a supply cabinet.

☞ Store used supplies alongside new items in supply cabinets, or create an “oldies but goodies” (OBGs) section. If your company uses a supplies requisitioning system, send OBGs to the requisition department to be redistributed. OBG candidates include pens and pencils, Post-It pads, paper clips, staplers, staples, plastic badges, partially used writing pads, mailing labels, interoffice envelopes, manila file folders, binders, and plastic tabs for hanging files.

### Envelopes for Speedy Billing

- *California’s Alameda County provides interoffice envelopes to its vendors so that invoices requiring authorization by several departments can be routed directly through the county’s mail distribution system. Now, fewer invoices are lost in the mail, postage costs are eliminated, and the envelopes are used over and over again.<sup>46</sup>*

### Preempting the Circular File

- *Lockheed Martin, an aerospace company, established a program called “The Reusables” at its Westover, New York, facility to capture and reuse office supplies. Employees bring items such as file folders, hanging folders, paper trays, binders, and staplers to one of four “reusable” distribution centers in the plant. The program reduces waste and unnecessary purchases.<sup>47</sup>*

### Free-Ring Binders

- *Bellcore, a communications firm based in Livingston, New Jersey, gives away used three-ring binders to departments for free but charges them for new binders. This reuse incentive saves \$9,000 yearly in purchasing costs.<sup>48</sup>*

- ☞ Reuse file folders by turning them inside out; reuse hanging file folders by inserting new labels into the plastic tabs.
- ☞ Reuse ringed binders; if you use specially printed covers, slide them into clear plastic covers and remove them later so the binders can be reused.
- ☞ Reuse envelopes by placing a label over the old address.
- ☞ Reuse computer diskettes by deleting obsolete files and erasing outdated software. You can also reformat diskettes received during marketing campaigns, such as those of on-line computer service providers. And you can ask the firms that send you unwanted diskettes to take you off their mailing list.
- ☞ Encourage employees to use fewer diskettes by transferring files via e-mail or the Internet.
- ☞ Purchase remanufactured computer disks. One brand is made from obsolete high-quality software disks by the Green Disk Co. For more information, contact them at (800) 305-DISK or see [www.greendisk.com](http://www.greendisk.com) on the Web.
- ☞ For office supplies that you can't reuse, set up an area where employees, local charities, and schools can shop for used items. Inform your maintenance staff so supplies to be donated are not inadvertently discarded.

### **Diskette Reuse**

- *Eastman Kodak Co. in Rochester, New York, has established a computer diskette reuse program called the Kodak Diskcycling Program. Personnel who are unable for medical reasons to do their usual jobs reformat the diskettes, which would otherwise collect dust on people's desks or wind up in the trash. Employees can then purchase the diskettes through the company's computerized purchasing system at about 30 percent of the cost of new ones. The program recycled approximately 30,000 diskettes in 1996, saving Eastman Kodak about \$20,000.<sup>49</sup>*

### **How to Reuse Computer Diskettes**

- Step 1:** Turn the diskette over and look at the back side. Usually there are square holes in the two upper corners. If the slider in the hole on the left is in the up, or locked, position, move it down to cover the hole. If the diskette does not have a slider you can still reformat the diskette by placing a piece of tape neatly over the hole.
- Step 2:** Reformat the diskette according to the instructions for your computer operating system. Consult your computer manual if you're unsure how to do this.
- Step 3:** When reformatting is complete, put a new blank label over the old one.

Diskettes obtained from reputable firms should be virus-free, but they can be easily checked with a virus detection program just to be sure.<sup>50</sup>

## 2. SHIPPING AND RECEIVING

The single largest component of municipal solid waste is corrugated cardboard, which is the primary material used to pack products for shipping.<sup>51</sup> Other types of shipping waste include wood pallets and crates, void fill (blister packs and foam pellets), and stretchwrap and shrinkwrap.

As both a shipper and a receiver of products, your business can benefit from a wide variety of strategies to reduce packaging waste and save money. These measures can be thought of in terms of a hierarchy, with elimination of waste-generating materials at the top followed by reduction and reuse in descending order:

- ☞ **Elimination** means avoiding packaging altogether as long as this does not compromise product integrity. For example, most tools do not really need to be protected by blister packs.
- ☞ **Reduction** means decreasing the amount of material used in packaging. Packaging can be reduced by changing product design (e.g., using concentrates or a different product structure), modifying package design (e.g., using a more lightweight package), or eliminating unnecessary packaging layers. Packaging toxicity can be reduced by switching to more environmentally benign materials, such as biodegradable starch “peanuts” instead of polystyrene ones.
- ☞ **Reuse** means using packaging such as shipping containers over and over again. Corrugated boxes, wood and plastic pallets, and foam peanuts can be sent back to vendors for reuse, or they can be reused in your own facility.

Strategies closer to the top of the hierarchy are obviously preferable to those lower down. In case of competing options, such as minimizing packaging versus reusing it, select the one that will result in the least amount of waste.

### **Why Use a Vault When All You Need Is a Box?**

*HASBRO, a manufacturer of games and toys, reduced the thickness of its corrugated shipping containers by 15 percent, saving \$400,000 and more than 763,000 pounds of corrugated cardboard in one year.<sup>52</sup>*

## Shipping Containers

- ☞ Consider eliminating packaging for products that need no protection.
- ☞ When elimination is impossible, design all packaging to be compatible with available recycling programs. Consider a material recyclable only if an economically viable and widely available system exists for collecting, processing, and marketing it.
- ☞ Use the maximum feasible amount of postconsumer recycled material in packaging. This is material that has been discarded after serving its intended end use. Check local health and regulatory restrictions for rules on using recycled materials in packaging.
- ☞ Make sure all packages contain the largest number of items possible — one large container uses less packaging per ounce than several smaller containers.
- ☞ Make sure the size of a box or carton matches the size of the item being shipped as closely as possible, with a minimum of void fill required.

### Naked Shipping

- *State Farm Mutual Automotive Insurance Company of Bloomington, Illinois, saves \$15,600 in yearly purchasing costs by eliminating the 120,000 shrinkwraps previously used to send packets of forms to regional offices. It saves an additional \$7,500 per year by eliminating shrinkwraps on 50,000 handbooks.<sup>53</sup>*
- *Steelcase, Inc., an office furniture manufacturer in Grand Rapids, Michigan, ships 40 percent of its orders unpackaged. At first, the switch to cartonless products was a trade-off between the economic benefits of reduced packaging and the inconvenience of storing, handling, and shipping unstackable items. Ultimately, the company devised new methods of protecting its products so that most of them can be stacked for shipping. For instance, reusable polystyrene buns (which separate and protect the unboxed items) allow chairs to be stacked in the staging area without damage. The buns are back-hauled to the factory after delivery. Shipping the chairs this way reduces solid waste generation by 1200 tons per year and saves Steelcase \$890,000 annually.<sup>54</sup>*

A study conducted by INFORM concluded that a single 5.5-pound, 2-cubic-foot reusable plastic shipping container that makes 250 trips over the course of its lifetime will have done the same amount of work as 250 1.5-pound single-use corrugated boxes weighing a total of 375 pounds. To deliver the same quantity of goods, those single-use boxes will have generated 98.5 percent more waste by weight than the reusable container.<sup>55</sup>

\$\$ Reusable shipping container systems can dramatically reduce solid waste as well as product damage and the costs of packaging and disposal. Lower freight, labor, handling, and storage costs can also result. Four factors generally favor the reuse of shipping containers:

- ☞ Short distribution distances
- ☞ Frequent deliveries
- ☞ Small number of parties
- ☞ Company-owned or “dedicated” distribution vehicles

Note, however, that there may be obstacles for the vendor, including the initial capital expense of the containers, the cost of tracking, storing, and accounting for them, and the cost of transporting them back to their point of origin.

### **Savings from Reusable Shipping Containers**

*Regular shipments back and forth between suppliers and manufacturers offer a prime opportunity for standardizing and reusing shipping containers. Taking advantage of such a “closed-loop” arrangement, Boston-based Polaroid Co. switched from single-use corrugated boxes to stronger reusable ones — conserving nearly 100 tons of corrugated cardboard in 1994. The new topless boxes, or totes, carry prepackaged photographic materials to Polaroid and return flat and folded to suppliers an average of 20 times before being recycled. The resulting savings helped Polaroid’s suppliers keep prices down on components, contributing to an overall \$70,000 savings for the company.<sup>56</sup>*

*Another arrangement saved Dow Corning almost \$64,000 in avoided procurement costs and relieved its customers of the burden of reconditioning or disposing of 1500 drums in 1995. Instead of receiving shipments of chemical products in conventional metal drums, these customers purchase reusable steel cylinders, which Dow Corning maintains. Upon arrival at the customer’s facility, chemicals are immediately transferred out of the cylinders, which are sent back to Dow Corning for reuse in subsequent deliveries.<sup>57</sup>*

*In 1994, 15 of New Jersey-based Ingersoll-Rand Co.’s industrial equipment manufacturing facilities kept 778,000 pounds of wood out of the landfill by switching from wood pallets and skids to reusable shipping containers — mostly collapsible plastic shipping containers with built-in handles.<sup>58</sup>*

*In 1995, Pepsi-Cola saved \$44 million by switching from corrugated to reusable plastic shipping containers for one-liter and two-ounce bottles, conserving 196 million pounds of corrugated cardboard.<sup>59</sup>*

- ☞ Ask vendors about available shipping options for items you receive. For instance, they may be willing to take back packaging and shipping materials for reuse or recycling if deliveries are unpacked immediately upon arrival at your facility.
- ☞ Reuse intact shipping boxes and packaging that you can't return for your own outgoing shipments.
- ☞ Order items such as cleaning products and office supplies in bulk to reduce packaging waste and save money.
- ☞ Consider reusing plastic drums as recycling containers. An empty 55-gallon metal drum weighs approximately 40 pounds; a similar plastic drum weighs 22 pounds. Plastic drums are also easier to roll and don't have sharp edges. Make sure the drums did not contain extremely hazardous materials and are well-rinsed before reuse.<sup>61</sup>

### Return to Sender

- *Perkin-Elmer Corp., a manufacturer of scientific equipment based in Norwalk, Connecticut, values its packaging materials so much it pays to get them back. The company encourages its customers to return product packaging by offering free return shipping. As a further incentive, Perkin-Elmer donates \$1 to environmental and wildlife organizations for each package returned. The company calculates the savings through reuse (up to five times for each box) by comparing the cost of return postage plus the cost of refurbishing some of the boxes returned to the avoided cost of new packaging. The result: a net savings of \$95,000 between 1992 and 1995 on 62 tons worth of reused corrugated and foam packaging material.<sup>60</sup>*

### Reusing Cartons by Reconfiguring Them

- *One California manufacturer has found an efficient way to integrate reuse of corrugated cardboard boxes into its distribution system. Smith & Vandiver, Inc., manufactures natural-ingredient personal care products that net \$7 million in annual sales. The firm's vice president designed a die-cutter that shapes boxes used for raw materials by vendors into smaller packing cartons for finished products. Even though the die-cutter required an investment of \$18,000, plus \$24,000 in additional wages to operate the machine, Smith & Vandiver still nets a savings of \$20,000 a year in avoided procurement and storage costs. Plus, the initiative helps boost the company's image as a "socially conscientious and environmentally responsible organization."<sup>62</sup>*

- ☞ Use reusable plastic crates instead of corrugated boxes for office moves.

### **Reusable Shipping Containers for Office Moves**

- *Moving with corrugated boxes is labor-, time-, and waste-intensive. Employees have to set up and break down the boxes, and then the company has to recycle or discard the used material. State Street Bank & Trust Co., in Boston, conserved the equivalent of 10,000 corrugated boxes by renting reusable plastic crates for a company move in 1994.*
- *Estimating that a corrugated box can be used an average of 2.5 times, State Street's moving consultant calculated that 10,000 boxes would have been needed to make the 25,000 trips involved in the moving process.<sup>63</sup>*
- *On a smaller scale, the graphic design firm Our Design, Inc., rented 65 reusable containers when it relocated in Manhattan. The rental cost was about the same as the cost of buying corrugated boxes, but Our Design saved on labor by not having to break down and recycle 150 pounds of corrugated cardboard.<sup>64</sup>*

## **Shipping Pallets**

- \$\$ Eliminate pallets altogether by substituting reusable slipsheets (thin plastic sheets with protruding tabs that enable stacked containers to be moved) made from recycled material.
- \$\$ Replace wooden pallets with more durable, reusable corrugated or plastic models, preferably made from recycled postconsumer materials.

### **Waste From Wood Pallets**

Pallets represent a major use of US lumber — lumber that often turns into waste after only a few uses. Each year, US pallet makers consume half of all hardwood and 10 percent of all lumber used nationally. The Wood Pallet and Container Association estimates that more than 50 percent of wood pallets are reusable and are reused an average of four times per year. But many others are discarded after only a single use.<sup>65</sup> Pallets discarded annually in the US contain approximately as much lumber as is used to frame 300,000 average-sized houses.<sup>66</sup>

☞ If switching to more durable pallets is not feasible, make sure the ones you use are designed efficiently. For example, ask your vendors to deliver products on pallets of a specific size and construction so you can reuse them internally.

☞ Train material handlers, fork-lift operators, and all distribution/shipping personnel in damage prevention methods to extend the life of your pallets.

☞ Ask vendors to take back pallets, and offer to take back pallets from your own customers.

☞ Extend the useful life of wood pallets by repairing rather than discarding broken or damaged units.

☞ Advertise through want ads or waste exchange publications the availability of shipping materials that cannot be reused but can be salvaged for their material. Find out if your local chamber of commerce or business association offers a materials exchange.

### **Bolted Pallets...**

○ *Since it began using special bolted pallets, Miller Brewing Co. has not sent a single pallet to the landfill.<sup>67</sup> The pallets cost about \$3 more than conventional designs, but they have a 95 percent repair rate and can be used many more times.*

### **...and Pallets that Use Less Wood**

- *When Eastman Kodak Co. redesigned its shipping pallets to use less wood, it had a simple means of calculating the waste prevented: purchasing records. The new design, which was 20 percent lighter but just as functional as ordinary pallets, called for 1.1 million fewer feet of two-by-fours and saved more than 5.5 million pounds of wood.<sup>68</sup> A second initiative, to use fewer pallets by changing product stacking patterns and packaging, eliminated an additional 1.8 million pounds of wood. Taken together, the pallet reduction efforts saved Eastman Kodak \$380,000 in 1994.<sup>69</sup>*
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- ☞ Recycle wood pallets or send them to a pallet remanufacturer in your area. The North American Pallet Recycling Network provides a list of wood pallet recycling firms on the Internet at [www.recycle.net/recycle/Wood/pallet/na/index.html](http://www.recycle.net/recycle/Wood/pallet/na/index.html). Or contact the National Wooden Pallet and Container Association at (703) 527-7667 (or [www.nwpc.com](http://www.nwpc.com)).

### **Savings from Pallet Standardization**

- *Polaroid Co. and its vendors saved \$32,000 in 1994 by standardizing the size of their reusable shipping pallets and conserving more than 80 tons of wood in the process. Because the new pallets can accommodate incoming supplies, folded-down empty boxes, and outgoing shipments of consumer products, Polaroid is able to use fewer of them.<sup>70</sup>*

- ☞ Recycle the wood content of damaged and unusable crates, shipping boxes, and pallets instead of discarding them. Wood waste can be processed into a wide variety of products, including new pallets, furniture, compost for soil improvement, mulch for weed control, sawdust for animal bedding, wood flour for cleaning up spills, and wood chips for landscaping. A list of wood recyclers can be found through [www.recycle.net](http://www.recycle.net).

### **Whittling Away at Wood Waste**

- *Herman Miller, an office furniture manufacturer, established a pallet return program in 1985 that has diverted approximately 1800 tons of scrap pallets from disposal facilities since 1990. Forty-five of the company's largest suppliers take advantage of the program.<sup>71</sup>*

## Other Packaging

- ☞ Use cornstarch-based fill instead of polystyrene foam peanuts. This is made from renewable resources, is less toxic to manufacture, and is biodegradable and compostable.
- ☞ Use packing materials as efficiently as possible. For example, reduce film consumption by prestretching it in stretchwrap machines.
- ☞ Reuse shipping materials such as foam peanuts, or make them available to local packaging companies.
- ☞ Ask customers to return packing materials and provide financial incentives that encourage them to do so.
- ☞ Shred or crumple newspaper or other waste paper for use as packing material.

### **That's Not Peanuts**

- *In a vivid example of how reuse means avoided purchasing, Dow Corning's investment in loose-fill packaging for the last five years has "amounted to zero." The manufacturer simply collects the polystyrene peanuts it receives from suppliers and reuses them in outgoing shipments.<sup>72</sup>*
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The Plastic Loose-Fill Collection Program has a nationwide telephone information service for identifying businesses in your area that will accept foam peanuts for reuse. Call (800) 828-2214.<sup>73</sup>

### 3. FOOD SERVICES

Businesses often provide food and beverage services for their employees – from simple pantries equipped with vending machines to cafeterias and lavish dining rooms. As in shipping and receiving, reducing the waste associated with food and drink is a matter of minimizing the use of packaging and containers and maximizing opportunities for reuse. But this business area also creates its own form of waste: the food itself and the dishes, cutlery, napkins, and other supplies used to serve and consume it.

This section identifies specific ways to reduce seven types of waste generated by food services:

- ☞ **Inventory waste** – spoiled and damaged food
- ☞ **Food preparation (prep) waste** – excess ingredients and rinds and peelings from fruits and vegetables
- ☞ **Waste from food prepared but not served**
- ☞ **Plate waste** – food that is taken but not eaten
- ☞ **Food-related waste** – serviceware (plates and utensils), napkins, and takeout containers
- ☞ **Packaging waste** – transport containers, cans and cartons, and packets of condiments and other single-use items
- ☞ **Kitchen maintenance waste** – paper towels, detergents, and other cleaning supplies

#### Inventory Waste

Efficient inventory management eliminates the spoilage and damage that lead to waste. For example, stockpiling and hoarding should be avoided.

- ☞ Routinely check the quality of incoming items to ensure usability.
- ☞ Date all products on the day of delivery to distinguish them from older items.
- ☞ Rotate perishable stock at every delivery to avoid spoilage. In the back-to-front system, new product is placed at the back or bottom of shelves, while older product is rotated to the front or top.

- ☞ Arrange refrigerator, freezer, and dry storage areas to facilitate product access and rotation.
- ☞ Check coolers and freezers regularly to ensure that no items have fallen behind the shelving and spoiled. To prevent freezing, store produce as far away from the condenser unit as possible.
- ☞ Wrap freezer products tightly and make sure they are used in a timely fashion to minimize waste caused by freezer burn.
- ☞ Store food in reusable containers instead of in plastic wrap.
- ☞ Reuse or recycle aluminum foil used to cover pans and food trays.

## Food Preparation Waste

Prep waste can result from spoilage, inaccurate estimates of the amounts of ingredients needed, and wasteful kitchen practices. Educating kitchen staff about waste prevention strategies is critical to reducing this waste.

- ☞ Buy locally (and organically) grown food. This will guarantee you the freshest foods in season and avoid both the pollution associated with transporting food over long distances and the chemicals used to preserve it.

## Waste Tracking

- *At the Thunderbird Hotel's Totem Pole Restaurant in Bloomington, Minnesota, the head chef used a computerized inventory system, along with routine visual checking, to track the amount of waste generated per meal. By examining the types of food entering waste containers, the restaurant's staff was able to modify food preparation procedures and reduce food waste by 20 percent.<sup>74</sup>*
- *The Boston Market restaurant chain also uses a computer program to monitor food inventories. Every day, leftover food is weighed and the amount fed into the computer. The program then calculates the difference between used and remaining food inventories, providing a daily estimate of preparation and storage losses. The chain reports that food loss has declined from 5 percent to 1 percent since use of the inventory tracking program began.<sup>75</sup>*

- ☞ Rely more on already prepared foods than on dishes prepared from scratch. This may mean buying pre-cut vegetables or precooked/already prepared dishes (e.g., fish fillets) that only need to be heated up. Because portion size is predetermined, these foods reduce the chance that ingredients will be wasted.
- ☞ Plan menus so the same fresh ingredients are used up in different recipes, instead of being wasted if employees order less of one dish.<sup>76</sup>
- ☞ Consider generating recipes by computer so the quantity of ingredients used can be adjusted to the expected number of portions served.
- ☞ Use vegetable and meat trimmings to make soup stock.
- ☞ Incorporate leftovers into other recipes. For instance, raw vegetables and other leftovers can be used in soup; tomato ends can be used in sauce made from scratch.
- ☞ Avoid the use of unnecessary garnishes, such as lemon slices and parsley sprigs.
- ☞ Discourage unnecessary discards by improving kitchen procedures.

### **Central Prep**

Food service facilities can reduce their own generation of waste by using pre-cut fruits and vegetables, but waste will still be generated elsewhere. On the other hand, centralized preparation can result in less waste by providing more opportunities for using excess food. For example, potato left over from french fry production can be recovered by food processors and used in other products, such as dehydrated potato flakes and potato starch. Automated processes, too, can sometimes reduce production waste. Eggs taken out of their shells by processing machines can lower the rate of processing loss, since up to 30 percent of egg whites will stick to the shell when eggs are shelled manually.<sup>77</sup>

### **Saved from the Dumpster**

- *At Florida Atlantic University in Boca Raton, the food service director noticed that kitchen workers were routinely discarding usable items like slightly blemished tomatoes and onions. In response, he replaced garbage cans at individual workstations with transparent tabletop receptacles that make discarded items visible. This measure has reportedly led to "dramatic reductions in production waste" by making workers feel more accountable for the food they discard.<sup>78</sup>*
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## Waste from Food Prepared but Not Served

Waste from food that is prepared but not served can be caused by fluctuations in the number of people taking meals and/or in the demand for particular items. Since running out of food is not an option, food service facilities tend to err on the side of overproduction. The goal is to keep this excess to a minimum and to make good use of leftovers.<sup>79</sup>

- ☞ Keep records of the demand for particular foods and use them in menu planning. Hot soup, for instance, is more popular in winter than in summer months.

- ☞ Keep track of attendance patterns. If a dining room stays open late for lunch but only a few customers come in, a lot of unserved food may have to be discarded.

- ☞ Prepare smaller amounts of food throughout the course of a meal. Instead of making large amounts ahead of time, prepare pasta, potatoes, and vegetables over a shorter period as demand warrants to reduce the amount discarded later.

### Donating Excess Food

- *Food service establishments often have leftover food that they choose not to serve again, but which is still edible. Hundreds of programs throughout the United States accept packaged, prepared, fresh, frozen, and baked food and deliver it to soup kitchens, homeless shelters, senior citizens' programs, and day-care centers.*
- *Restaurants at Walt Disney World teamed up with one program, called Second Helpings (part of Second Harvest Food of Central Florida), to distribute 594,000 pounds of leftover food, or 792,000 meals, to needy individuals.*
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Second Helpings is a member of Foodchain, a Kansas City-based national coalition of prepared and perishable food programs that advises organizations interested in starting donor programs. You can reach the organization on the Web at [www.foodchain.org](http://www.foodchain.org), or call (800) 845-3008.<sup>80</sup>

- ☞ Set out items at salad bars, steam trays, and buffets in smaller containers and replenish them more often.
  
- ☞ When preparing for catered events, avoid over-ordering of bagels, pastries, sandwiches, and other perishable items.
  
- ☞ Freeze leftovers and keep them in reserve. Careful menu planning will make it easier to incorporate leftovers into future meals. Some leftovers (such as lasagna) can be served as an additional entrée on the following day.
  
- ☞ Encourage employees to take home extra food.
  
- ☞ Donate unneeded but still edible food to a local food bank or homeless shelter.

### *Good Samaritan Food Donation Act*

Recent legislation provides uniform national protection to citizens, businesses, and nonprofit organizations that in good faith donate, recover, and distribute excess food.

The Bill Emerson Good Samaritan Food Donation Act became law in October 1996. The act encourages the donation of food and grocery products to nonprofit organizations such as homeless shelters, soup kitchens, and churches for distribution to needy individuals.

The act states that, absent gross negligence or intentional misconduct, donors shall not be subject to civil or criminal liability arising from the nature, age, packaging, or condition of apparently wholesome food. It also establishes uniform definitions pertaining to the donation and distribution of nutritious foods and helps ensure that donated foods meet all quality and labeling standards of federal, state, and local laws and regulations.

Although the Bill Emerson Good Samaritan Food Donation Act takes precedence over the various state “Good Samaritan” statutes, it may not entirely replace them. The act creates a uniform minimum level of liability for donors nationwide. But state statutes may still provide protection beyond that guaranteed in the federal statute.<sup>81</sup>

## Plate Waste

The reasons for plate waste range from poor food quality and insufficient time for meals to wasteful habits and bad judgment in selecting food. Education and good communication can reduce the amount of food that is taken but not eaten, at least in the short term.<sup>82</sup>

- ☞ Start a “think before you eat” campaign to reduce food waste and the use of single-use items such as napkins and condiment packages.
- ☞ Evaluate portion sizes and consider offering half- or smaller portions. This may require buying uncut foods (including meat and produce) rather than foods that are already cut to size and ready to use.<sup>83</sup>
- ☞ Switch to smaller plates.
- ☞ Use a food grinder or food pulper system to reduce the volume of waste for disposal. A local pig farmer may be willing to take the pulped food to use as animal feed, though some states and municipalities do not allow the feeding of food scraps to swine. Check with your state and local health departments or the local cooperative extension office.
- ☞ Use compost made from kitchen and food waste for landscape maintenance. Consider worm bins for indoor composting; properly managed, these are convenient and odor-free.

### **Just All You Can Eat**

- *Columbia University’s John Jay Dining Hall serves five lunches, seven dinners, and two weekend brunches every week. Lunch is à la carte and is served to 200 to 300 people a day, while 600 people a day take the “all you can eat” dinners. In 1994, the university conducted an analysis of the facility’s food waste and found that almost a pound of waste was generated per customer at the all-you-can-eat meals (for a total of 520 pounds per meal), compared to only a quarter of a pound per customer at the à la carte meals (for a total of 63 pounds). Clearly, the à la carte system was encouraging customers to take what they intended to eat, and no more. The university began promoting waste prevention through the use of table tents and a poster bearing a photo of discarded food and the announcement, “It’s All You Can Eat, Not All You Can Throw Away.”<sup>84</sup>*

## Food-Related Waste

\$\$ Replacing single-use serviceware with washable plates, utensils, glasses, and cups is the single most effective way to reduce food service waste. This strategy will also reduce the costs of purchasing and disposing of single-use items, but it will bring added costs in the labor and equipment needed for washing and handling.

☞ If a complete switch to washables seems overwhelming, try targeting only one item at a time, such as silverware. Run a trial and, if successful, include other items.

☞ Use energy-efficient dishwashing equipment and nontoxic detergents.

☞ Restrict the use of single-use serviceware to take-out orders.

☞ Use washable items for both take-out orders and orders that stay. Charge a deposit to ensure their return.

☞ Move single-use items away from washable ones. Arrange it so customers have to ask to get single-use items, or put them someplace out of the way.

### **Cups, Saucers, Savings**

- *The employee cafeteria at NYNEX, a New York City-based communications company (now Bell Atlantic), serves 700 people daily. Switching to washable serviceware saved \$6000 annually in purchasing costs and reduced the volume of waste for disposal by 45 percent.<sup>85</sup>*

### **Have a Mug, Hold the Clamshell**

- *When Home Box Office, a New York City entertainment company with over 800 employees, decided to eliminate single-use serviceware for food eaten in the cafeteria, it began by offering china mugs (rather than cups) to better compete with polystyrene. Clamshell containers were removed from the salad bar and made available for take-out orders only upon request. To encourage employees to take washable serviceware back to their desks, HBO purchased lighter (glass-tempered) dishes, which also facilitated collection by custodial staff.*
- *As a result of these measures, employees began taking three times as many washable dishes back to their desks. After a nine-week payback period, HBO's savings from avoided purchasing reached \$1,300 a month.<sup>86</sup>*

- ☞ Encourage employees to keep washable mugs, cups, plates, and silverware at their desks instead of taking single-use items.
- ☞ Replace single-use cafeteria trays with washable ones.
- ☞ When washable serviceware is not available, ask take-out customers if they need single-use items rather than automatically providing them.
- ☞ Eliminate the need for serviceware in catered events by serving sandwiches, fruit, cookies, and other finger foods.
- ☞ When catered events require serviceware, encourage the use of washable items by asking caterers to remove price incentives that favor single-use items.
- ☞ Give employees a beverage discount when they use their own cups. Consider providing free company mugs with no-spill lids and eliminating single-use cups entirely.
- ☞ Encourage employees to bring lunch to work in washable containers.

### Tray Bien

- *Replacing single-use cafeteria trays with washable plastic trays saves Bell Communications Research (Bellcore) \$55,000 annually. The 5200-employee communications research firm in Piscataway, New Jersey, used to spend about \$50,000 per year on single-use lunch trays and another \$5,000 to dispose of them. Part of a companywide environmental policy, the washable trays avoid the generation of an estimated 5 tons of solid waste per year.<sup>87</sup>*
- *At Columbia University in New York City, replacing single-use with washable trays in one cafeteria has saved \$6,000 per year in purchasing costs.<sup>88</sup>*

### May Your Cup Runneth Over and Over

- *The Itasca Medical Center in Grand Rapids, Minnesota, eliminated the use of single-use polystyrene cups by providing washable mugs to its 200 employees (who are responsible for washing them). The mugs cost a total of \$270, but washable cups rarely need replacing — an annual savings in purchasing costs of 58 percent, or about \$94 per year, not including disposal costs.<sup>89</sup>*

- ☞ Eliminate the use of lids on single-use cups for those eating in.
- ☞ Provide condiments, paper napkins, and straws only on request for take-out orders, instead of offering them self-serve.
- ☞ Provide straws for beverages served in bottles or cans only.
- ☞ Use bulk dispensers instead of individually wrapped straws.

- ☞ Provide napkins in dispensers on cafeteria tables instead of at the beginning of food service lines. When piles of paper napkins are set out for the taking, they often become a large part of a business's waste stream.

- ☞ Use washable cloth napkins, tablecloths, and placemats. Used table linens can be made into aprons for kitchen staff or reused as cleaning rags when worn out.

- ☞ Buy smaller and thinner napkins.

- ☞ Discourage employees from taking bags, napkins, and packets of condiments back to the office along with their orders.

### **Shrinking Napkins**



*Florida's Walt Disney World resort reduced the size of the paper napkins supplied in dispensers by 25 percent, decreasing waste by 263,085 pounds annually. The resort was able to keep the original dispensers by folding the napkins in a different way.<sup>90</sup>*



### **Napkin Gluttons**



*A study at two University of Michigan dining rooms showed that in the one where customers took napkins from dispensers at the beginning of the cafeteria line, an average of 3.3 napkins were used at every meal. In the dining room where napkin dispensers were placed on tables, each person used an average of 1.4 napkins per meal.<sup>91</sup>*



## Packaging Waste

Packaging is typically the largest category of waste after food in food service operations.

- ☞ Find out from food distributors if products are available with less packaging. Inspect all deliveries to identify packaging that could be eliminated or reduced and work with vendors to get the desired change. If necessary, issue new purchasing specifications requiring reduced packaging.
- ☞ Request that vendors use reusable shipping containers for items like bread and rolls, and avoid buying fruits, vegetables, and meats packaged in nonrecyclable waxed corrugated boxes.
- ☞ Ask food distributors to take back packaging for reuse or recycling.
- ☞ Ask caterers to reduce or take back delivery and presentation packaging.
- ☞ Purchase foods such as flour and grains in bulk to reduce the volume of packaging waste. Then dispense them into refillable containers.
- ☞ Replace individual milk cartons with a bulk milk dispenser. Refill it with milk delivered in 5-gallon bags on reusable plastic crates rather than by the gallon. If smaller quantities are unavoidable, 8-ounce milk pouches or recyclable plastic jugs are preferable to waxed cartons, which are typically not recyclable (though some communities do recycle milk cartons).

At James Madison University in Harrisonburg, Virginia, corrugated packaging accounts for approximately 10.4 percent of the waste generated by the school's largest dining hall.<sup>92</sup>

### ***Just a Straw, Please***

○ *Instead of the usual 8-ounce cartons, the cafeteria at the Itasca Medical Center in Grand Rapids, Minnesota, now provides pouches of milk to its customers. This has reduced the custodial labor associated with discarding the more voluminous cartons and brought a cost savings of \$276 a year.<sup>93</sup>*

- ☞ Purchase juice, iced tea, and hot chocolate in bulk or concentrate and serve them from reusable containers.
- ☞ Dispense carbonated drinks from refillable cylinders instead of offering bottles and cans.
- ☞ Offer condiments (cream, sugar, and artificial sweeteners; honey and syrups; jams and jellies; salt and pepper) in health department-approved refillable dispensers rather than individual packets. Keep the dispensers in a central location instead of at individual tables, and refill them with condiments purchased in bulk.
- ☞ Buy coffee beans and grind them on-site instead of using packets of pre-measured coffee.
- ☞ Buy reusable/unbleached coffee filters.
- ☞ Reuse large plastic jugs and other containers for storage and for holding prep items.
- ☞ Reuse wooden fruit boxes. Employees and charitable institutions may be able to use damaged ones for fireplace or wood-stove kindling.

### **Bulk Purchasing**

- *Aramark, Inc., one of the nation's largest food service providers, reduced its purchasing costs by replacing single-serve packages of milk and condiments with dispensers located in common areas of the food court at Cleveland State University.<sup>94</sup>*
- *Purchasing agents at Disney World order certain products in bulk. For instance, tomato paste delivered in 55-gallon drums has eliminated the use of 86,000 cans, and mustard packaged in 48- instead of 24-ounce jars has reduced discards of corrugated boxes by 6000 pounds.<sup>95</sup>*

## Kitchen Maintenance Waste

- ☞ Use cleaning chemicals without toxic ingredients wherever possible.
- ☞ Purchase cleaning products in bulk and concentrate form. Provide dilution machines to ensure that the correct amount of water is added.
- ☞ Reduce spills and waste by purchasing dry, concentrated dishwasher chemicals and keeping them in dispensers.
- ☞ Instead of steel wool, use spun-glass pads – soaped or unsoaped – for scrubbing pots and pans. These last longer than steel pads and don't rust.
- ☞ Use washable rags instead of paper towels.
- ☞ Use cloth-roll towels or hot-air dryers instead of paper towels.
- ☞ Use unbleached paper towels with recycled content.
- ☞ Use large-roll paper towels or smaller or lighter-weight paper towels.
- ☞ Replace single-use paper hats and aprons with washable ones.
- ☞ When dining facilities are remodeled, redye tablecloths and napkins to match the new color scheme instead of replacing them.
- ☞ Install a magnet on garbage containers to recover silverware accidentally thrown away with food waste.
- ☞ Reduce the need for pesticides by storing food in airtight containers and removing garbage from the premises at closing time.
- ☞ Hold periodic staff training sessions on correct equipment use and maintenance.
- ☞ Purchase new refrigerators and freezers that are CFC-free and dispose of used refrigeration appliances with dealers who recycle CFCs. For more information on chlorofluorocarbons and other ozone-depleting substances, see the US EPA's ozone depletion Web page at [www.epa.gov/docs/ozone/index.html](http://www.epa.gov/docs/ozone/index.html), or Ozone Action's site at [www.ozone.org](http://www.ozone.org).

## 4. FACILITIES

### BUILDING MAINTENANCE

#### Equipment

Keeping products in working order is vital to waste prevention. The longer a product lasts, the fewer times it needs to be replaced. Both inadequate maintenance and neglect will shorten a product's life, hastening its entry into the waste stream.

- ☞ Make sure employees operate and maintain all equipment according to the manufacturer's recommendations. Improper use and overuse can quickly lead to product breakdown and a trip to the landfill. Promote awareness and understanding by documenting operating instructions, potential product hazards, and maintenance procedures and responsibilities in a manual or set of guidelines.
- ☞ Extend the life of equipment by developing a preventive maintenance program. It may be more cost-effective to hire a maintenance contractor; this will avoid the costs of training employees in preventive maintenance and buying special equipment and learning how to use it.

#### *Preventive Maintenance and Timely Repairs*

Preventive maintenance involves regularly inspecting and cleaning equipment — lubricating, testing, and replacing broken or worn parts. Its benefits are longer equipment life, fewer breakdowns, and less waste from rejects such as poor photocopies.

Like proper maintenance, repair keeps products from entering the waste stream prematurely. Often, repair simply means reattaching a part or replacing a switch. Nonetheless, companies sometimes discard equipment when a handle or knob breaks or disappears, even though replacement parts are available for most brand-name items from the manufacturer, an authorized service center, or a private repair shop. Most experts agree that repair is appropriate when the cost is 50 percent or less than the cost of replacement.<sup>96</sup> Repairs also tend to be less expensive when dealt with sooner rather than later.

- ☞ Use durable materials for repairs.
- ☞ Purchase reusable air conditioner filters or reusable metal frames. Air conditioner filters must be changed or cleaned regularly to save energy and extend equipment life. Reusable air filters require cleaning with hot water (no soap); reusable frames have a disposable filter insert. Some businesses find it cost-effective to hire a firm to replace filter inserts on a regular schedule.
- ☞ Send old air conditioner cooling compressors back to the vendor to be refurbished and resold.
- ☞ Use rechargeable batteries in radios, walkie-talkies, portable power tools, flashlights, and other products.
- ☞ Purchase equipment powered by solar cells (photovoltaics) or fuel cells when these are available and cost-effective over the product's expected lifetime.

### **Reusable Air Conditioner Filters**

- *In Minnesota's Itasca County, 16 garages belonging to the Road and Bridge Department use reusable air filters instead of disposable ones. The aluminum filters are changed about once a week and cleaned using high-pressure water equipment. With proper care, they may last for as long as the 16 buildings in which they are used.*
- *In the past, the garages landfilled approximately 3120 single-use air filters each year. The new filters have saved the department \$4,470 annually, before avoided disposal costs. And their purchase price of \$1,270 (two for each of 60 slots — one is in service while the other is being cleaned) was paid back in 3.1 months.<sup>97</sup>*

### **A Few Words on Rechargeable Batteries**

There are two basic types of consumer (nonautomotive) batteries — primary and rechargeable. Most are alkaline batteries that must be replaced once discharged. Rechargeable batteries can be used repeatedly because the chemical reaction that creates the energy can be reversed, thereby recharging the battery. Rechargeables may initially be more expensive than primary batteries, and require the purchase of a recharger, but each rechargeable may substitute for hundreds of primary batteries and cost less than the batteries it replaces over its lifetime.

Rechargeable alkaline batteries can be recharged at least 25 times and hold their charge for up to five years. Nickel-cadmiums (Ni-Cds) can be recharged hundreds of times and last from five to seven years depending on usage. Other types of rechargeable batteries in use today are lithium-ion, nickel-metal hydride, and zinc-carbon batteries. Ni-Cds are typically used to power cordless and cellular phones and camcorders, and they dominate the market for electric appliances such as “dust busters” and high-power-drain applications such as power tools.<sup>98</sup> Lithium-ion and nickel-metal hydrides are also becoming common in cell phones, as well as in consumer electronics such as laptop computers.

- ☞ Collect used alkaline and worn-out rechargeable batteries at a central collection point and dispose of them according to local requirements. Many municipalities have special rules for disposing of batteries, and some locales have battery collection and recycling programs, especially for Ni-Cds.

### *Recycling Rechargeables*

According to the US Environmental Protection Agency, the toxic heavy metals (such as cadmium) found in rechargeable batteries pose no real risks while the battery is in use. But they can be of concern when discarded along with ordinary waste. In landfills, heavy metals can leach slowly into soil, groundwater, and surface water. When incinerated, cadmium can enter the atmosphere through smokestack emissions. Cadmium is toxic to fish and wildlife and can pass to humans through the food chain. It has been associated with numerous human illnesses, particularly lung and kidney damage.

In 1995, the battery industry established the nonprofit Rechargeable Battery Recycling Corporation (**RBRC**) to administer the collection and recycling of rechargeable Ni-Cd batteries. RBRC has set up four separate collection systems for the different generators of used Ni-Cds: retailers, communities, businesses and public agencies, and the federal government. Businesses can take advantage of the program by collecting their used batteries and shipping them to any of three RBRC consolidation points around the country. RBRC is also investigating the possibility of including other types of rechargeable batteries, such as nickel-metal hydrides, in the program.<sup>99</sup> For more information (including a list of collection sites throughout the US), contact the RBRC at (800) 822-8837, or find them on the Web at [www.rbrc.org](http://www.rbrc.org).

## **Paint**

Paints are among the most common sources of exposure to toxic materials in the workplace. More than 300 toxic chemicals have been identified in solvent-based paints, chemicals that may linger in the atmosphere for months after the paint is applied.<sup>100</sup>

Among the toxic constituents of paints are solvents and heavy metals. Exposure to solvents such as toluene, naphthalene, and phthalates can have effects ranging from dizziness and headaches to permanent damage to the liver, bone marrow, or nervous system. A number of solvents that are used in paints are either known or strongly suspected to cause cancer in human beings. Heavy metals such as cadmium are known to be toxic to the nervous system, especially in children.<sup>101</sup> In addition to posing human health risks, most paints contain volatile organic compounds (VOCs) that can cause environmental damage, including smog and depletion of the stratospheric ozone layer.

- ☞ Use water- instead of solvent-based paints to minimize toxic emissions and allow cleanup with water. Water-soluble latex paints typically contain fewer VOCs and generate less odor. Using water-based paints will also eliminate the need to use paint thinners, which contain additional toxic chemicals (see the box on less toxic paints, page 72).
- ☞ Avoid paints with toxic pigments such as cobalt and cadmium.
- ☞ Choose paints that meet your needs. One that can't do the job may also be harmful to the environment, especially if additional paint or repainting is required, resulting in increased emissions and waste.
- ☞ Buy "recycled" paint, made from a variety of paints that have been collected and remixed. The post-consumer content in recycled paint varies widely, from 15 to 100 percent. Virgin constituents are sometimes added to enhance performance.
- ☞ Buy only the amount of paint needed for a particular project, and store only a minimal amount for touch-up jobs.
- ☞ Use excess paint for renovation projects and graffiti removal. Some stores will take back partially used cans of paint from customers or will donate unused paint to local non-profit organizations such as animal shelters.
- ☞ Reuse paintbrushes and rollers.
- ☞ Consolidate partially used cans of paint before storing them.
- ☞ Avoid pouring unused paint and paint thinner into drains, which can cause problems in sewage systems and pollute groundwater.
- ☞ Make sure paint containers are empty before disposal. Tools and containers contaminated by toxic metals may have to be managed as hazardous waste.

In 1994, 1.2 billion gallons of paint were manufactured in the US. That translates into 3 million gallons every day, or enough to provide each person in the country with more than 4 gallons of paint a year. Architectural coatings — interior and exterior paints, primers, and stains — accounted for slightly more than half of this volume. The rest included specialty and industrial coatings, such as those used on aircraft and autos and in bridge maintenance.<sup>102</sup>

## JANITORIAL SERVICES

### Cleaning Chemicals

Commercial cleaning products – disinfectants, degreasers, drain openers, polishes and waxes, window cleaners, caustic cleaners, and toilet cleaners, among many others – are among the most common sources of employee exposure to toxic chemicals. Yet very little testing has been done on how their use, especially in combination, affects human health, and even less on how these products affect the environment.

- ☞ Use cleaning chemicals that contain no toxic, corrosive, or flammable ingredients. Such products are likely not to require any special precautions.
- ☞ Order only the amount that can be used before the product expires.
- ☞ Use the smallest amount possible to get the job done. For instance, if wiping equipment with a rag is sufficient, do not douse it with a hose.
- ☞ Use concentrated cleaning solutions that can be mixed as needed, and educate staff on the proper mixing of concentrates to avoid waste and save money.
- ☞ Use measuring cups or mixing machines to ensure that the proper proportions are used.
- ☞ Pour cleaning chemicals from larger containers into smaller reusable containers. Some suppliers offer chemicals in refillable 55-gallon drums.
- ☞ Use refillable pump-spray bottles instead of single-use aerosol cans.
- ☞ Buy products in bulk, since one large container uses less packaging per ounce than several smaller containers.

#### *Buying Less Toxic Cleaning Chemicals*

Green Seal, an environmental products testing organization, suggests using the following criteria as a guide in selecting less toxic cleaning products.<sup>103</sup>

- Phosphate and phosphonate concentrations of less than 0.5% of product weight
- VOC concentrations of less than 10% of product weight
- Labels that do not list any of the following ingredients:
  - Arsenic, cadmium, chromium, lead, mercury, nickel, and selenium
  - Those listed in the latest edition of the *Annual Report on Carcinogens* (US Department of Health and Human Services, National Toxicology Program)
  - Those known to carry reproductive risks (as listed by the State of California, 22 CCR Div. 2, Ch. 3, Section 12000 et seq)

Ask your vendor or the product manufacturer for information on specific products, or see Green Seal's Web page at [www.greenseal.org](http://www.greenseal.org).

- ☞ Review handling, storage, and disposal procedures with staff.
- ☞ Post material safety data sheets (MSDS) in a conspicuous location.
- ☞ Store unused chemicals in a cool, dry, and well-ventilated place.
- ☞ Use a containment pan at all times to prevent the leaching of unused chemicals.
- ☞ Check buckets, cans, drums, and other chemical containers periodically and replace leaky ones as needed.
- ☞ Dispose of chemicals according to label instructions.

## Other Janitorial Supplies

- ☞ Include information about waste prevention in housekeeper training sessions.
- ☞ Use washable rags, shop towels, mop heads, and scrubbing pads instead of single-use products. Hire a linen or cleaning service if volume is large or your business does not have washing equipment on premises.
- ☞ Avoid buying individually wrapped sponges.
- ☞ Eliminate liners from garbage cans not used for food or liquid waste, and replace liners in office trash cans only when they are soiled.

### **Rags to Riches**

○ *In switching from disposable to reusable rags in its printing services department, Columbia University saved \$86.50 a week in purchasing and disposal costs. The department's 175-rag weekly load is picked up and cleaned by a linen service for \$38, generating over \$2,500 in savings annually.<sup>104</sup>*

- ☞ Use cloth-roll towel dispensers in bathrooms or purchase hot-air dryers. If paper towels must be used, buy unbleached towels with recycled content, large-roll towels, or smaller, lighter-weight towels.
- ☞ Use large-size rolls of toilet paper.
- ☞ Donate rolls of toilet paper that are removed before they're completely empty to charity.
- ☞ Provide liquid soap in dispensers instead of "soft soap" in pump bottles.
- ☞ Use reusable vacuum cleaner bags.
- ☞ Reduce the need for pesticides by removing food containers, garbage, and recycling containers frequently; clean employee break rooms daily; and report cracks around doors and windows to the building maintenance department.

### **Tale of Two Towels**

- *Switching from paper to cloth-roll towels has saved the Itasca County courthouse (in Minnesota) almost \$1,000 (not including avoided disposal costs) and kept 1100 pounds of paper out of the waste stream each year. The 25 cloth rolls used each week are washed and reused more than 100 times. When worn out they are turned into rags.<sup>105</sup>*

- *On the other hand, a New York State bank explored the possibility of replacing paper towels with reusable cloth towel rolls and reached a different conclusion. Although the cloth toweling system uses no plastic disposal bags and generates no waste, its cost is almost twice that of the paper towels currently in use (\$615 compared to \$336 per year).<sup>106</sup>*

## **VEHICLE MAINTENANCE**

Apart from jettisoned cars and trucks, the waste associated with a company's vehicles consists primarily of discarded tires and the lubricating oils and other fluids used in maintenance.

- ☞ Implement a strict vehicle maintenance schedule.
- ☞ Hold employees accountable for reckless and careless use of vehicles.
- ☞ Use high-mileage tires and keep them inflated to the proper air pressure to extend their useful life.

### **Check the Pressure**

- *To increase tire life, the Itasca County (Minnesota) Road and Bridge Department applies a sticker to all trucks reminding drivers to check the air pressure.<sup>107</sup>*

- ☞ Retread the tires on trucks and passenger vehicles instead of purchasing new ones. Retreads not only reuse 70 to 80 percent of the used tire, they also typically cost about half as much as new tires. For more information, contact the Tire Retread Information Bureau at (888) 473-8732, or see their Web site at [www.retread.org](http://www.retread.org).
- ☞ Check the oil in vehicles in keeping with the manufacturer's recommendations.
- ☞ Consider using motor oils that have been cleaned, or "re-refined." Since lubricating oil gets dirty but never wears out, there is no disadvantage to using re-refined products. Buy oils with a minimum of 25 percent recycled content, or the highest available amount.
- ☞ Look for lubricating oils that contain vegetable oil. Made from renewable sources, these replace their petroleum-based counterparts.
- ☞ Use an oil filter crusher to reduce the volume of filter waste for disposal. This permits collection of more of the remaining oil for re-refining.

### *Re-Refined Oil: How Good Can It Be?*

According to *Resourceful Purchasing*, an Alameda County (California) publication, the following lubricants can be made with re-refined oil base stock:

- Automotive oils: automotive engine lubricating oil, transmission fluid, hydraulic fluid, and gear oil
- Industrial oils: hydraulic fluid, turbine oil, bearing oil, gear oil, process oil, marine oil, metalworking oil (for removing, forming, testing, and protecting), compressor oil, refrigeration oil, railroad diesel oil, natural gas engine oil, aviation oil, and grease

In preparing lubricating oils to meet specifications, manufacturers use re-refined base stock exactly as they use virgin base stock, with the same additive packages. Some common lubricating oils contain re-refined oil, although it may not be identified on the label.

For many years, users avoided re-refined lubricating oils out of concern that their warranties would not be honored by vehicle manufacturers. The issue was put to rest in 1993 and 1994, when the US Environmental Protection Agency obtained statements from the Big Three automakers acknowledging that re-refined oil could meet their vehicles' specifications.

Recent improvements in re-refining technology have resulted in re-refined oils that equal their virgin counterparts in quality. These meet the most frequently cited specifications for lubricating oils — those of the American Petroleum Institute (API) and the US military. To acquire API approval, engine oils must be licensed, meaning they have passed the same tests — for pumpability, cold start, rust and corrosion, engine wear, phosphorus content, and high-temperature thickening — as virgin oils.<sup>108</sup>

The US EPA has established standards for the federal government's use of re-refined vehicular engine oils, hydraulic fluid, and gear oils with at least 25 percent recycled content. See [www.epa.gov/cpg/products/lubricat.htm](http://www.epa.gov/cpg/products/lubricat.htm) for a list of manufacturers and suppliers of products approved by the American Petroleum Institute.

\$\$ Purchase used or remanufactured vehicle parts such as starters and alternators. See the Automotive Recyclers Association's Web site at [www.autorecyc.org](http://www.autorecyc.org) for a directory of its thousands of members worldwide, or call the ARA at (703) 385-1001.

- ☞ Use a garage that recycles used oil and batteries and recovers ozone-depleting CFCs from air conditioning equipment.
- ☞ Try to use vehicular lubricating products offered in returnable drums.
- ☞ Use propylene glycol antifreeze, which is less toxic than ethylene glycol.
- ☞ Save used antifreeze drained from vehicles during repairs and pour it back later.
- ☞ Do not discharge diluted antifreeze into sewers. Instead, consider purchasing an antifreeze re-refining machine if your business uses large numbers of vehicles.
- ☞ Request reclaimed antifreeze at service stations. This is often less expensive and purer than comparable virgin products. For a list of manufacturers of recycled antifreeze and engine coolant reclamation equipment, see the US EPA's Web page at [www.epa.gov/cpg/products/engine.htm](http://www.epa.gov/cpg/products/engine.htm).

## LANDSCAPE MAINTENANCE

The landscaping of business grounds can produce significant waste from lawn clippings and from tree, shrub, and plant trimmings. Preventing waste in landscaping means reducing the generation of this organic matter and using as much of it as possible on the property.

### Plantings and Design

- ☞ Reduce clippings by keeping areas planted with grass to a minimum.
- ☞ Where grass is planted, choose varieties that require less mowing and watering.
- ☞ Plant perennial ground covers, shrubs, and bushes instead of grass to minimize mowing and watering.
- ☞ Avoid the extra costs and waste of planting annuals (plants that don't survive the winter in colder climates) by choosing perennials (plants that are dormant over the winter and rebloom the following spring or summer) instead.

- ☞ Choose trees, bushes, shrubs, and other plants that require minimal pruning. Some trees and shrubs – especially those that are slow growing or drought tolerant – need little or no pruning and produce less waste.
- ☞ Eliminate the need to water plants through “xeriscaping” – the use of native plant species that can live on naturally occurring rainfall.
- ☞ Use rocks and fallen tree limbs from the property in plant displays; use rocks, old bricks, and broken concrete as edging materials.

## Upkeep of Grounds

- ☞ Use the “one-third rule” when mowing lawns: mow often enough that no more than a third of the length of the grass needs to be cut at any one time. This will produce short clippings that decompose quickly and do not cover up the remaining grass.
- ☞ Mow when the grass is dry and keep mower blades sharp.
- ☞ Let grass clippings fall to the ground by removing the mower’s collection bag; they will decompose quickly and release valuable nutrients into the soil.
- ☞ Use a mulching mower. This cuts the grass into small pieces and pushes them into the ground, allowing clippings and leaves left on the lawn to decompose more readily.

### *How Tall Should the Grass Be?*

The following are the proper mowing heights for various types of grass according to the California Integrated Waste Management Board:<sup>109</sup>

Grass Type	Mower Setting	Mow when Grass Reaches this Height
Bent grass	$\frac{1}{2}$ - 1 in	$\frac{3}{4}$ - $1\frac{1}{2}$ in
Bermuda grass (common)	1 - $1\frac{1}{2}$ in	$1\frac{1}{2}$ - $2\frac{1}{4}$ in
Bermuda grass (hybrid)	$\frac{1}{2}$ - 1 in	$\frac{3}{4}$ - $1\frac{1}{2}$ in
Kentucky Bluegrass	$1\frac{1}{2}$ - $2\frac{1}{2}$ in	$2\frac{1}{4}$ - $3\frac{3}{4}$ in
Kikuyugrass	1 - $1\frac{1}{2}$ in	$1\frac{1}{2}$ - $2\frac{1}{4}$ in
Perennial Ryegrass	$1\frac{1}{2}$ - $2\frac{1}{2}$ in	$2\frac{1}{4}$ - $3\frac{3}{4}$ in
Tall Fescue	$1\frac{1}{2}$ - 3 in	$2\frac{1}{4}$ - $4\frac{1}{2}$ in
Saint augustine grass	1 - 2 in	$1\frac{1}{2}$ - 3 in
Zoysia	$\frac{1}{2}$ - $1\frac{1}{2}$ in	$\frac{3}{4}$ - $2\frac{1}{4}$ in

- ☞ Make mulch out of grass and leaves.
  
- ☞ After pruning trees and shrubs, chop the smaller pieces of wood into chips and use them as mulch.
  
- ☞ If any trees need to be cut down, rent a wood chipping machine and use the chips as mulch.
  
- ☞ Make compost out of grass clippings, leaves, and trimmings from trees, shrubs, and plants.
  
- ☞ If on-site composting is not an option, send leaves; grass clippings not left on the lawn; and trimmings from trees, shrubs, and other plants to a local composting facility.
  
- ☞ Minimize the use of toxic pesticides, herbicides, and fertilizers. Besides reducing environmental harm, this will save money by eliminating the need to dispose of biocide containers, some of which have to be managed as hazardous waste.
  
- ☞ Control pests through minimal applications of organic pesticide in combination with integrated pest management (IPM) methods. These include pest identification, baits, training, and the promotion of practices that discourage the conditions favored by pests.

### *What Is Mulch?*

Mulch can be made from a variety of materials — wood chips, compost, shredded paper, or pine boughs. Placed on top of the soil, it reduces water evaporation and soil erosion, inhibits weed growth, and protects plants from extreme temperatures.

### *What Is Compost?*

Compost is a soil conditioner and fertilizer that looks and feels like dark, crumbly soil. It is made from recycled organic matter such as plant trimmings, grass clippings, and food scraps. Compost enhances the soil's structure and texture and improves aeration. It loosens clay soils to improve drainage and helps sandy soils retain water. Adding compost to the soil promotes fertility, helps control erosion, and stimulates healthy root development in plants. It also provides slow-release nutrients that feed plants on a constant basis; in contrast, many synthetic fertilizers cause spurts of growth, which can increase the need for pruning, trimming, and mowing.<sup>110</sup>

## REMODELING AND RENOVATION

Many of the materials and products involved in remodeling and renovation offer opportunities for waste prevention, both in the design stage and while work is being done.

### Architecture and Design

- ☞ Call for designs that use standard-size materials. This will eliminate construction waste in everything from precut studs and joints to sheet rock and insulation panels to floor tiles. When production is done at a factory, waste is generally reused; on construction projects, cutoffs and other waste are typically discarded.
- ☞ Require designs that are adaptable to future needs. Wall systems with wiring inside the panels and accessible walls and floors that accommodate large amounts of cabling can meet the growing power needs of desktop hardware and substantially reduce waste.
- ☞ Use modular wall panel systems to create open-space office areas. These can be reconfigured and reused as needed, preventing future renovation waste caused by torn-down walls and damaged floors and ceilings. Although these systems are initially more expensive than fixed walls made of sheet rock, they can bring significant cost savings in the long run. For instance, while wallboard needs repainting every three to five years, wall panels last approximately 12 years before refinishing/reupholstering is required. Damaged sections can also be easily replaced.<sup>111</sup>
- ☞ Buy refurbished modular wall systems, which are less expensive than new.

#### Flexible Walls

○ *At Bank of America in San Francisco, movable walls save 70 percent in avoided renovation, demolition, and disposal costs every time offices are reconfigured.*

○ *In Washington, DC, National Resources Defense Council (NRDC) is using an unusual alternative to gypsum wallboard: wall panels made out of straw. Although not part of a movable wall system, the panels can be unbolted for reuse. They also can be easily composted.<sup>112</sup>*

- ☞ Use solid wood in shelving, book cases, and other furniture instead of formaldehyde-emitting particle board.
- ☞ Require contractors to use structural fiberboard with 80 to 100 percent post-consumer recycled content. Two such products are Homasote (call 800-257-9491) and Celotex (call 800-556-4215).
- ☞ Call for designs that encourage waste prevention and recycling by the facility's users. Recycling chutes or storage areas for materials awaiting reuse and recycling can be incorporated into the plans. Food service areas can be redesigned to accommodate dishwashers, facilitating changeover to reusable serviceware.
- ☞ Incorporate previously used/salvaged materials into designs to reduce waste generation and the need for new materials. Ask contractors and subcontractors (such as electricians and plumbers) for suggestions on reuse opportunities.

### **Second-hand Hall**

- *California Gas Company chose a preexisting building in Downey, California, to house its new Energy Resource Center, a meeting space and exhibit hall that showcases the latest innovations in energy conservation. About 60 percent of the original building's materials were either left in place or removed for storage and subsequent reinstallation. Using the old building permitted reuse of the existing air conditioning system, electrical conduits and fittings (amounting to approximately one ton of avoided waste), and uninterruptible power system (for a savings of \$20,000). In addition, 5 to 10 percent of the original ceiling tiles were cleaned, stripped, and reinstalled in the center's new lobby. The design also incorporated reprocessed wood from a Banana Republic store and a steel stairway from a Warner Brothers movie set — materials that would otherwise have ended up in the landfill.<sup>113</sup>*

### **Leasing the Comfort of Carpeting**

- *Interface, Inc., a commercial floor covering company, is pioneering an innovative program in collaboration with fiber producers. Their new product line — "comfort" — allows customers to lease their carpeting or floor tile and replace parts of it as they wear out. The old covering (its "comfort" depleted) is then refurbished by Interface and reintroduced to the marketplace. The arrangement prevents waste in three ways: only worn sections of floor covering are replaced, the old material is reused, and Interface — as the owner of the carpeting — has an added incentive to provide a durable product.<sup>114</sup> For more information, contact Interface at (770) 437-6800.*
- *The textile firm Milliken & Co. offers customers the option of having their old carpet tiles pressure-cleaned, retextured, redyed, and returned for reuse. For information on the company's Earth Square Process, call (800) 241-4826, ext. 3221, or go to [www.milliken.com/environment/reuse2.html](http://www.milliken.com/environment/reuse2.html).*

- ☞ Use durable linoleum flooring made from natural substances and eliminate the toxic components of vinyl flooring.
- ☞ Instead of buying, consider leasing items such as carpet.
- ☞ When carpet leasing is not an option, require the installer to take back and recycle carpeting at the end of its useful life.
- ☞ Look for carpets with recycled content, vegetable or solution dyes, and low-VOC adhesives. Or use carpet tacks instead of toxic floor-covering adhesives.
- ☞ Use energy-efficient lighting systems (such as up-down pendant fluorescent lights, which are open at the top and bottom) to maximize brightness, reduce glare, and reduce electricity and light bulb use.
- ☞ Document and retain architectural plans to facilitate future disassembly and reuse of products and materials.

### *Carpet Recycling Programs*

Discarded carpet — between 3.5 and 4 billion pounds a year — makes up 2 percent of this country's municipal solid waste stream by volume.<sup>115</sup> Several companies in the carpeting industry have developed programs to collect and recycle old carpets into new carpets and carpet backing, as well as into auto products, sound insulation material, and other products.

- AlliedSignal, Inc., and DSM have initiated a joint venture called Evergreen Nylon Recycling, LLC. For more information, call (877) N6-CYCLE; go to their Web site at [www.n6recycling.com](http://www.n6recycling.com); or write AlliedSignal at PO Box 31, Petersburg, VA 23804, attn: Carpet Recycling.
- BASF will take back some of its own nylon carpets through its 6ix Again Recycling Program. Call (800) 839-3233 or see [www.basf.com/commitment/ecology/econews/QandA.html](http://www.basf.com/commitment/ecology/econews/QandA.html).
- Collins & Aikman describes the purpose of its carpet recycling program as “mining buildings for resources instead of mining the earth.” Call (800) 527-7749 or go to [www.powerbond.com/environmental/index.html](http://www.powerbond.com/environmental/index.html).
- DuPont's Carpet Reclamation Program will accept any nylon carpet for recycling. See their Web site at [www.dupont.com/dfs/dfs/environmental/reclamation.html](http://www.dupont.com/dfs/dfs/environmental/reclamation.html), or request information by phone at (800) 441-7515 or by e-mail at [info@dupont.com](mailto:info@dupont.com).
- Solutia has launched a carpet recycling program called Partners for Renewal. For more information, call (800) 543-5377, ext. 641, or go to [www.solutia.com/digexweb/ultronvip/env/env2.htm](http://www.solutia.com/digexweb/ultronvip/env/env2.htm).

## Construction and Other Materials

- ☞ Require the use of durable materials and components. Accepting the lowest bid based on “first costs” only can lead to the purchase of lower-quality, less durable materials. In the long term, an accounting system that looks at costs over the entire lifetime of a product is likely to yield the greatest environmental and economic benefits.
- ☞ Review estimating procedures to ensure that only the amount needed is specified, and make sure orders are consistent with room dimensions. Wallboard, for instance, is available in a variety of sizes, and in large quantities can be ordered to suit custom designs.<sup>116</sup>
- ☞ Centralize cutting operations to reduce wood waste and promote reuse. This encourages workers to use cutoffs whenever possible, rather than fresh pieces of full-sized lumber.
- ☞ Use nontoxic, water-based paints, sealants, and other coatings.
- ☞ Remix leftover paint and reuse it in areas like basements where the color is not so important.

### *What's in Construction Waste?*

Waste generated during remodeling projects varies considerably but is similar to waste found in new construction projects. The following are the dominant waste types in new commercial construction.<sup>117</sup>

<u>Material</u>	<u>% Construction Waste</u>
Wood	20% - 30%
Concrete and concrete blocks	10% - 20%
Drywall	5% - 0%
Cardboard	5% - 10%
Steel	1% - 8%
Brick	1% - 5%
Extruded polystyrene (rigid) insulation; kraft paper packaging; plastic sheeting and bags	3%
Electrical wire	2%
Overspray from fire-proofing products	0% - 5%
Other materials	1% or less

- ☞ Store and handle supplies carefully to prevent loss from breakage, theft, and weather damage. Cover all materials and keep them up off the ground. Cover bags of mortar with plastic bags, and stack bricks and blocks to prevent breakage.
- ☞ Convert damaged and unfinished wood chips into walkway surfacing materials or mulch.
- ☞ Crush unused bricks and use them for landscape cover or driveway bedding.
- ☞ Convert unworn sections of old carpet into mats for hallways and entryways.
- ☞ Remove equipment carefully to protect its reusability.
- ☞ Require contractors to submit bids that include the cost of removing the waste they generate. This will give them an incentive to keep waste to a minimum.

### **Big Savings From Reuse...**

*Eastman Kodak Co. saved \$1 million in purchasing costs by promoting an internal company materials exchange to recover valuable equipment such as valves and pipes.<sup>118</sup>*

### **...and Kudos as Well**

*About \$20,000 worth of carpeting, lights, ceiling tiles, and cabinets salvaged by State Street Bank & Trust Co. from a demolition job wound up reused in a housing project. The 70,000 pounds of material, which otherwise would have been landfilled, was donated by the Boston bank to United Way.<sup>119</sup>*

*AMOCO Corp.'s Denver office donated used carpeting to Colorado State University, which reused it in one of its dormitories after having it retextured and recolored by the manufacturer. Reused carpeting can cost 50 percent less than new carpeting.<sup>120</sup>*

- ☞ Donate materials such as doors, cabinets, and fixtures to charitable or not-for-profit organizations.
  
- ☞ Donate materials and products suitable for reuse to a materials exchange. Salvaged materials accepted by these programs include bricks, steel, lumber, windows, doors, cabinets, carpeting, some plumbing fixtures, and electrical equipment and fixtures.

Habitat for Humanity, a major builder of housing for the poor around the world, accepts donated materials, but they must be preapproved. In California, the organization runs the Builders Resource Center, a retail store that sells salvaged materials to remodelers and builders working on small projects. Profits go to Habitat for Humanity housing projects.

A list of materials exchanges operating in the United States may be found in *Choose to Reuse*, a comprehensive encyclopedia of reuse by David and Nikki Goldbeck (Ceres Press, Woodstock, NY, 1995).