

Greening Your Products:

Good for the environment, good for your bottom line



Prepared for:

Environmental Protection Agency, Office of Pollution Prevention and Toxics; (202) 260-2736

On behalf of:

- Committee for Purchase From People Who Are Blind or Severely Disabled
- National Industries for the Blind (NIB)
- NISH

Prepared by:

Tellus Institute, Boston, MA; (617) 266-5400

Under Cooperative Agreement Numbers: C X 826825-01-0 & X 821580-01-0

February 2002

Acknowledgments

The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under Cooperative Agreement # C X 826825-01-0 and X 821580-01-0 to Tellus Institute. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

The authors gratefully acknowledge Eun-Sook Goidel, EPA Project Manager, in the Pollution Prevention Division, Office of Pollution Prevention and Toxics, for her continuous and substantive contributions during all phases of this project. We also extend our gratitude to Julie Shannon, Office of Pollution Prevention and Toxics, for her insightful comments on the final document.

This document would not have been possible without the generous donation of time and insights of our “Green Guidance Development Team.” These colleagues include:

- Joan Smith, Committee for Purchase From People Who Are Blind or Severely Disabled, Arlington, VA
- Michael Fuller, National Industries for the Blind, Earth City, MO
- Lou Heacock, NISH, Vienna, VA
- Ned Rupp, National Industries for the Blind, Alexandria, VA
- Jim Ross, National Industries for the Blind, Alexandria, VA
- Blaine Robinson, NISH, Vienna, VA
- Heather Davies, US Department of Interior, Washington, DC
- Derek Davis and Dan Hunt, Industries of the Blind, Inc., Greensboro, NC
- Linda Merrill, Envision, Wichita, KS
- Regis Barber, South Texas Lighthouse for the Blind, Corpus Christi, TX
- Gibson DuTerroil, The Lighthouse of Houston, Houston, TX
- James Bowen, Jr., Louisiana Association for the Blind, Shreveport, LA
- Elizabeth Lasky, The Easter Seal Society of Western Pennsylvania, Pittsburgh, PA
- Bob Jones, Eastern Carolina Vocational Center, Inc., Greenville, NC
- Robert Jones, National Center for Employment of the Disabled, El Paso, TX
- Paul Atkinson, Louise W. Eggleston Center, Inc., Norfolk, VA
- Karen Jury, Peckham Vocational Industries, Inc., Lansing, MI

Information for case studies was provided by:

- Paul Becker, Blind Industries and Services of Maryland, Baltimore, MD
- Vikki White, Signature Works, Hazelhurst, MS
- Barney Macari, Envision, Wichita, KS
- Barry Adamson, Multi-Community Diversified Services Inc., McPherson, KS
- Shelly Taylor, Louisiana Association for the Blind, Shreveport, LA
- Russell Clark, US EPA Office of Pollution Prevention and Toxics

Any remaining errors of fact or interpretation are the sole responsibility of the authors.

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Section 1: Introduction

Many innovative businesses have successfully introduced "green" products in recent years. While many of these products have saved money, they have also reduced impacts on human health and the environment by using recycled or recyclable material (e.g., recycled paper products), reducing their energy usage (e.g., efficient washing machines that use less water and energy) or eliminating the use of toxic chemicals during their manufacture, for example. How do these business owners and product designers go about improving existing products or introducing new green products? What motivates them to do so? In providing insight into these questions, this guidance document aims to encourage you to identify opportunities to green your existing products or introduce new green products to your product line.

This guidance document focuses on opportunities to help your business reduce the impact on the environment, while saving you money. Two approaches for improvement are product improvement and process improvement (Figure 1).

Figure 1 Product and Process Approaches to Greening

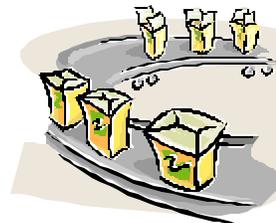
PRODUCT



APPROACH

Develop products that have preferable environmental attributes when compared with similar products (e.g., use recycled materials, are energy efficient, are easily recycled) and market these products as green.

PROCESS



APPROACH

Improve your manufacturing and business operations to reduce your use of energy and materials as well as reduce wastes and emissions associated with the process of making the product.

The goal for these two approaches is to benefit your bottom line, while also benefiting the environment. They aim to improve your profitability in a variety of ways, as shown in the table below.

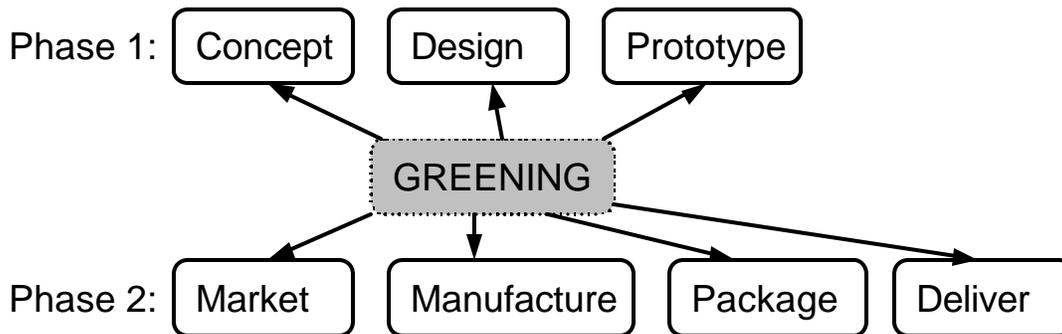
Table 1 Greening is Profitable

	Increasing market share	Attracting green consumers by getting your products included in environmentally preferable purchasing programs.
	Reducing operating costs	Increasing efficiency and reducing waste leads to better profit margins.
	Less tangible benefits	Includes benefits such as increasing employee participation and morale, strengthening the company's image in the community.

It is helpful to consider the product development process (Figure 2) when considering how to incorporate greening concepts. While greening concepts should be incorporated into all product development phases, special consideration should be given to the product's design – studies show that about 70% of a product's environmental impacts are determined by decisions made during the design stage.

Incorporate greening concepts into your product development process.

Figure 2 Incorporate Greening into All Development Phases of a Product



It is important to remember that the concept of “greening” is relatively new, and is therefore still a moving target. Government agencies and businesses alike are struggling to determine the best ways to improve their products to better protect human health and the environment. For example, greener materials not available today may be available tomorrow. Thus, greening is a continuous process, as new information and ideas become available to further improve your products and manufacturing processes. Therefore, identifying greening opportunities should be part of the standard product and process improvement practices of your organization.

Greening is a continuous process!



Is There a Market for Green Products?

Federal agencies have been purchasing green products for quite some time, and are under increasing pressure to buy more of these products. As early as 1976, the Resource Conservation and Recovery Act directed federal agencies to buy recycled-content products. More recently, various Executive Orders as well as the Federal Acquisition Regulation (FAR) have expanded the environmental criteria required in making purchasing decisions (Table 2).

Each year the federal government procures more than **\$200 billion** worth of products and services, giving these mandates the ability to significantly expand the market for green products.

Table 2 Recent Federal Green Procurement Mandates

Executive Order 13101 Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition

This Order requires federal agencies to consider environmental criteria in their purchasing decisions, states a preference for procuring "environmentally preferable" products and services, and directs the U.S. Environmental Protection Agency (EPA) to develop guidance for environmentally preferable purchasing (EPP).

For more information see: <http://www.epa.gov/oppt/epp/pdfs/13101.pdf>



Federal Acquisition Regulations

These are the rules governing how federal agencies buy goods and services. These regulations specifically require federal agencies to "implement cost-effective contracting preference programs favoring the acquisition of environmentally preferable and energy-efficient products and services" (FAR 23.704a).

For more information see: <http://www.arnet.gov/far/>



Biomass Research and Development Act of 2000

This Act promotes the development and manufacture of biobased products.

For more information see: http://www.bioproducts-bioenergy.gov/bio_act.html



In addition, an estimated **\$400 billion** is spent annually by state and local governments to procure products and services. A growing number of state and local governments are implementing environmentally preferable purchasing programs, including those shown below.

Table 3 States, Counties, and Cities Implementing EPP Programs

 States	Connecticut, Delaware, Indiana, Maine, Maryland, Massachusetts, Pennsylvania, Texas, Vermont, Washington DC, Wisconsin
 Counties	California: Orange County, San Diego County Florida: Lee County Michigan: Kalamazoo County, Washtenaw County Minnesota: Olmstead County Missouri: Jackson County Nevada: Washoe County New Jersey: Cape May County North Carolina: Chatham County Oregon: Multnomah County Virginia: Fairfax County Washington: King County
 Cities	Arizona: Phoenix California: Chula Vista, Oakland, Richmond, San Diego, San Francisco, Santa Barbara, Santa Monica Colorado: Boulder Illinois: Chicago Missouri: Kansas City New York: New York City Ohio: Cincinnati, Dayton Oregon: Portland Tennessee: Chattanooga Washington: Seattle

The above list will expand over time as more governments see the value in implementing greener procurement systems and learn from each other. As these procurement systems grow and become more integrated into standard practice, opportunities to successfully market your green products will be greatly enhanced.



Resource: Information About State and Local Governments

State and Local Government Pioneers: How State and Local Governments Are Implementing Environmentally Preferable Purchasing Practices. *November, 2000.*

<http://www.epa.gov/opptintr/epp/pdfs/statenlocal.pdf> 



Section 2: What Is a Greener Product?

“Greener” products have a *lesser or reduced impact* on human health and the environment *than other products* that perform a similar function. Table 4 compares several traditional products to greener products.

Table 4 Examples of Greener Products

Product Category	Traditional Product	Greener Product	Improved Environmental Performance
Lighting	Incandescent bulb	Fluorescent bulb	Less energy used
Paper tablet	100% virgin paper	50% postconsumer paper	Reduces natural resource use
Copier paper	Chlorine bleached paper	Processed chlorine free paper	Reduces toxic emissions

Evaluating greener products generally requires a review of multiple environmental attributes. For example, in the above lighting example, while fluorescent bulbs use less energy than incandescent bulbs, these bulbs contain mercury that can be released into the environment if they are not properly disposed (e.g., not recycled).



Resource: Evaluating Multiple Environmental Attributes

This multimedia training tool provides an overview of the US EPA's Environmentally Preferable Purchasing program (EPP). Section IV: Environmental Performance Characteristics provides guidance on evaluating products across multiple environmental attributes.

<http://www.epa.gov/oppt/epp/gentt/intver/app.html>



Case Study: Recycled Writing Tablet (Blind Industries and Services of Maryland)

100% recycled, 100% postconsumer, processed chlorine free writing tablet

Blind Industries and Services of Maryland (BISM) manufactures an extensive line of writing tablets. The Department of the Interior (DOI) approached BISM a couple of years ago about developing a writing tablet made from 100% recycled, 100% postconsumer, processed chlorine free paper. BISM agreed and collaborated with DOI to bring the product to market. DOI identified a vendor for the feedstock. As the feedstock did not require any changes to BISM's manufacturing process, the new feedstock was easily incorporated into the new product. Introduced less than a year ago, the new tablets cost about 20% more than the standard 30% recycled content tablets. Sales remain slow, but BISM is confident that just as with 30% recycled content paper, over time, product demand and production volume will increase, causing prices to drop and increasing the product's competitiveness.

Contact:

Paul Becker, Director of Marketing

Blind Industries and Services of Maryland <http://www.bism.com>

800-647-2468



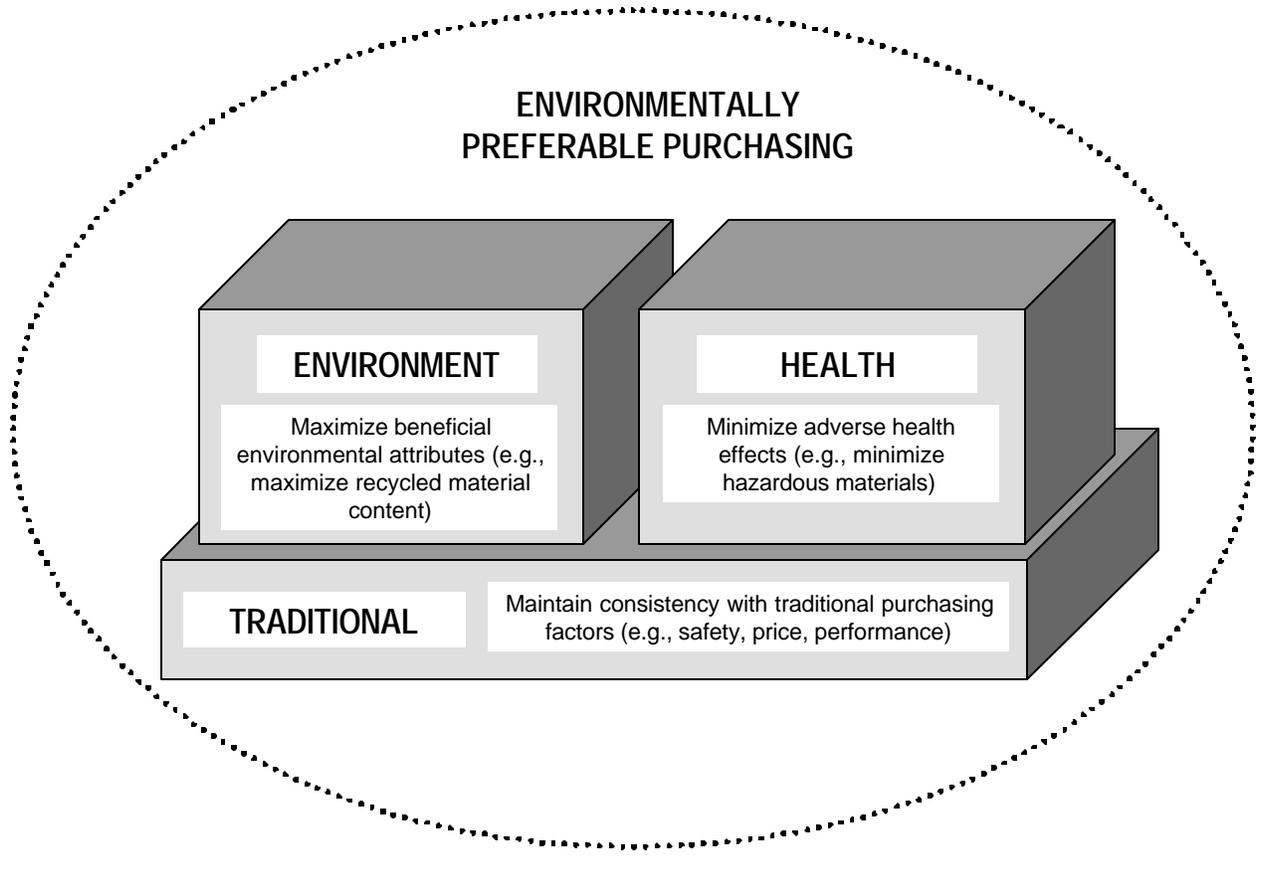
Traditionally, product design takes into account standard product attributes such as price, performance, and safety. To be competitive in the marketplace, green products must incorporate these traditional attributes. EPA's Environmentally Preferable Purchasing (EPP) program builds upon these traditional attributes by adding "Environment" and "Health" considerations into these traditional building blocks (Figure 3 on the next page).

This document focuses on two approaches for greening your products: greening the attributes of your products, and greening your manufacturing process (see Table 5). These two greening approaches are introduced below and then explained in greater detail in Sections 3 and 4 of this document.

Table 5 Two Approaches to Greening

	Type of Greening	Examples
	Greening product attributes	<ul style="list-style-type: none"> • Paper made from recycled content • Flatware that is biodegradable
	Greening the manufacturing process	<ul style="list-style-type: none"> • Replacing traditional solvents with citrus-based solvents • Installing energy efficient motors

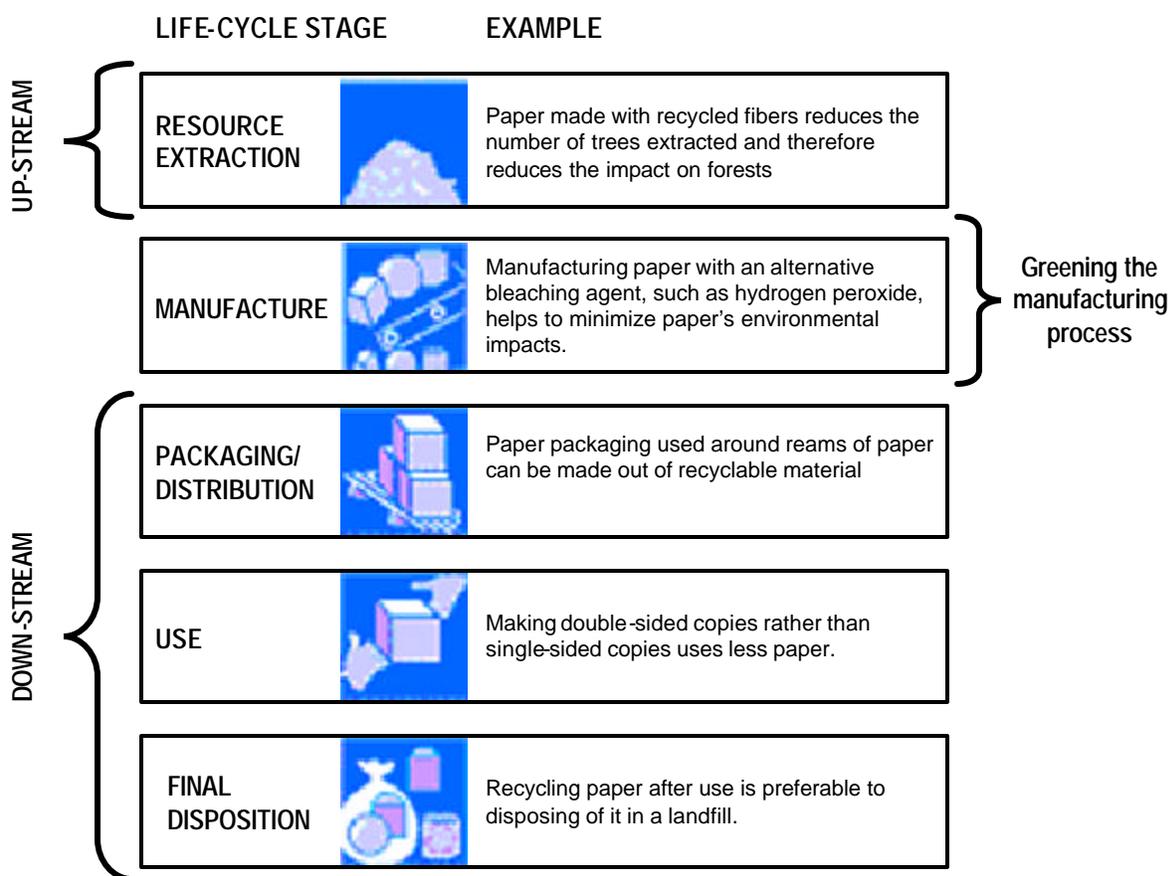
Figure 3 Characteristics of Environmentally Preferable Purchasing



Overview: Greening Product Attributes

A product can be considered greener based on its characteristics, or “attributes.” Those attributes can reduce the environmental impact of a product in a variety of ways. Examining a product’s life cycle across its many stages provides a useful framework for thinking about how product changes will impact the environment. The diagram in Figure 4 below illustrates product attributes that can be improved for each life cycle stage, using paper manufacturing as an example.

Figure 4 Life-cycle Diagram for Paper



Focus is usually placed on the environmental impacts arising from manufacturing. But it is also important to consider the upstream impacts (those that occur before the product is manufactured, such as mining or processing the input materials) and downstream impacts (after manufacture including distribution, use, and final disposal) of a product. When thinking of ways to improve a product’s environmental effects, think about all stages of the product’s life cycle. More detail on greening product attributes is provided later in this document.

Case Study: Greening Plastic Flatware (Signature Works)

Signature Works, a division of LC Industries Inc., is a nonprofit company located in Hazelhurst, Mississippi that is affiliated with the National Industries for the Blind. Signature Works began work on a greener product to avoid the cost of large capital investments. These steps look likely to succeed in both avoiding costs and in ensuring the continuity and stability of their customer base.

Signature Works, a participant in the JWOD program, is the designated mandatory source to the government for plastic flatware (spoons, forks, knives etc.). Indeed, it is the principal supplier of plastic flatware to the armed forces and was commended by the U.S. Military for the quality of their supply support during the Gulf War. The division has approximately 500 employees and annual revenues of \$25 million.

In February of 2000, the Defense Logistics Agency (DLA) announced that it intended to replace flatware made of polystyrene plastic with biodegradable and biobased alternatives and issued new descriptions and stock numbers for those items. To maintain its customer base and sole source position, Signature Works needed to radically modify its product and possibly its production process. For some businesses, making the changes might have generated a panicked rush. Signature Works, however, was not worried—the company was already working to develop a biobased biodegradable product.

Signature Works began assisting with the development of biobased and biodegradable plastic flatware in 1990, a decade earlier, when a supplier asked them to try using a resin made out of potato starch. Although that product proved unsuccessful for technical reasons, Signature Works realized that commercially viable biobased and biodegradable resins would ultimately be developed. If the company did not play an active role in the development of those resins, the resins that emerged as commercial products might well be incompatible with the company's manufacturing equipment. Replacing all of that equipment would be an expensive prospect—costing between \$500,000 and \$1,000,000. To avoid this eventuality the company sought out collaborations with Natick Army Research Center, polymer researchers, and resin suppliers, offering free use of its manufacturing facilities to test new and experimental resins.

Signature Works is currently testing various biobased and biodegradable resins. As of the end of 2001, resins tested thus far have been incompatible with Signature Works' equipment. However, the company will continue identifying and testing additional resins so as to maintain their supplier relationship to the US military.

Contact:
Vikki White
Signature Works
800-647-2468 vwhite@netdoor.com

Overview: Greening the Manufacturing Process

Products can also be made greener by improving the manufacturing processes involved in producing them. Several key characteristics of greener manufacturing are highlighted below.

Table 6 Characteristics of Greener Manufacturing

	Consumes less natural resources
	Requires less energy to produce
	Releases less gases that lead to global climate change
	Uses and releases less toxic materials
	Creates less waste (both hazardous and non-hazardous)

Some aspects of greener manufacturing translate into a product attribute (e.g., paper made with chlorine-free bleaching process). Many lead to cost savings through more efficient materials use, waste reduction and energy use reduction.

Greening the manufacturing process also has positive impacts on human health of employees as well as the surrounding community. For example, traditional wall paints contain solvents, many of which are volatile organic compounds (VOCs.) VOCs emitted while manufacturing or using the product can contribute to the formation of ground-level ozone, a lung irritant that makes breathing difficult. Some paint solvents can also cause lung irritation in workers manufacturing or using paints. The paint manufacturing process can be made greener by reducing solvent use (i.e., by using solvents more efficiently in the manufacturing process) or by replacing the solvents with those that are less volatile and toxic.

Greening is good for employees.

Case Study: Printing Green – Small Changes, Big Dividends (Custom Print)

Custom Print is a sheetfed, offset lithographic printer of commercial color products including brochures, folders, and booklets. They are a 22 year-old company employing 30 people with \$4 million in annual sales. For them, greening their process has been a profitable experience that took place by implementing small changes over the course of a few years. The following highlights several of their initiatives and resulting cost savings:

1. Streamlining inventory: As a result of process mapping (further described in Section 4), Custom Print examined its inventory and purchasing records, revealing that over 80 different chemicals were on-site. A team of press operators, purchasing staff and maintenance personnel investigating the causes for the large inventory suggested ways for reducing the chemical inventory. First, the team discovered that sometimes multiple chemicals were being purchased to perform the same task. Employees using these chemicals got together to agree upon one chemical that would be used for the task. Second, the team identified chemicals that could perform multiple tasks as a means to further reduce inventory. Lastly, the team recommended returning unused or partially used samples to vendors. After implementing these changes, Custom Print cut its inventory by 70% – to just 24 chemicals – and is saving an estimated \$5,000 per year in inventory and waste disposal for expired chemicals, while reducing its potential liability.

2. Modifying ventilation: After an employee complained of headaches from isopropyl alcohol (IPA) in the fountain solution, Custom Print installed an air conditioning system with a high volume fan. A year later the company switched to an alcohol-free system, but the fan kept running until some time later when an employee accidentally turned it off. This accidental flip of the switch made the company realize that less air movement was needed in the shop with the new fountain solution. The change in ventilation proved to be very profitable – reduced air conditioning needs cut electricity costs by \$2000/month (40%) and enabled the company to renegotiate its service contract, saving \$200/month. Heat from the presses was now enough to keep the room warm in winter, cutting fuel costs by \$400/year. The slower air circulation also improved the consistency of print quality by keeping temperature and humidity more constant.

3. Reducing wasted ink: Custom Print was wasting ink because less frequently used colors often expired before they could be consumed. Working with its ink vendor, the company reduced wasted ink by training employees to mix specialty colors from existing ink stocks.

Initiative	Annual Cost Savings
Streamlining inventory	\$5,000
Modified ventilation	\$26,800
Reduced wasted ink	\$8,000
TOTAL:	Approximately \$40,000 per year in savings

Custom Print's experience demonstrates that:

- Greening can improve your bottom line
- Greening often means improving process or operational changes unrelated to product manufacture
- Greening includes changes in general non-industry specific infrastructure and services, such as heating and cooling
- Employees can help make improvements if given the opportunity

Source: US EPA Design for Environment Program, *Lithography Project Case Study 2: Pollution Prevention at Custom Print*, EPA-744-F-96-001, Aug. 1996.

Contact:

Stu McMichael, President, Custom Print <http://www.customprint.com>
703-979-6670





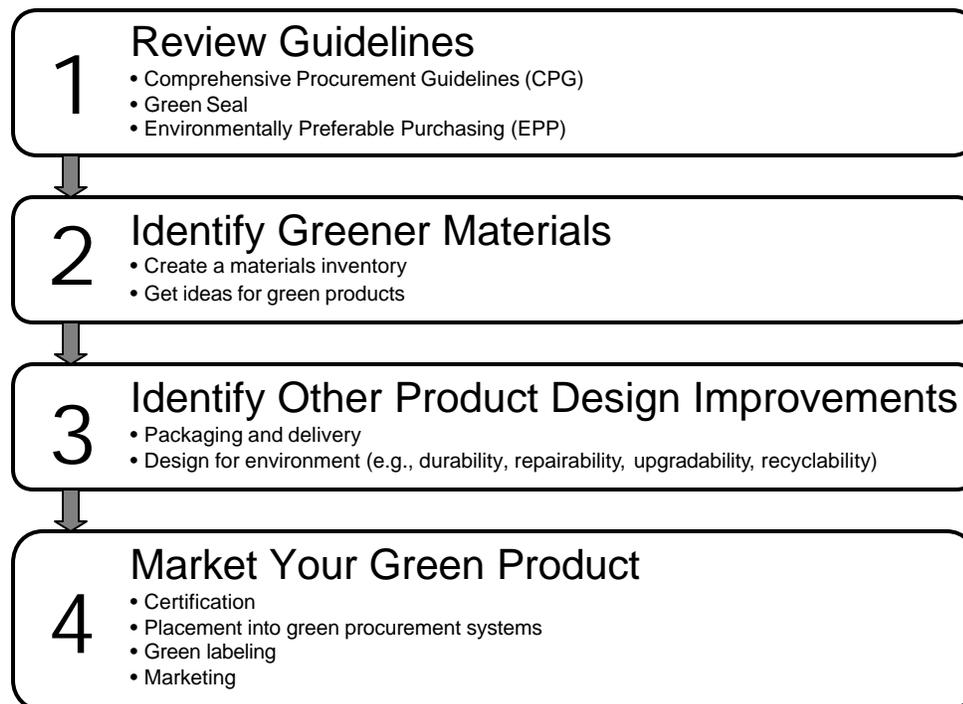
Section 3: Greening Product Attributes

The most common approach to greening a product is improving one or more of its environmental attributes. Green products are oftentimes benchmarked in comparison to other products that perform the same function. For example, you can benchmark the recycled content of your paper products based upon (1) the average recycled paper content currently found in the marketplace; (2) guidelines (described below) specifying recommended recycled content; or (3) recycled content levels found in other paper products marketed as green. All three benchmarks can provide a recycled content target for your products.

Benchmark your green products.

The figure below summarizes the steps toward greening a product by improving its attributes. Each step is subsequently detailed in this section.

Figure 5 Product Approach to Greening





Step 1: Review guidelines

A growing number of guidelines are becoming available to help purchasers select green products (Table 7). These guidelines can help you find the criteria your customers may use, help you develop criteria for greening your existing products, or provide ideas for new green products to introduce in your product line.

Table 7 Guidelines at a Glance

<i>Detailed on page 14</i>	Comprehensive Procurement Guideline (CPG)
Sponsoring Organization:	U.S. Environmental Protection Agency
Key component:	Contains a list of designated products (and manufacturers) and accompanying recycled content recommendations.
Website:	http://www.epa.gov/epaoswer/non-hw/procure/ 
<i>Detailed on page 17</i>	Green Seal
Sponsoring Organization:	Nonprofit environmental labeling organization
Key component:	Provides a set of environmental criteria for products and certifies that a particular product meets these standards.
Website:	http://www.greenseal.org/ 
<i>Detailed on page 19</i>	Environmentally Preferable Purchasing (EPP)
Sponsoring Organization:	U.S. Environmental Protection Agency
Key component:	The document "EPA's Final Guidance on Environmentally Preferable Purchasing" helps Executive agencies integrate environmental considerations into their buying decisions.
Website:	http://www.epa.gov/oppt/epp/index.htm 

Comprehensive Procurement Guideline (CPG)

The federal government has undertaken various initiatives to include the environment in purchasing decisions. The Comprehensive Procurement Guideline (CPG) program is part of EPA's continuing effort to promote the use of materials recovered from solid waste. Buying recycled-content products ensures that the materials collected in recycling programs will be used again in the manufacture of new products.

The CPG program is authorized by Congress under Section 6002 of the Resource Conservation and Recovery Act (RCRA) and Executive Order 13101 ("Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition," signed into law in 1998).

EPA is required to designate products that are or can be made with recovered materials, and to recommend practices for buying these products. Once a product is designated, procuring agencies (federal, state, or local agency using federal funds for procurement) are required to purchase the product with the highest recovered material content level practicable.

Q: What is the difference between post-consumer and recovered materials?

- A:**
- ☼ Post-consumer material means a material or finished product that has served its intended use and has been diverted or recovered from waste destined for disposal, after having completed its life as a consumer item.
 - ☼ Preconsumer material means waste material that is generated from, and commonly reused within, an original manufacturing process.
 - ☼ Recovered material means both post-consumer and preconsumer materials.

A key component of the CPG program is EPA's list of designated products and recommended recycled content for each product. EPA has already designated or is proposing to designate the products listed in Table 8 (about 54 products). EPA also published final or proposed recycled content recommendations for each item. The CPG web site contains a brief description for each of the designated products, EPA's recommended recycled content ranges, and a list identifying manufacturers, vendors, and suppliers for each item. An example of a CPG guideline entry is shown in Figure 6.

Figure 6 Sample CPG Guideline— Commercial/Industrial Sanitary Tissue Products

EPA's Recommended Recovered Fiber Content Level

Item	Post-consumer Fiber (%)	Recovered Fiber (%)
Bathroom tissue	20-60	20-100
Paper towels	40-60	40-100
Paper napkins	30-60	30-100
Facial tissue	10-15	10-100
General purpose industrial wipers	40	40-100

NOTE: The content levels should be read as X% recovered fiber, including Y% post-consumer fiber and not as X% recovered fiber plus Y% post-consumer fiber.

List of Manufacturers and Suppliers

[There are 40 entries in this list; the following is a sample entry]

Javits-Wagner-O'Day Program
 c/o National Industries for the Blind (NIB)/NISH
 1901 North Beauregard Street; Alexandria, VA 22311
 Phone: 800 433-2304; Fax: 703 998-5416

The Javits-Wagner-O'Day (JWOD) Program is a mandatory source for federal customers. JWOD nonprofit agencies furnish bathroom tissue with 100 percent recovered fiber and 20 percent post-consumer fiber content.

Table 8 Current List of Products With CPG Requirements

<p><u>Construction Products</u></p> <ul style="list-style-type: none"> · Building insulation products · Carpet · Carpet cushion · Cement and concrete containing: a. Coal fly ash; b. Ground granulated blast furnace slag · Consolidated and reprocessed latex paint · Floor tiles · Flowable fill · Laminated paperboard · Patio blocks · Railroad grade crossing surfaces · Shower and restroom dividers/partitions · Structural fiberboard <p><u>Landscaping Products</u></p> <ul style="list-style-type: none"> · Garden and soaker hoses · Hydraulic mulch · Plastic lumber landscaping timbers and posts · Lawn and garden edging · Compost made from yard trimmings or food waste <p><u>Nonpaper Office Products</u></p> <ul style="list-style-type: none"> · Binders, clipboards, file folders, clip portfolios, and presentation folders · Office recycling containers · Office waste receptacles · Plastic desktop accessories · Plastic envelopes · Plastic trash bags · Printer ribbons · Toner cartridges 	<p><u>Paper and Paper Products</u></p> <ul style="list-style-type: none"> · Commercial/industrial sanitary tissue products · Miscellaneous papers · Newsprint · Paperboard and packaging products · Printing and writing papers · Park and Recreation Products · Park benches and picnic tables · Plastic fencing · Playground equipment · Playground surfaces · Running tracks <p><u>Transportation Products</u></p> <ul style="list-style-type: none"> · Channelizers · Delineators · Flexible delineators · Parking stops · Traffic barricades · Traffic cones <p><u>Vehicular Products</u></p> <ul style="list-style-type: none"> · Engine coolants · Re-refined lubricating oils · Retread tires <p><u>Miscellaneous Products</u></p> <ul style="list-style-type: none"> · Awards and plaques · Industrial drums · Mats · Pallets · Signage · Sorbents · Manual-grade strapping
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NOTE: Many mandatory source JWOD products already meet environmental purchasing criteria, including: clipboards, notebooks and binders; hanging file folders; paper towels and napkins; steno pads, pens and pencils.

Green Seal



Green Seal is a nonprofit standard setting organization that awards the "Green Seal of Approval" to products that cause less harm to the environment than other similar products as defined by their certification standards. Green Seal both develops environmental standards for product categories as well as carries out the actual certification of particular products from interested manufacturers. Table 9 lists currently available product certifications.

Q: What if I do not want to pursue Green Seal Certification?

A: The certification information provided by Green Seal is very valuable even if you choose not to pursue certification. It can give you ideas of green products that you may wish to develop, and to understand the generally accepted green attributes of that product.

For more information on certification, see the section below called "Marketing Your Product."

Before a product gets the Green Seal, it must go through a certification process administered by Green Seal to ensure it meets the environmental standards that Green Seal has established. Unlike the Comprehensive Procurement Guidelines, which do not actually certify products from individual companies, Green Seal operates as an unbiased, third party certification organization.

After a product is successfully certified, it is permitted to display the Green Seal label. Having a Green Seal certification for your product increases its visibility and marketability.

Table 9 Current List of Available Green Seal Standards

Tissue Paper	Dishwashers
Re-Refined Engine Oil	Cook tops/Ovens/Ranges
Compact Fluorescent Lamps	Watering Hoses
Water Efficient Fixtures	Alternative Fueled Vehicles
Printing and Writing Paper	Anti-Corrosive Paints
Household Cleaners	Plastics Labeling Systems
Paper Towels and Paper Napkins	Showerheads
Coated Printing Paper	Paper Products Used in the Preparation of Food
Paints	Residential Air Conditioning Systems
Windows	Fleet Vehicle Maintenance
Window Films	Powdered Laundry Bleach
Newsprint	Electric Chillers
Reusable Utility Bags	Residential Central Air-Source Heat Pumps
Refrigerators	Degreasers
Freezers	Food Service Packaging
Clothes Washers	Commercial Adhesives
Clothes Dryers	Industrial & Institutional Cleaners

Example of a Green Seal Standard: Tissue Paper (GS-01)

Second Edition, February 12, 1992 Copyright 1992 Green Seal, Inc.

A. Product Specific Performance Requirements

1. Product must be made in accordance with reasonable industry practice with respect to holes, tears, wrinkles, cleanliness, foreign materials or dirt. It must have no disagreeable odor, either wet or dry, in accordance with reasonable industry practice. Edges of the product must be cleanly cut and not ragged. Product must dispense properly from dispenser or roll.
2. Each roll of bathroom tissue must contain at least 40 square feet of product (300 x 4.5" x 4.4" sheets). Each box of facial tissue must contain at least 70 square feet of product (175 x 8.0"x 8.0" sheets).

B. Product Specific Environmental Requirements

1. Bathroom Tissue: the fiber in bathroom tissue shall contain 100% recovered materials, including 20% post-consumer materials.
2. Facial Tissue: the fiber in facial tissue shall contain 100% recovered materials, including 10% post-consumer materials.
3. Post-consumer Content: the post-consumer content of a product shall be determined by measuring the average product fiber utilization over a period of no longer than three months.
4. De-inking of Recovered Paper: recovered paper shall not be de-inked using a solvent containing chlorine, or any chemicals listed by the EPA under Section 313 of the Emergency Planning and Community Right To Know Act.
5. Bleaching: If a bleaching agent containing chlorine is used, the adsorbable organic halogen content of the effluent from the production facility shall not exceed 1.0 kg per air dried metric ton of pulp. Chlorine and its derivatives shall not be used after January 1, 1996.
6. Additional Ingredients: the product (not including packaging) shall not contain any added pigments, inks, dyes, or fragrances.

C. Packaging Requirements

1. The core of a roll of bathroom tissue or the box used to package facial tissue must be made from 100% recovered fiber.
2. A consumer package of bathroom tissue must contain at least 4 rolls unless the outer wrapper has been manufactured from 100% recycled materials.
3. Packaging shall not contain inks, dyes, pigments, stabilizers, or any other additives to which any lead, cadmium, or hexavalent chromium has been intentionally introduced.
4. The sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in any package or packaging components shall not exceed 100 parts per million by weight.

D. Labeling Requirements

1. The Green Seal Certification Mark may appear on the packaging and the product itself.
2. Whenever the Certification Mark appears on a package or product, the product or package must contain a description of the basis for certification. The description shall be in a location, style, and typeface that are easily readable by the consumer.

Reference: <http://www.green Seal.org/standards.htm>



Environmentally Preferable Purchasing (EPP)

The U.S. federal government is the single largest consumer of goods and services in the U.S., spending more than \$200 billion annually on goods and services. EPA recognizes that this tremendous purchasing power influences what products and services are produced. EPA's Environmentally Preferable Purchasing (EPP) program, a federal program (established pursuant to Executive Order 13101) leverages that power by encouraging and assisting Executive agencies in purchasing environmentally preferable products and services.

EPP's goal is to empower federal consumers to make smart purchasing decisions that reflect environmental considerations. Various tools developed by the program assist this goal.

On-line EPP Tools



Use the "General Environmentally Preferable Purchasing Training Tool." This Interactive Training Tool is intended to help quickly and easily understand Environmentally Preferable Purchasing.

<http://www.epa.gov/oppt/epp/gentt/index.html> 

Additional information can be found in the document "EPA's Final Guidance on Environmentally Preferable Purchasing."

<http://www.epa.gov/opptintr/epp/finalguidancetoc.htm> 



Use the on-line "EPP Database" to learn more about green standards for specific products.

<http://yosemite1.epa.gov/oppt/epstand2.nsf> 

Q: How is "environmentally preferable" defined?

A: Executive Order 13101 defines environmentally preferable as: "...products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance or disposal of the product or service."



General EPP Training Tool— This interactive training tool is intended to help you quickly and easily understand environmentally preferable purchasing. The tool includes:

- General overview, which covers basic EPP principles, including the definition of EPP and its environmental benefits.
- Current EPP mandates, including Executive Order 13101 and Federal Acquisition Regulations.
- EPA's Five Guiding EPP Principles that guide the process of incorporating environmental considerations into purchasing decisions.
- Environmental Performance Characteristics, which provides guidance on evaluating the environmental impacts associated with purchasing decisions across multiple environmental attributes.
- Procurement Policy, which describes how to incorporate environmental considerations into the federal purchasing process.
- Existing Green Purchasing Programs, describing various federal programs.
- Promising Practices Preview, describing successful EPP strategies that have been implemented by federal agencies.

The five guiding principles developed by the EPA provide broad guidance for applying EPP in the federal government setting. You should review these principles when considering the performance of your own products, and when providing information to consumers about your products. A summary of the principles is presented below.

Table 10 Five Guiding Principles for Environmentally Preferable Purchasing

<p>Guiding Principle 1: Environment + Price + Performance = Environmentally Preferable Purchasing— Environmental considerations should become part of normal purchasing practice, consistent with such traditional factors as product safety, price, performance, and availability.</p>
<p>Guiding Principle 2: Pollution Prevention— Consideration of environmental preferability should begin early in the acquisition process and be rooted in the ethic of pollution prevention, which strives to eliminate or reduce, up-front, potential risks to human health and the environment.</p>
<p>Guiding Principle 3: Life Cycle Perspective/Multiple Attributes— A product or service's environmental preferability is a function of multiple attributes from a life cycle perspective.</p>
<p>Guiding Principle 4: Comparison of Environmental Impacts— Determining environmental preferability might involve comparing environmental impacts. In comparing environmental impacts, Federal agencies should consider: the reversibility and geographic scale of the environmental impacts, the degree of difference among competing products or services, and the overriding importance of protecting human health.</p>
<p>Guiding Principle 5: Environmental Performance Information— Comprehensive, accurate, and meaningful information about the environmental performance of products or services is necessary in order to determine environmental preferability.</p>



EPP Database— Another useful resource is the Environmentally Preferable Purchasing (EPP) Database. This is a tool designed to make it easier for agencies to purchase products and services with reduced environmental impacts. The database is organized like a giant shopping mall with environmental information for selected products and services located within each store. Environmental information on over 600 products and services is included. This database links to the following information:

- Contract language and specifications created and used by federal and state governments and others to buy environmentally preferable products and services.
- Environmental standards and guidelines for the product you want to buy and vendor lists of product brands that meet these standards, where available.
- Other useful sources of information on the environmental preferability of products and services.



Step 2: Identify Greener Materials

Step 1 provides information and guidance for developing criteria for greener products. In this step you use this information to identify greener materials that can be substituted into your current products, or identify new green products to add to your product offerings.

Actions to Take

- a Create a materials inventory
- b Get ideas for green products

a Create a Materials Inventory— Whether you are considering greening an existing product or planning on introducing a new green product, a review of the input materials used in the manufacture of the product is necessary. The figure below shows a sample form that can be used to collect information on the various materials that go into a product. A copy-ready form is included at the end of this document.

Figure 7 Materials Inventory Sheet

Materials Inventory Sheet				
Product: _____		Inventory conducted by: _____		Date: _____
Material/Specifications	Quantity per unit product/Quantity produced per month	Cost per unit product/ Cost of material purchased per month	Current vendor/ alternate vendors	Applicable alternatives/ Goals based on guidelines
1	2	3	4	5

NOTES: _____

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The first column should contain the material and relevant specifications. The second and third columns should contain information on the current quantity and cost of the material. The fourth column should contain a list of the current vendors and alternate vendors that can be contacted. Use the appropriate trade association to get information on additional vendors that you may not have worked with in the past. EPPNET, described below, is also a useful resource.

The fifth column in the materials inventory sheet contains information about possible alternatives and goals based upon guidelines. For example, the alternative to ordinary plastic resin for flatware may be a biobased resin or a biodegradable resin. The alternative to ordinary paper napkins may be napkins with recycled materials. Green Seal standards require that napkins contain 100% recovered materials and at least 40% post-consumer material by weight— these specifications could be used as goals for your product.

Resource: Northeast Recycling Council (NERC) EPPNET

The Northeast Recycling Council (NERC) established EPPNET, the Environmentally Preferable Products Procurement Listserv, to link federal, state, local and private procurement and environmental officials charged with purchasing environmentally preferable products and developing policies for the procurement of these products.

The NERC EPPNET is intended to provide this group with quick access to information such as: availability of product specifications, lists of vendors for particular products, pricing information, strategies to achieve recycled product procurement goals, and federal procurement policies.

<http://www.nerc.org/eppnet.html> 



Get Ideas for Green Products!— Use the following techniques to help you come up with ideas for greening existing products or introducing a new green product.



Green Guidelines— Reviewing the guidelines presented in Step 1 (page 13) gives you an idea of what types of green products have penetrated the market to an extent that purchasing and certification programs have identified requirements and guidelines.



Market Survey— Some products may not be mentioned in any of the guidelines, but are available as a green product. It is important to conduct a survey of the market to see if competitors are offering green products that serve the same function as your product. Characteristics of a competitor's product can be used as a guide for the greening of your own product. The two highlighted resources below (page 25) can be used to see what green products are available for purchasers and who currently manufactures or markets them.



Green Materials— The table below describes various types of materials that can be used to make your product greener. Use this list in conjunction with the materials inventory sheet to identify opportunities to replace existing input materials with greener materials.

Table 11 Overview of Greener Materials

Made from recycled materials:

- Replacing virgin material with recycled materials.
- Post-consumer recycled (PCR) content is preferable because it helps keep waste materials out of the landfill (pre-consumer mill waste has always been recycled).

Greener paper stock and inks for printed materials and packaging: †

- Tree free paper stock (e.g., sugar cane waste, straw, seaweed, algae and hemp). Alternative renewable paper sources can reduce need for wood pulp from old growth forests.
- Recycled paper stock that has not been de-inked. De-inking is an energy intensive process which may still result in toxic waste ink.
- Unbleached or nonchlorine bleached paper stock. Paper bleached with chlorine produces toxins such as dioxin, which are harmful to humans, fish and wildlife. Processed chlorine free (PCF) recycled paper is made using no chlorine during manufacturing. (However, some of the waste paper being recycled may have been bleached in the past with chlorine, so it can't be labeled totally chlorine-free.)
- Vegetable based printing inks such as soy inks. Vegetable based inks are renewable and emit less toxic volatile organic compounds (VOCs).
- Avoid the use of ink colors that contain high levels of heavy metals such as lead, copper, chrome, etc.

† Society for Responsible Design <http://www.green.net.au/srd/>



Less toxic or non-toxic:

- Non-toxic materials do not have the capacity to produce personal injury or illness to humans or other species through ingestion, inhalation, or skin absorption; less-toxic materials reduce such impact.
- Aim to replace a toxic material with a less toxic or non-toxic substances.
- Refer to Material Safety Data Sheets (MSDSs) to assist in determination of toxicity.

Low volatile organic compounds (VOCs):

- VOCs evaporate easily (volatilize) at room temperature and often have a sharp smell. They can come from many products, such as office equipment, adhesives, carpeting, upholstery, manufactured wood products, paints, solvents, pesticides, and cleaning products. Some VOCs can cause cancer in certain situations, especially when they are concentrated indoors. In the presence of sunlight, VOCs create ozone, a harmful air pollutant to both people and plants.
- It is preferable to use low-VOC versions of products to reduce risks to human health and the environment.

Biobased:

- Current biobased products and bioenergy technologies have the potential to make renewable farm and forestry resources major sources of affordable electricity, fuel, chemicals, pharmaceuticals, and other materials.
- They also have the potential to reduce dependence on foreign oil, improve air quality, water quality, and flood control, decrease erosion, and help minimize net production of greenhouse gases.
- Example is using soy-based inks for printing.

Biodegradable:

- Recent ASTM Standards require that any product claiming to be biodegradable must completely decompose into carbon dioxide or water, the byproducts of decomposition, within a 180-day period.
- Note that the earlier generation of products described as biodegradable would often fragment and breakdown into big pieces that would not completely biodegrade.

Other considerations:

- Materials that will reduce hazards posed to workers when handled during product manufacture.
- Materials that can be obtained locally will reduce the environmental impacts of transportation.
- Materials that are easier to work with or require simpler processing.



Contact vendors— Contact your existing material vendors as well as new vendors to discuss the availability of greener materials. EPPNET is a useful resource for identifying green materials and vendors (see page 23).



Resource: “Environmentally Preferable Purchasing Guide” Minnesota Solid Waste Management Coordinating Board

This Guide is a reference tool for government and school purchasers in MN who want to make wiser purchasing choices. This Guide helps them find ways to reduce workplace hazards, consume less energy, and protect natural resources by identifying environmentally preferable alternatives in over 30 product areas. It also provides information on cost and performance and sources of these products.

http://www.swmcb.org/EPPG/1_1.htm



Resource: “GreenOrder.com” Website

GreenOrder is a new resource for government institutional buyers and suppliers of energy efficient, recycled, and other environmentally preferable products. GreenOrder enables buyers to source and submit “Request for Quotes” (RFQs) for a broad range of products provided by suppliers registered with GreenOrder.

<http://www.greenorder.com/home>



Case Study: Recycled Trash Bags (Envision, Inc.)

100% recycled-content (30% postconsumer) trash bags

Envision, Inc. in Wichita, Kansas is the largest supplier of trash bags through NIB. To leverage increasingly “green” purchasing preferences of the federal government, Envision decided to introduce a recycled-content plastic trash bag. Although the typical recycled content in plastic products is 30% or less, Envision decided to develop a 100% recycled, 30% postconsumer content product, believing this would give them a strategic advantage over competitors. Product marketing reflects this choice and environmental attributes are emphasized as the defining feature of the product.

To locate a feedstock, Envision simply requested the desired recycled content from their suppliers. Production of the new bags required no significant process alterations. The recycled-content bags must be made from somewhat thicker plastic film in order to perform as well as the virgin plastic product. But, because the recycled-content film also costs approximately 15% less than virgin stock, the final product is price competitive. Added to the procurement list in 2000, the sales of bags have increased each year since the product was introduced and rose 10% in the last year alone. Government clients currently account for 90% of sales.

Contact:

Envision, Inc. <http://www.envisionus.com/>
316-267-2244



Case Study: Biodegradable, Biobased Plastic Bags (Multi-Community Diversified Services Inc.)

Plastic trash bags are the bane of large-scale composting operations that handle residential yard waste today. Communities and contractors usually feel compelled to permit residents to use polyethylene or PVC bags because of their convenience and resistance to moisture. But accepting such bags is costly – contents must be debagged, the final product is invariably contaminated with plastic fragments lowering its quality, and an average of 20% of the input is wasted in contaminated “overs” (i.e., contaminated product that must be disposed of). All this adds up to bottlenecks and slower throughput, lower prices, lost sales revenue, and significant disposal costs. For a facility processing 15,000 tons, which might serve anywhere from 15-45,000 households depending on the region, the total cost could run anywhere from \$184,000 – \$364,000 depending on disposal fees and compost market prices. Multi-Community Diversified Services Inc. (MCDS), a NISH affiliate based in McPherson, Kansas, has a product that can substantially reduce these costs—a biodegradable plastic bag.

Founded in 1974, MCDS provides employment and support services for people with disabilities in McPherson County (population 28,000). An annual budget of approximately \$9 million supports a staff of 210 engaged in support services and manufacturing activities. MCDS offers both employment and residential support services. The organization provides job placement and on-the-job support. The organization manufactures wooden pallets, remanufactures toner cartridges (this operation alone accounts for over 25% of annual revenues), and does subcontract work for local businesses, such as cutting and packaging lengths of drip irrigation tubing. MCDS also runs a small yard waste drop-off and on-site composting facility.

While attending a recycling and composting conference, MCDS staff were introduced to Mater-Bi, a biobased biodegradable plastic resin made from cornstarch and polylactic acid manufactured by Novomont. Unlike many competing products, the biodegradability of plastic bags and other products made from Mater-Bi had met ASTM and international standards for biodegradation under a variety of conditions in third party testing. Noting that Mater-Bi bags sold in the US were manufactured in Germany and considering its own unique access to the federal market through the JWOD program, MCDS decided to explore the viability of setting up a US operation for manufacturing Mater-Bi biodegradable plastic bags. After ensuring it would have access to the resin, MCDS performed due diligence research on the technology and company and hired a professor from Wichita State University to conduct a formal financial analysis. (As a rule MCDS seeks outside advice and assessment for large projects such as this one so that the Board of Directors can be confident that the proposal is sound).

MCDS will soon be moving into a new facility in which 3800 square feet have been set aside for bag production. The organization intends to phase in production elements over time. MCDS will begin by simply repackaging bags manufactured in Germany, then, as sales volume increases, move to manufacturing bags from imported Mater-Bi plastic film and finally to blowing its own plastic film from imported resin. Initially, bags will be produced primarily for federal customers, such as military bases composting food waste and grounds keeping operations composting yard trimmings. MCDS is projecting revenues of \$1.25 million on sales of 4.25 million bags in year one.

MCDS is already repackaging bags for sale to government and commercial clients while waiting for final approval from the Committee for the Purchase from the Blind and Severely Disabled. MCDS is convinced that the potential market for biodegradable and biobased bags is enormous—half of all US States already restrict disposal of yard-waste in landfill—and it is determined to get in on the ground floor.

Contact:

Barry Adamson, Executive Director, Multi-Community Diversified Services Inc.
(620) 241-6699 mcds01@midusa.net



Step 3: Identify Other Product Design Improvements

There are other ways to green your products that will improve their environmental performance when used by the consumer (e.g., reduced product packaging) and finally disposed of (e.g., designed for recycling).

Energy Star ®

ENERGY STAR was introduced by the US Environmental Protection Agency in 1992 as a voluntary labeling program designed to identify and promote energy-efficient products in order to reduce carbon dioxide emissions. EPA partnered with the US Department of Energy in 1996 to promote the ENERGY STAR label, with each agency taking responsibility for particular product categories. ENERGY STAR has expanded to cover most of the buildings sector, residential heating and cooling equipment, major appliances, office equipment, lighting, consumer electronics, and other product areas.

Areas of improvement include:

- Packaging/ delivery
- Durability
- Repairability/ upgradeability
- Design for recycling/ disassembly

This approach helps improve your company's position for future trends in environmental improvement, oftentimes at no additional cost.



Packaging/delivery— Greener packaging can have a significant impact on reducing the solid waste associated with the product when it reaches the consumer.

It is also important to consider the impacts associated with the delivery of products. The mass and volume of the shipped product will impact transportation costs and energy use. For example,

Greener packaging goals

- Eliminate materials
- Reduce or replace most harmful materials
- Minimize number of levels of packaging
- Minimize mass of each level
- Returnable/ reusable/ refillable/ consumable
- Recyclable

concentrated cleaners can deliver the same results using a smaller quantity. The smaller quantity means smaller containers that can be made with less material, saving you money and reducing the amount of waste that your customer must dispose of (thereby saving them money too). The smaller containers also decrease transportation costs.



Durability—Products that are more durable last longer. Therefore, fewer products are required, which reduces impacts on the environment. For example, toner cartridges that are intended to be refilled many times should be built to be more durable. Even if its initial cost to the consumer is higher, it will pay for itself since the consumer purchases cartridges less frequently.



Repairability and Upgradeability— Products that can be easily repaired or upgraded (e.g., easily replaceable parts) are usually better from an environmental viewpoint. Computers require upgrading every few years. Instead of having to replace the entire computer, they can be designed such that the outer case and other elements can be retained, and upgraded parts (such as a new processor or CD-ROM drive) can be replaced.



Design for Recycling/Disassembly— When appropriate, products should be designed to be easily recycled after use. For example, portable phones should be designed to allow the user to easily access and remove the rechargeable battery for recycling. The easier it is for the consumer to recycle, the more likely that recycling will occur. In addition, products designed to be easily disassembled facilitate the recycling process by allowing different materials to be more easily separated.

Design for Recycling Goals

- Use fewer types of materials
- Choose materials for which there are currently available recycling programs
- Properly label the product as to which parts are recyclable
- Design for disassembly



Product Take-back (future)— Think into the future! It is expected that manufacturers of larger products (e.g., white goods, cars, appliances, tools) will be expected to take these products back from the consumer. Products should be designed so they can be easily disassembled, remanufactured or recycled.



Step 4: Market your Green Product

While many of your current marketing techniques are also applicable to green products, the environmental attributes of a green product differentiate your product in the marketplace. Actions you can take to market your green product are described below.

Actions to Take

- (a) Get your product certified
- (b) Get your product included in green procurement systems and lists
- (c) Appropriately label your green product
- (d) Use marketing strategies

(a) Certification— There are currently several green certification programs in the U.S. Many are for specific product areas (e.g., forestry products), but others, such as Green Seal or Scientific Certification Organization, have a broader list of certifiable product categories. In the future, additional certification programs may become available.

Examples of Certification Programs



Green Seal: Certifies a wide variety of products.

<http://www.greenseal.org>



Scientific Certification Organization: Certifies a wide variety of products.

<http://www.scs1.com>



Smartwood: Certifies wood products.

<http://www.nwf.org/northeastern/resources/guidelines.html>



Green Seal

If you have a product for which a certification program is already established by Green Seal, you can follow the procedure outlined below to obtain certification. If you manufacture a green product that is not included, consider requesting Green Seal to add it to their program. (See page 17 for a discussion of Green Seal standards.)

An advantage of having Green Seal certification is the listing of your product in their “Office Green Buying Guide” and in their periodic publication “Choose Green Reports”. These services are part of Green Seal’s Environmental Partners Program that provides green buying assistance to organizations (businesses, government, academia) concerned about the environmental impacts of their purchases. Green Seal does the work for them by identifying the greenest products available. Green Seal's product recommendations take into account environmental impacts, product performance and packaging. There are currently over 450 member companies providing products certified by Green Seal. This offers the potential for wide visibility of your product directly with purchasing agents.

Table 12 Green Seal Certification Procedure

1. Review the Green Seal standard for your product category. (If a Green Seal Standard does not exist for your product, call Green Seal to discuss developing one.) Call Green Seal if you do not have a copy of the standard or if you or your technical staff has any questions. (For a listing of standards, see page 17.)

2. Identify the product or products you wish to submit to Green Seal for certification testing.

3. Call Green Seal to discuss the costs associated with evaluating your product for Green Seal certification. These costs reflect the nature and number of lab tests required and the cost of a site visit. At the end of this discussion, Green Seal will provide a firm quote of the costs involved in evaluating your product and conducting annual monitoring to ensure its continued compliance with the standard.

4. Sign Green Seal's Application for Certification and pay the product evaluation fee specified in Step 3.

5. Submit product samples for any required tests and schedule any required site visits. If the product meets the standards set forth in the standard, Green Seal will grant you the right to use the Green Seal Mark on the product, its packaging, and in product advertising.

6. Should a product fail to meet the standard, Green Seal will inform you of the reasons and, if you wish, work with you to make the changes needed to meet the standard. Green Seal keeps confidential all test results and the fact that you have submitted products for testing.

7. Work with Green Seal staff on the design of the certified product's packaging to include the Green Seal Mark and the accompanying text that spells out the environmental preferability of your product.

8. Green Seal begins annual monitoring to ensure the product continues to meet the Green Seal standards.



Scientific Certification Systems (SCS)

Scientific Certification Systems (SCS) was established in 1984 as the nation's first third-party certifier for testing pesticide residues in fresh produce. In the past 15 years, the company has evolved to become a testing and certification organization, evaluating a wide variety of food safety and environmental claims.

The company's environmental division certifies a wide variety of claims related to environmental performance in the product manufacturing and natural resource extraction sectors. Specific product attributes, such as recycled content and biodegradability, are certified under the Environmental Claims Certification program (see Table 13 below for additional examples). SCS also certifies broader claims of environmental preferability based upon the product's life cycle. These certifications are specifically intended to establish important facts about the products that may be of particular interest to purchasers. Certifications are consistent with international standards. SCS consults with the US Federal Trade Commission (FTC) to clarify questions regarding claims and ensures that its claims comply with the FTC and relevant state environmental marketing guidelines.

Table 13 Examples of Attributes That Have Been Certified By Scientific Certification Systems (SCS)

• Recycled content	• Recovered content
• Salvaged wood from urban sources	• Biodegradability
• No ozone depleting chemicals	• No VOCs / low VOCs
• No added formaldehyde emissions	• Organic ingredients
• Poison-free/ alternative to poison	• Water efficient

Table 14 Scientific Certification Systems (SCS): Certification Procedure

1. Work Authorization: SCS reviews initial information to determine the feasibility of certification. Applicant then enters into a Certification Agreement.
2. Data Review: Applicant discloses data to SCS. All disclosures are confidential. SCS evaluates these data, and requests additional information as needed. Data review includes upstream suppliers where appropriate.
3. Claim Verification: SCS certification engineer conducts an audit, typically including on-site inspection of manufacturing facilities and records, including upstream suppliers where appropriate. Product testing is also conducted where necessary.
4. Certification: If product claims are substantiated, SCS issues a certificate and authorized certification artwork as appropriate to the certification recipient.
5. Monitoring: Certified company submits updated data on an annual basis to SCS to ensure that the certified claim remains valid.

b **Procurement Systems**— The CPG program maintains a list of manufacturers, suppliers and vendors of EPA designated items. If your organization produces a designated item containing recovered material within the content ranges recommended by EPA, you can request to be added to the lists of suppliers. You will be asked to include information that substantiates the recovered materials content of your product.

EPA is also interested in learning about products for potential future designation. Should you consider requesting that a product be added to the CPG program, consult the September 20, 1995 *Federal Register* notice describing EPA's information needs and decision-making process (<http://www.epa.gov/epaoswer/non-hw/procure/pdf/1995rg.pdf>). 

Table 15 EPA's CPG Program

EPA evaluates six primary concerns when examining products for designation:

- 1. Use of Materials Found in Solid Waste**— All products must be manufactured with materials that are recovered or diverted from the solid waste stream. Particular attention is paid to those items produced from materials that are a significant component of the waste stream.
- 2. Economic and Technological Feasibility and Performance**— EPA conducts research to verify that the product containing recovered materials is available and that the product meets industry or government specifications and performance requirements. It also is important for the product to be priced competitively and for there to be adequate competition among suppliers of the product.
- 3. Impact of Government Procurement**— EPA considers the potential impact that government purchasers might have in minimizing the solid waste stream if they purchase a product made with recovered materials. For example, although widgets might be made from 100% post-consumer materials, if the government does not buy widgets, EPA is not likely to designate them because designation would not contribute to a reduction in the solid waste stream.
- 4. Availability and Competition**— The items EPA selects for designation are available from national, regional, or local sources. The relative availability of an item influences the ability of a procuring agency to secure an adequate level of competition when procuring it.
- 5. Other Uses for Recovered Materials**— EPA also considers the possibility of one recovered material displacing another recovered material as feedstock, thereby resulting in no net reduction in materials requiring disposal; the diversion of recovered materials from one product to another, possibly creating feedstock shortages for one or both products; and the ability of manufacturers to obtain recovered materials in sufficient quantity to produce the item under consideration.
- 6. Other Considerations**— The price of recycled-content items are generally cost-competitive with virgin products. Prices may be influenced, in part, by such factors as the quantity of a product purchased, transportation costs, etc. These factors exist whether the item is virgin or recycled. In addition, EPA does not intend to designate experimental or developmental products until it can be shown that they meet all of EPA's selection criteria.

 **Green labeling**— It is important to label your green product in a way that it will attract consumer attention, but it is critical not to make unsubstantiated or misleading claims. The Federal Trade Commission (FTC) has set forth guidelines for the labeling and marketing of green claims on products.

FTC’s guidance document, “Complying with the Environmental Marketing Guides,” can help you properly label and market your product.

FTC Guidelines Principles

1. Clear and prominent qualifications and disclosures.
2. Distinguish between attributes of product, package and service.
3. Do not overstate attribute.
4. Basis for comparisons must be clear.

The following is an example of a misleading claim:

- Paper is advertised as “environmentally friendly”: Although it contains recycled fiber, the manufacturing process still produces and releases toxic materials. Therefore, the environmentally friendly claim is misleading.

The following is an example of an acceptable claim:

- Paper claims to be “30% recycled fiber”: Some of the recycled fiber is post-consumer, the rest is paper manufacturing scrap never sold to customers. This claim is acceptable because it does not overstate the attribute.



Resource: FTC Guidelines On-line

“Complying with the Environmental Marketing Guides”

<http://www.ftc.gov/bcp/online/pubs/buspubs/greenguides.pdf>



“Guides for the Use of Environmental Marketing Claims (Green Guides)”

www.ftc.gov/bcp/grnrule/guides980427.htm



d Use Marketing Strategies – Marketing your green product adds a whole new dimension to your traditional marketing approaches. Thus, it is important to consider these basic concepts:

1. **Understanding the green consumer mindset** – Consumer concern about the environment has steadily increased over the past two decades.
2. **Identify opportunities** – The demand for greener products exists and will grow in the future.
3. **Highlight direct benefits** – Consumers primarily buy products for direct needs, not to “save the planet”, and consumers purchase out of self-interest (e.g., top environmental concern is health).
4. **Don’t marginalize products by “green washing”** – Highlight functionality first and environmental benefits second.
5. **Educate and empower consumers** – Consumers need information to become more sophisticated about buying green.
6. **Maintain credibility** – Do not make unsubstantiated claims.



Resource: Strategic Green Marketing

The six strategies presented above are from: “Strategic Marketing of Greener Products,”
by Jacquelyn Ottman and Virginia Terry

<http://www.greenmarketing.com/articles/JSP1Apr98.html>



For additional articles: http://www.greenmarketing.com/Articles_and_Speeches.html



Case Study: Green Copy Paper (Louisiana Association for the Blind)

Product Line Extension- 100% recycled, 50% postconsumer processed chlorine-free copy paper

On January 19, 2001, EPA Headquarters (HQ) implemented a new policy requiring that copy paper used at HQ contain at least 50% postconsumer content rather than the Federal standard of 30% postconsumer content. The policy also specifies that processed chlorine free (PCF) paper should be used whenever available. The new requirements took effect at the Headquarters level first, with all Regional offices and labs to make the conversion by the end of October 2001. In response, the Louisiana Association for the Blind (LAB) in Shreveport immediately began working to extend their product line to include a new copy paper product that would meet the EPA specifications.

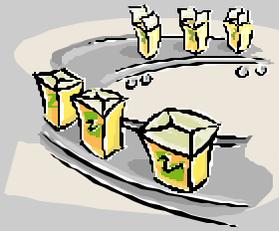
It was an intensive, demanding process for both LAB staff and its suppliers. LAB had produced 100% recycled, 30% postconsumer paper since 1995. Due to the excellent relationships between LAB, its suppliers and the paper mills, development of the new product was a collaborative effort. The first and most difficult step was finding a reliable source to produce the paper and ensure that it would meet all performance requirements of the finished product. The new paper underwent extensive testing and had to be certified as 100% processed chlorine free by the producing mill. During the conversion process from roll stock to cut-size sheets, LAB performed further tests for performance in high speed copiers, laser printers and ink jet printers.

In July of 2001, LAB began actively marketing to the EPA Regional Offices and quickly reached a blanket purchase order agreement with Region 4. The new copy paper costs more than the 30% recycled-content paper, but is priced competitively for a specialty product. Paper prices can fluctuate dramatically, but as demand increases, LAB expects the new 100% recycled, 50% postconsumer content copy paper product to remain within a price range attractive to the customer.

While the EPA is the only agency currently requiring the new paper, LAB anticipates that other customers will similarly change their specifications and LAB intends to be well positioned when demand increases. As demand for the product grows, LAB expects to introduce other paper products with the same environmental specifications. Always thinking ahead, the organization has already completed additional research on 100% recycled, 100% postconsumer PCF paper products and currently has copy paper available to also meet that specification.

Contact:

Shelly Taylor, VP Marketing, Louisiana Association for the Blind, <http://www.labbsciee.com/>
318-635-6471 jabowen@softdisk.com



Section 4: Greening the Manufacturing Process

Products can also be made greener by improving the processes used in their manufacture. Toxic materials used in manufacturing can be replaced with less toxic or non-toxic alternatives (e.g., substituting traditional solvents with citrus-based solvents). Materials can be recycled on-site so you reduce your material use (e.g., on-site recycling of used solvents reduces the need for solvent disposal while reducing your solvent purchases). Upgrading your equipment may improve process efficiencies, enabling you to reduce your use of energy (such as installing energy efficient motors) and raw materials. These approaches are also commonly called pollution prevention (P2) or source reduction. Studies have shown that companies often overlook some of these money saving process improvements.

Two principles guide the approach to greening manufacturing processes:

Principle #1

Maximize the percent of input material that leaves the facility as a saleable product

- Process improvements
- Improved housekeeping
- Better inventory control
- Segregate waste streams
- Identify ways to turn wastes into saleable products to other companies
- Recycling process wastes

Principle #2

Minimize use of energy and ancillary materials

- Energy and water conservation
- Recycling programs
- Process optimization
- Regular equipment maintenance
- Employee training and incentive programs

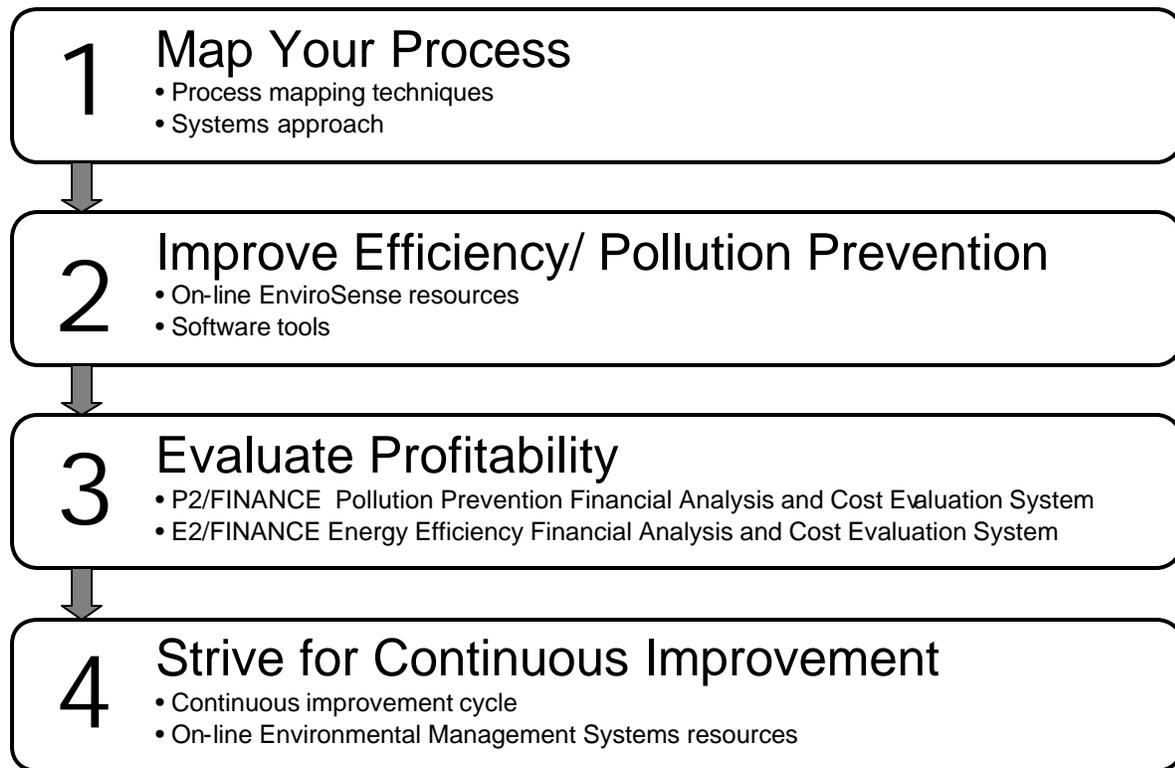
This section helps you identify opportunities to green your manufacturing processes by using materials and energy more efficiently, while also saving money.

The following diagram summarizes the steps you can take to identify opportunities for greening your manufacturing processes. Each step is subsequently detailed in this section.

Improving the use of resources during manufacturing results in cost savings through:

- Reduced input materials
- Reduced waste
- Reduced emissions
- Reduced energy consumption
- Improved worker safety

Figure 8 Steps in Greening the Manufacturing Process





Step 1: Map Your Processes

Understanding your manufacturing processes is the first step in identifying greener manufacturing opportunities. It is usually assumed that we understand how the industrial processes work in our facility, but oftentimes we do not really understand exactly how processes work or whether they can be improved, simplified or eliminated. Many times the person responsible for disposal of wastes does not understand the systems that are generating those wastes, or personnel continue to conduct tasks as they always have, without really understanding certain aspects of the function of these tasks. This can lead to the inefficient use of resources, such as using more solvent than is necessary or running water through a rinse system at too high a flow rate. Process mapping helps start the process of improving operations at your facility by creating an outline that gives you and your team a better understanding of how things work.

What is a process map? A process map is a schematic description of a process or processes. It is not a quality improvement flowchart, a floor plan, nor a complex wiring diagram. Enough detail should be included to provide adequate information to understand the bigger picture of your processes and stimulate discussion on the interactions between various processes.

Reference for this section: Pojasek, Robert; "Understanding a Process with Process Mapping," *Pollution Prevention Review*, Summer 1997; p. 91-101. <http://www.pollutionprevention.com/Pdf-p2/understanding-a-process-with-process-mapping.pdf> 

Process maps are usually prepared by a team rather than by one individual because individuals with specific skills and knowledge of subsystems in the manufacturing process need to come together and make these connections. A completed process map should be the result of the integration of these subsystems into a map that allows you to look at the whole picture.

For complex processes, several sets of hierarchical process maps may be needed to adequately describe all of the activities at various levels of details. Maps can include energy consumption, material flows, waste flows and air emissions. It is important to consider ancillary processes (e.g., equipment startup, maintenance), as there may be opportunities to improve these processes as well.

Figure 9 shows a sample process map for lithographic printing. The upper map provides an overview, showing only the major steps in the manufacturing process. The lower map shows greater detail of the "prepress" stage. Figure 10 then lists the inputs and wastes associated with each of these prepress steps. The focus of each

Benefits of Process Mapping

As a result of process mapping, Custom Print, a lithographic printer, realized that over 80 different chemicals were on-site. By reducing its inventory to 24 chemicals, the company saved \$5,000 per year. (See page 11 for more details about Custom Print.)

map depends on the areas of interest. Figure 10, for example, could be modified to include energy consumption by various processes to allow a team to focus on identifying opportunities for increasing energy efficiency.

Figure 9 Lithographic Printing Process Map Example: Product Flow

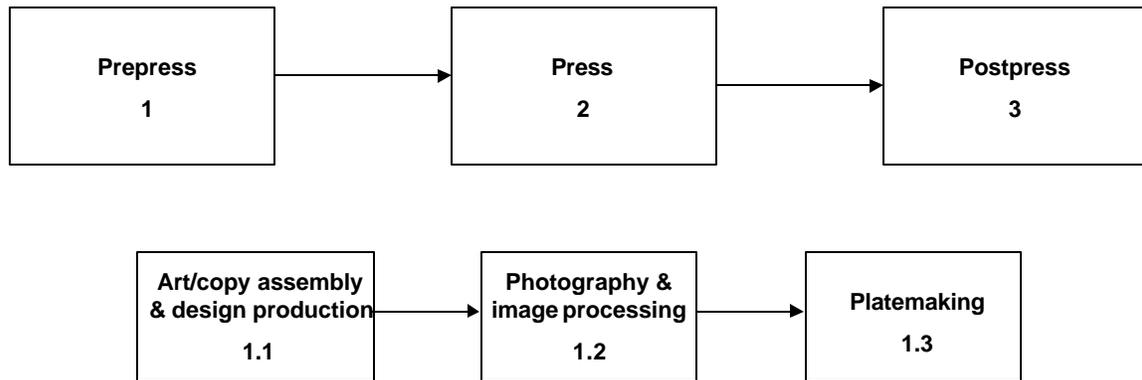
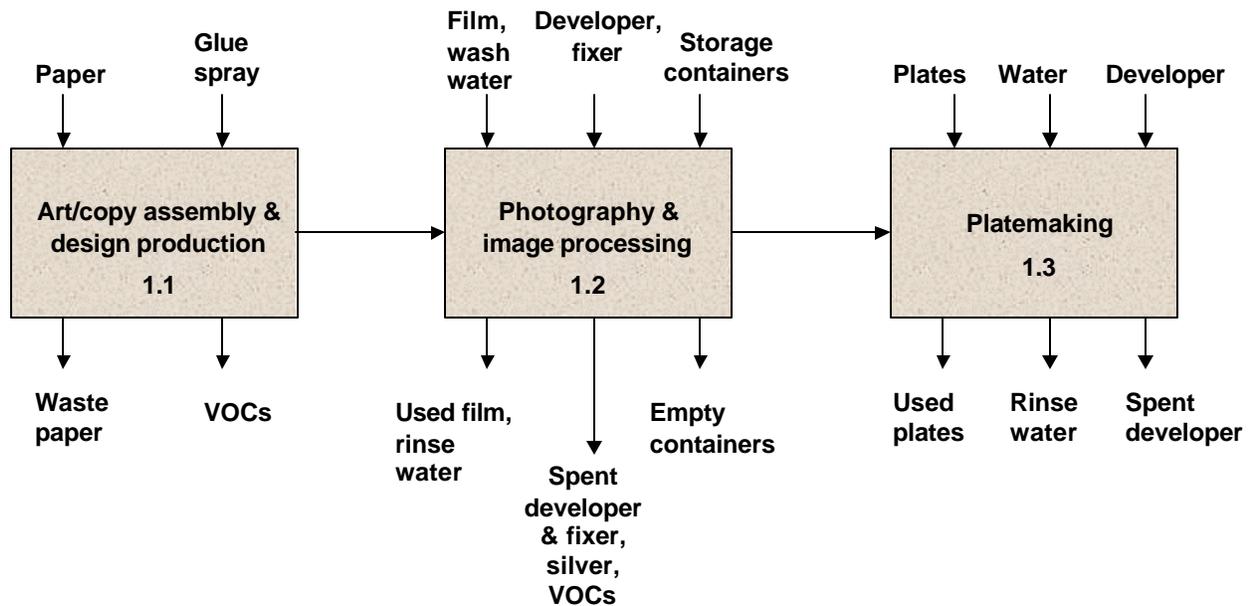


Figure 10 Lithographic Printing Process Map Detail: Input/Loss



Resource: Systems Approach Tools

This website contains a selection of articles by Robert B. Pojasek that provide guidance on approaching process improvements from a “bigger picture” perspective.

<http://www.pollutionprevention.com/Pdf-p2/handouts-PDF.html>





Step 2: Identify Greener Manufacturing Opportunities

Process mapping helps you identify opportunities for improving your processes. Often elements of the process map point clearly to areas in the manufacturing process that can be improved by applying the two principles introduced earlier—(1) maximizing the percent of input material that leaves the facility as a saleable product and (2) minimizing the use of energy and ancillary materials. For example, implementing a system to reduce wasted solvents reduces the amount of emissions associated with the use of the solvent, but also reduces the need for as much solvent. Resources below can help you identify opportunities to use materials and energy more efficiently and optimize your manufacturing process to reduce waste.



Resources: On-line at Enviro-Sense



Small Business Waste Reduction Guide

37 case studies from various industry sectors (e.g., food processing, printing, wood finishing, metal cleaning, coating/painting).

<http://es.epa.gov/new/business/sbdc/sbdc7.htm>



VendInfo

Listings of pollution prevention equipment, products, or services (e.g., solvents, pallets, lubricants, cleaning chemicals, recovery equipment).

<http://es.epa.gov/vendors/>



Business Assistance Cooperative

Provides easy access to sector-based information on pollution prevention and greener manufacturing from state and local government programs, technical assistance programs, compliance assistance centers and business assistance centers.

<http://es.epa.gov/cooperative/stateandlocal/>



Resource: EPA Sector-based programs

Provides links to various EPA programs that focus on industry sector issues.

<http://es.epa.gov/cooperative/topics/EPAintro.html>





Resources: On-line efficiency tools

Two on-line tools are available to assist you in improving the efficiency and environmental performance of your operations.

Coatings Guide™

The Coatings Guide™ is a pollution prevention tool for paints and coatings users. The Coatings Guide™ contains several tools to help users identify low-volatile organic compound/hazardous air pollutant coatings that may serve as drop-in replacements for existing coating operations.

To date, the Coatings Guide™ information base has focused on alternative coatings for plastic and metal substrates. Watch for the addition of new information on alternative coatings for architectural substrates coming in fall 2001.

<http://cage.rti.org/> 

SAGE

SAGE is a comprehensive guide designed to provide pollution prevention information on solvent and process alternatives for parts cleaning and degreasing. SAGE does not recommend any ozone depleting chemicals.

<http://sage.rti.org/> 



Resource: Technical Assistance Providers

Technical assistance providers (TAPs) help businesses identify and implement green manufacturing opportunities. You can identify a local TAP at:

<http://www.epa.gov/p2/resources/index.htm> 

or a regional TAP at:

<http://www.p2rx.org> 

In addition to these tools, your suppliers may be a valuable information source.



Step 3: Evaluate Profitability

When capital improvements are required, it is necessary to evaluate the profitability of these greening projects. A key element in assessing the profitability of pollution prevention and greener manufacturing projects is to properly account for all environmental cost savings. Often costs (such as waste disposal) are neglected from the analysis. Techniques and software are available to help in such an evaluation (see below).



Resource: E2/FINANCE

Energy Environment Financial Analysis and Cost Evaluation System

E2/FINANCE can help you assess the profitability of potential energy efficiency or pollution prevention investments, or investments in other environmental projects.

<http://www.tellus.org/risk/software/e2freq.html> 



Resource: P2/FINANCE

Pollution Prevention Financial Analysis and Cost Evaluation System

P2/FINANCE is a spreadsheet software application for conducting financial evaluations of current and potential investments. It is unique among capital budgeting tools because it expressly addresses traditional obstacles to the financial justification of pollution prevention (P2) investments. Specifically, P2/FINANCE differs from conventional practices by expanding the cost and savings inventory to include indirect and less tangible environmental costs, and by using profitability indicators and time horizons that capture the longer-term savings typical of pollution prevention investments.

<http://www.epa.gov/opptintr/acctg/download/p2finan.htm> 



Step 4: Strive for Continuous Improvement

Start Small !

Remember that you don't have to do everything at once! It is important to start small with projects that will achieve success so that you and your employees gain experience with the process and build confidence in your ability to make changes.

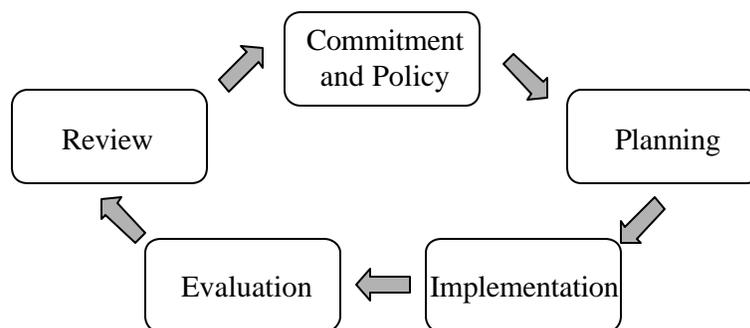
Greening your manufacturing process is not something that is accomplished all at once, or something that is complete after implementation. Greening should be taken one step at a time, and always part of the decision making process.

The five stages of the “continuous improvement cycle” shown in Figure 11 are the main components of what is known as an “environmental management system”

(EMS) as defined by ISO 14001 (a commonly used continuous improvement framework). An environmental management system provides a systematic way to review and improve operations for better environmental performance. It can be used to help a company improve resource utilization and efficiency, streamline operations, and meet compliance requirements.

Even if you do not have immediate plans to embark on achieving ISO 14001 certification, the tools and techniques presented here are useful for any level of effort that seems appropriate to your company at present. The continuous improvement cycle is applicable to any business operation.

Figure 11 The Continuous Improvement Cycle



Commitment and Policy—Top management commits to environmental improvement and establishes a company environmental policy.

Planning—The company conducts a review of its operations, identifies legal requirements and environmental concerns, establishes objectives, evaluates alternatives, sets targets, and devises a plan for meeting those targets.

Implementation—The company follows through with the plan by establishing responsibilities, training, communication, documentation, operating procedures, and an emergency plan to ensure that environmental targets are met.

Evaluation—Where the company monitors its operations to evaluate whether the targets are being met, and if not, takes corrective action.

Review—The process is modified to optimize its effectiveness. The review stage creates a loop of continuous improvement for the company.



Resources: On-Line Information About Environmental Management Systems (EMS)

Integrated Environmental Management Systems: Implementation Guide, US EPA (Oct 2000)
<http://www.epa.gov/opptintr/dfe/tools/iemsguide.htm> 

Environmental Management Systems, NC Division of Pollution Prevention and Environmental Assistance
<http://www.p2pays.org/iso/> 



Section 5: Conclusion

This document is intended to be an introduction to greening products, focusing on two elements of greening: (1) greening product attributes and (2) greening the manufacturing process. The following are some parting thoughts as you embark on the journey toward improving your own products.

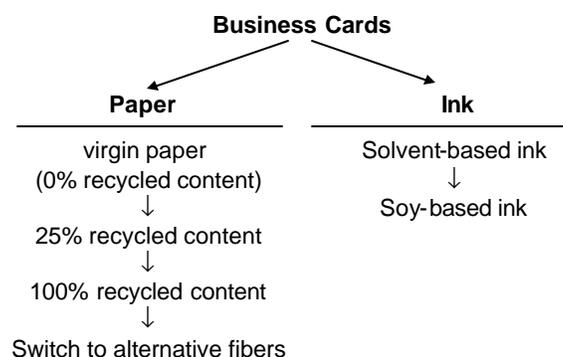
1—Evaluate greening opportunities during product design. Because approximately 70% of a product’s environmental impacts are determined by decisions made during its design (such as what materials are used, how the product is packaged), it is important to evaluate greening opportunities during this phase of a product’s development.

2—Greening is a moving target. It is important to remember that the concept of “greening” is relatively new, and is therefore still a moving target. Government agencies and businesses alike are struggling to determine the best ways to improve their products to minimize impacts to human health and the environment. Replacement materials that may not be available today may be available tomorrow—always be on the lookout!

3—Greening takes time. It is important to remember that greening is not something that needs to happen overnight. All improvements do not have to be done at the same time. For example, with business cards, first replace the 100% virgin fiber with recycled content, increasing recycled content as material becomes available/more affordable, or moving to alternative fibers; then you can consider replacing solvent-based printing inks with soy-based inks (Figure 12).

4—Green product market is increasing. More and more companies, governments, and individuals are demanding and purchasing greener products. Greening your products now will give you strategic market advantages in the future.

Figure 12 Example of Incremental Improvements



Materials Inventory Sheet

Product: _____

Inventory conducted by: _____

Date: _____

Material/ Specifications	Quantity per unit product/ Quantity procured per month	Cost per unit product/ Cost of material purchased per month	Current vendor/ alternate vendors	Applicable alternatives/ Goals based on guidelines

NOTES: