

## 2.6 Waste Reduction Options: Going to the Source

The focus here is primarily **source reduction**. Where options can be identified, this strategy invariably is the most cost efficient. Although recycling has sometimes been included in waste reduction discussions, recycling **does not** reduce the amount of waste generated at the business site. Recycling does reduce the amount of waste going to landfills. However, because material is still generated as a waste, it means the business source of the recyclable materials incurs potential cost inefficiencies.

In many instances, recycling is still necessary, or may be an important first step toward source reduction. For example, a printing company discovered that it could turn pallet waste from a cost to a profit center. The company had been disposing of pallets in the landfill. By repairing or rebuilding pallets, and then selling them, the company saw a \$100,000 waste cost become a \$300,000 net profit. This example works because the particular business generates a large number of pallets. However, this is not true for many businesses. A more cost effective alternative in many instances is to switch to returnable, reusable pallets or other forms of non-disposable shipping units.

To further emphasize the source reduction approach, some companies have established “**zero waste**” goals. In some cases this was in response to voluntary partnerships like EPA’s **33/50 program**. This program established 33 percent and 50 percent reduction goals for 17 targeted chemicals by 1992 and 1995, respectively. Approximately 1,300 companies joined this program. Many of them greatly exceeded the partnership goals. Some achieved the 50 percent overall reduction goal a year ahead of schedule.

In **Climate Wise**, another EPA-sponsored program, the goal is to turn energy efficiency and pollution prevention into corporate assets. In this program companies establish a plan to identify and implement cost-effective energy efficiency and pollution prevention options. The program began in 1994. By the year 2000 it is expected to produce an \$80 million cost savings annually among participants. Some facilities have already achieved \$400,000 to \$500,000 in cost savings.

Regardless of the initial reason for companies voluntarily establishing waste reduction goals, an important point is that management recognize the importance of making the commitment. This is accomplished through establishing goals and policies that involve all employees. Every employee is an essential asset for identifying and implementing waste reduction ideas. Outside consultants and technical assistance representatives can help get things started, but in the long run, it takes knowledge of both the internal process and the organization to be most effective.

### **Old Habits Die Hard**

There are many cost savings examples related to waste reduction. However, it can be difficult to start projects and try to implement change in a company that is not enthusiastic about waste

reduction as an important part of its business strategy. Changing old habits can be a significant hurdle, even when management and staff have shown an initial interest.

For example, a small custom truck body manufacturer became interested in the idea of saving money by working to eliminate wastes from processes. They were partially driven by hoping that eliminating waste would also reduce the regulatory burden that affected the business. A number of options were identified for solid and hazardous waste reduction. These ideas included both source reduction and recycling measures.

The company's painting operation's source reduction proposals were greeted with great interest. The proposed changes involved a better understanding of customer needs, a reduction in hazardous waste costs, and a reduction in the regulated waste streams. The changes could be made without significant changes in the work patterns or habits of employees.

In contrast, another opportunity identified for pallet wastes failed after a short attempt at implementation. Pallets were being disposed of at the local landfill by a local hauler who picked them up at one of two company loading docks. The company was paying both hauler and landfill disposal fees. The pallets came from many suppliers, and it would take some time to work towards a returnable pallet system.

The short-term solution identified for pallets seemed to make good economic sense. A regional pallet company that rebuilt pallets and ground up unusable materials for animal bedding parked an empty trailer at the company's other loading dock. Employees were asked to bring pallets to the new location and place them in the trailer. Even though there was a clear and substantial savings opportunity, the change in habits related to pallet management were an implementation barrier. Furthermore, management's understanding of the cost implications of waste had not matured enough to try to facilitate the change with employees. This lost opportunity equaled the cost of one hourly position.

This illustrates the importance of helping companies realize the potential value of cost reduction through waste reduction. It also shows the need to ensure that the business has the tools to evaluate the projects that may be identified and of helping to establish priorities that will be supported by management and employees. Where employees encounter barriers and cannot facilitate change, management must understand those barriers and have enough information about the project to determine the merit of helping employees overcome those hurdles.

In the pallet example, management could have supported the change process to assist employees in breaking old habits. This could have been a successful project if management had assigned a small portion of a fork lift operator's time to move the pallets to the new location, and to then insert them into the trailer.

## Setting Priorities

Helping a business begin identifying options often means finding some initial opportunities that will have an obvious positive impact. This will likely gain the support of employees and management. Priority projects should meet one or more of the following criteria:

- C Easy to identify and implement.
- C Requires low capital investment;
- C Delivers an attractive payback period or return on investment;
- C Results in attractive savings for the business;
- C Offers a positive public image;
- C Improves safety for employees;
- C Reduces the regulatory burden;
- C Lowers company liabilities;
- C Reduces a large volume of waste;
- C Lowers energy consumption; and/or
- C Reduces the use of toxic or hazardous materials.

One simple way to evaluate ideas that have been identified is to set up a simple **comparison matrix** in which each projects can be scored on a number of points. For example, one might identify three possible projects such as switching from wood to returnable plastic pallets, eliminating the use of a hazardous solvent in a painting operation, and switching to more efficient lighting systems. Eventually it would be good to implement all three, but it may be necessary to pick one to start. The following comparison matrix is scored to show a hypothetical ranking system where a score of “5” is the maximum value and a “1” has the minimum value for each category of evaluation. The categories are added for each project to determine the priority ranking.

**Table 2.6 Project Comparison Matrix**

<b>Project</b>	<b>Cost Savings Potential</b>	<b>Regulatory Relief</b>	<b>Degree of Hazard</b>	<b>Liability Relief</b>	<b>SUM</b>
Wood to plastic pallets	3	1	1	1	6
Eliminate solvent	1	5	4	5	15
Change lighting system	5	1	2	2	10

In this example, the change in the lighting system has the greatest cost savings using return on investment as the criterion. The pallet system conversion has noteworthy potential for cost savings, but otherwise offers minimal benefits. The elimination of the solvent system has minimal cost savings because the replacement system will have nearly the same costs. However, this

system brings about major benefits in other evaluation categories, such as costs or potential costs not considered in the return on investment in the first column.

This example emphasizes the regulatory and liability portion of potential evaluation criteria. The criteria used depends on the businesses' priorities and concerns. This example would fit well for some manufacturers; however, a retail store might choose criteria such as volume of waste or waste storage space, product packaging costs, employee handling time, et cetera.

## **Basic Strategies**

Source reduction begins when assessing materials or equipment to be purchased. A few basic tips include buying only the amount of product needed, buying durable goods that can be repaired and maintained, and reducing or eliminating the use of toxic materials. In these examples the **purchasing agent** or buyer is very important in helping the business identify material and equipment sources to achieve these goals.

**Buying only the amount and type of product needed for the job** is a very simple, low-cost strategy. This strategy applies to both individuals and to businesses. This strategy is often sidetracked by marketing or pricing schemes that encourage the buyer to get a larger volume of material at a lower price per unit volume. The high volume purchase promotion is a good buy if all of the product can be used. It becomes a bad deal when there is significant unused product that becomes a waste after the job is completed.

Good examples of the volume purchase traps include paints, occasional use cleaning products, and industrial solvents. If a small business wants to redecorate the office, for example, and paint is being purchased, it is important to get a good estimate of the surface area to be covered. The company can then work with the paint supplier to determine the amount of paint needed. A quart of paint often costs about half the price of a gallon of paint, but if a quart is all that is needed, then don't buy the gallon. Or, if three gallons will do the job, don't buy the five gallon pail. The most common high volume waste from households and small businesses at hazardous waste collection events has been paint and related solvents and cleaners. Small businesses find it very expensive to properly dispose of small quantities of hazardous waste.

If a salesman comes to a small business and says "I have a wonderful new cleaning product" or "We have a great discount on solvent X this month", how should the business respond? New products run the risk of not being acceptable. The buyer should know what is in the product before agreeing to try the product. The buyer should also have an agreement with the supplier that if the product is unacceptable, then the supplier will take the material back. Purchasing a large volume of product on sale is fine if that product will clearly be used within the period of its shelf life. Volume purchases should be avoided if the product is only occasionally used. Waste could become a problem in these cases. A special promotion of a solvent for \$200 per drum may seem like a good deal until it becomes a \$1,000 hazardous waste disposal cost.

**Reducing toxicity of materials** used by a company is another waste reduction strategy that saves money in terms of insurance, employee exposures and sick time, liability, hazardous waste disposal, and regulatory reporting. This opportunity can be found in almost any business. Medical, dental, and veterinary clinics, for example, can find alternatives to mercury thermometers, or developer system cleaners that don't contain chromium. Both of these materials are hazardous, and a mercury spill from broken equipment can be costly to clean up. Printers and artists are often exposed to solvents and heavy metals in inks and paints. Substituting pigments and using vegetable-based inks reduces the exposure hazard and the amount of hazardous waste.

**Material substitution** is an option for reducing material toxicity or hazardous waste generation by a business. This is one of the most significant opportunities for businesses, whether it is finding non-toxic cleaning solutions for building maintenance, or non-solvent based cleaners for an industrial process.

One company switched to a cleaning solution with less volatile materials and saved \$20,000. An industrial valve manufacturer switched to a water-based coating to finish a product, saved nearly \$30,000 in hazardous waste disposal costs, and had a higher quality finish on the product. A small manufacturer of metal fasteners switched from cleaning parts with mineral spirits to using an aqueous cleaner. The spent mineral spirits were a hazardous waste, while the aqueous cleaner could be neutralized and periodically sent to the local sewer system.

**Process change** often accompanies the material substitution strategy. As a growing, competitive business looks to upgrade its operations, it is an ideal time to think about the materials used and the waste streams generated by process options. For other businesses a less progressive philosophy is "if it isn't broken, don't fix it". Satisfaction with an existing process or product quality can be a barrier to using better alternatives. Other barriers to process change include downtime, capital requirements, payback period, and sometimes regulatory issues.

If a business asks the right questions up front, it has a much better chance of finding the most cost effective solution. For example, a company decided to go into a new venture that remanufactured used office furniture. It would have been easy for the company to adopt standard technology for stripping and refinishing the furniture, but that involved using solvent-based coatings. Instead, the company sought help in finding alternative technologies to reduce the potential for generating hazardous wastes. By establishing alternative coating technology processes at the beginning, the company reduced its regulatory exposure, and saved approximately \$250,000.

A motor vehicle filter manufacturer changed from spray painting to powder coating a product. This eliminated all hazardous waste costs. A powder overspray recovery system was developed that completely eliminated waste. The payback period was more than two years, but the improved product quality and the elimination of expensive waste streams were strong incentives. A toy manufacturer switched to powder coating and had a payback period of less than one year. In addition, the company found new customers who wanted the products because they had lower environmental impacts during manufacture.

A small metal fabricator had a problem with phosphate discharges to the local sewer system. They had a very efficient powder coating system. However, there was a problem with the phosphating system that prepares the metal surface for coating. It was found that the multi-stage phosphating system could be modified and process water changed. Thus, the phosphate discharge would be virtually eliminated, and the treatment solution life could be significantly extended. In this case, the company could realize both regulatory relief and raw material cost savings.

**Packaging reduction** is a common manufacturing and retail business opportunity. While many forms of packing create a solid waste, reducing packaging costs can save in several ways. Since packaging does not add to product value, reduced packaging saves the manufacturer in terms of product cost and also saves the consumer money.

Examples of retail packaging reduction include eliminating plastic bags on undergarments on display, reducing material used in a container of canned goods, eliminating multiple layers of packaging materials, and providing product in bulk or concentrated forms. Both the store and the customer benefit from using less packaging.

The benefits and opportunities for manufacturers are basically the same as for retailers. For example, a maker of small auto parts was shipping parts in Gaylord boxes. The boxes were closed and mounted on wooden pallets with steel banding. This created three solid wastes for the customers, and the company had to continually buy the packaging materials. It switched to a plastic, returnable pallet with folding sides. After the initial investment, the company eliminated the constant cost of buying disposable packaging. In addition, customers were more satisfied when the waste was eliminated.

**Reuse of products or materials** is often possible, even when products are designed for single use. Office paper is a very large volume waste stream that can be reduced by reusing the back side of papers for draft materials or creating note papers. Boxes can be sent to corrugated manufacturers for recycling, but often can be reused before being recycled. A carton company was created by collecting cardboard boxes, cleaning them, and selling them for reuse.

A small newspaper virtually eliminated ink waste by collecting waste color inks and black ink and blending them. The resulting black ink was perfectly suitable for press use. Not only was the waste cost eliminated, but reusing “waste” ink reduced the purchase of new ink. The drums used to ship ink and other materials were designed for single use. However, many drum recyclers will take drums from companies, clean them, and prepare them for resale.

A **materials exchange** is a special service that promotes reusing materials. These exchanges may function at the local, state, or regional level. They help businesses identify other businesses that may be able to use their waste material as a raw material. They also help businesses searching for a specific material locate that material in another company's waste stream.

**Durable goods** should be repaired and reused whenever possible. Products designed for single use that cannot be easily repaired should be avoided. For example, toner cartridges are increasingly being reclaimed and reused in offices. Equipment and tools requiring rechargeable batteries should be easily serviceable, ensuring that batteries can be replaced when no longer usable. Products designed to discourage service or repair should be avoided.

**Good housekeeping practices** are effective in reducing waste and preventing costly repairs. Machines properly maintained will be least wasteful and will provide a better quality product. Whether it is an office copy machine or a widget machine, good maintenance is essential. Machines poorly maintained develop leaks that become waste problems in terms of clean up costs and replacing lost product or material.

An electrical equipment manufacturer found that good maintenance and repair practices on machines virtually eliminated cleanup and disposal problems of waste oils and coolants. The machines did not leak lubricants, and the coolants were periodically removed, cleaned, and reused to extend their life. The company had very little downtime because of good maintenance. In contrast, another machinery manufacturer had a poor maintenance and general housekeeping program. As a result, metal turnings from drill presses and oil leaks from various presses and stamping machines spilled onto the floor and were tracked around the facility. When the company realized it had a significant cleanup problem, it found that it had a \$1.5 million bill just to clean the facility, not including any repairs that were needed.

**Employee training and involvement** is key to a good program. Employees are a good source of ideas, and are critical to implementing waste reduction practices. Office staff have numerous opportunities to reduce paper use, recycle materials, use returnable toner cartridges, use more computer communications and records, and make sure that equipment undergoes routine maintenance. Lunch room environments can also be a good place for employees to reduce waste. Employees can reduce waste by bringing a personal mug or using company mugs, by reducing use of disposable food containers, and by using a linen service instead of paper hand towels.

A small electronics company with 90 employees switched to cloth linens in the lunch room and rest room. The company saved a net value of \$9,000 annually vs. the paper towel system. The company also eliminated disposable cups for employees and replaced them with company mugs. Visitors or employees who forgot mugs could purchase a “disposable” cup from the company. The trash volume from this area was reduced by nearly 90 percent.

Perhaps one of the more notorious opportunities for waste reduction begins with the fork lift operator. A fork lift operator is found in many businesses besides manufacturing. They move materials and equipment, and play a key role in warehouse and product inventory operations. Careless forklift operators have often led to substantial damages to materials in warehouses, which creates additional waste streams. Good fork lift operating practices can save a company significant waste costs.

Proper equipment use training is a given when trying to reduce waste. Technicians using paint spray equipment, for example, have reduced paint waste from overspray by 10 percent or more, simply through training. Additional waste reduction has been achieved with equipment or process changes.

Giving employees a chance to share their waste reduction ideas is virtually a zero-cost opportunity that can reap great benefits. A dairy plant had too much water waste. The volume of water from cleaning operations was creating capacity problems with sewer disposal. While management was not sure what to do, it was discovered that one of the employees knew where and how much water was being wasted, and what could be done to reduce water consumption. The problem was that no one had asked the employee for his ideas.

### **Tools for Starting Programs**

This guidebook makes no attempt to identify all the tools and processes that businesses can use to implement waste reduction programs in their office or shop. There are a variety of references available for that purpose listed in the following Additional Reading section.

#### **Additional Reading**

*Facility Pollution Prevention Guide*, U.S. Environmental Protection Agency, EPA/600/R-92/088, May 1992.

*Business Guide for Reducing Solid Waste*, U.S. Environmental Protection Agency, EPA/530-K-92-004, November 1993.

*Waste Prevention: Source Reduction NOW, How to Implement a Source Reduction Program*, by Ken Brown, Minnesota Office of Waste Management, February 1993.

*Pollution Prevention: A Guide to Program Implementation*, University of Wisconsin-Extension, Solid and Hazardous Waste Education Center, July 1993.