



RETAIL HARDWARE

Best Practices for Waste Management

July 1998

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Project Background

The Water Foundation, a 501(c)3 environmental education corporation located in Brainerd, Minnesota, received a grant from the Minnesota Office of Environmental Assistance (OEA) to research, identify, and document cost/benefits of “best management practices” for waste reduction and pollution prevention in the operation of a retail hardware store. The pilot program was implemented in partnership with the Minnesota-Dakotas Retail Hardware Association and the Ace Hardware Corporation. This guide, *Retail Hardware Best Practices for Waste Management*, is a management tool for hardware retailers throughout the United States.

Four Minnesota Ace Hardware stores participated in the year-long pilot project: Henricksens Ace Hardware, North St. Paul, Minnesota; Frattallones Ace Hardware, Arden Hills, Minnesota; Denny & Kathys Ace Hardware, St. Cloud, Minnesota; and Alexandria Ace Hardware, Alexandria, Minnesota. They represent a cross section of retail hardware operations, from a smaller retail store (7,000 square feet) to an eight-store retail hardware group.

A technical team from the OEA, Minnesota Waste Wise, and The WATER Foundation conducted on-site waste management surveys at each hardware store. The surveys assessed the amount of waste generated and potential handling improvements; current waste minimization practices; transport packaging; improved efficiency for lighting, energy and water consumption; products used for building maintenance; and purchasing patterns.

Following the on-site visit, an optimal waste reduction and pollution prevention plan was developed for each store. Over 40 waste management practices were monitored and documented at the pilot stores for cost and waste savings (in weight and volume), and are detailed in this guide. Employee training on waste reduction was conducted at each store using Ace Hardware's retail training video, Environmental Best Practices For Retail Profit, which was produced by the Ace Hardware Corporation in conjunction with this project.

A waste management survey was sent to members of the Minnesota-Dakotas, Iowa, Eastern, and Midwestern Retail Hardware Associations, and to over 5,000 Ace Hardware dealers. The survey documented conservation practices and the amount of waste produced and disposed of in the retail hardware industry as a baseline for this project. It also identified profitable waste reduction practices as a model for other retailers. Tabulated surveys are included in this guide.

This guide describes strategies, methods, products and cost/waste benefits at the pilot stores and other retail hardware stores identified through the survey process. This guide will be a tool to encourage hardware retailers to incorporate environmental responsibility into their business operations and “green up the bottom line” through costs savings in materials purchasing, waste disposal, labor, and utility use. It is clear that hardware retailers can conserve natural resources by optimizing waste management practices. In addition, through their influence on the buying decisions of customers, they can improve and preserve the environment for future generations.

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Introduction: Reducing Waste and Increasing the Bottom Line

An urgent environmental concern

In the past, abundant natural resources were taken for granted. Today, as the population continues to increase, resources are being depleted at a rate unsurpassed in history. Because of the increasing volume of waste generated in the United States, the cost of managing waste is at an all time high.

Meeting the needs of increasingly more people with declining natural resources is an urgent economic and environmental concern. The solution lies in using fewer natural resources, reducing waste, and recycling. Practicing waste reduction helps the economy, the environment and the community.

Resource conservation is the key to reducing waste

When it comes to waste management, old answers aren't working for today's questions. But there is good news in the battle to lower operating costs and positively impact our environment. The good news is a fresh look at an old term—resource conservation.

Resource conservation includes both source reduction and recycling. Both help decrease waste and conserve natural resources.

- **Source reduction** is any activity that reduces the amount of waste produced. Source reduction **prevents waste**.

- **Recycling** uses waste to make new products.

The key to good waste management is to first practice source reduction to prevent waste everywhere possible, and then recycle the remaining waste.

Why should hardware retailers be concerned?

Managing waste hurts the bottom line in many ways. First, there's the cost to receive packaged goods, and then a cost to dispose of the packaging. There's cardboard, wood, glass scraps, plastic film pallet wrap, aluminum cans, employee trash, paper and all kinds of containers to dispose of.

In addition, most hardware stores have an array of cleaning products, degreasers, paints, adhesives, and other products that require disposal, and that may contribute hazardous chemicals to the environment.

Wasted resources don't stop with what's in the trash. Energy, water, materials and especially labor are often wasted through normal business practices.

All of these waste management costs can be a significant portion of the slowly—but steadily—growing cost of doing business.

Why be conscientious about waste management?

Reducing waste management and waste disposal costs, improving operating efficiency and reducing materials cost can save money. The cost savings may be immediate or anticipated, based on avoiding future waste management costs.

Hardware stores that have a commitment to waste reduction can gain significant goodwill and customer loyalty by serving as a waste management model in their community, and gain significant profits.

In addition, selling resource conservation products is big business. The U.S. EPA estimates that the sales of conservation-oriented products reached \$100 billion in 1995—a trend that will continue to grow and provide profits for the retail hardware industry.

Three ways to accomplish source reduction

- **Reduce Waste:** Reduce the amount of material needed to accomplish any task (like using less raw material, packaging or other materials), use less toxic products, and consume less energy and water. When "less" does the same job as well or better, "less means more."
- **Reuse:** Reuse the same product or resource over and over again.
- **Repair and Refill:** Repair equipment or refill products because durable, long-lasting products cost less in the long run.

Reduce waste then recycle

After reducing waste, recycle the remaining waste so it can be remanufactured into new products. As an environmentally responsible retailer, it is important to purchase products made out of recycled materials for use in the store and for sale to customers. Purchasing and using recycled-content products closes the recycling loop and insures continued markets for recycled materials while saving natural resources.

Economic benefits of source reduction and recycling

The economic and environmental benefits of source reduction and recycling can be measured in cost savings, both direct and indirect; and in environmental savings, in volume and weight of waste avoided to the waste stream. Based on the over 40 cost-effective waste management practices documented in this guide, the savings can be significant.

Any retail hardware store could see these savings

If an average hardware store with 10,000 to 12,000 square feet of retail space implemented the majority of the waste reduction activities documented in this guide for product purchasing, computer reporting, inventory management, energy and water conservation, recycling, store cleaning, office practices, and toxicity reduction, the collective waste and cost savings for that store for one year could be:

- 22,500 gallons of water saved
- 620 cubic yards of waste avoided
- 74 tons of waste avoided
- 70 pounds of toxic materials kept out of the waste stream
- \$15,000 in direct cost savings and avoided waste disposal costs

Though most of the examples in this guide are based on practices at Minnesota Ace Hardware stores, the economic and environmental benefits can apply to hardware stores at any location, in any state, or affiliated with any major hardware company, and even more broadly to most retail businesses. The "best management practices" detailed in this guide can be compared to and assessed by any hardware retailer for their applicability to that store, and can be used to prioritize any store's waste reduction efforts. Keep in mind that cost benefits and savings will vary from store to store based on unique factors; however, these practices document potential opportunities for waste reduction and cost savings for any hardware retailer.

Source reduction can work

Source Reduction—reduce, reuse, repair, and refill—followed by recycling does work. Benefits to the bottom line and the environment will be the real payback for any retail hardware store that implements the waste reduction practices documented in this guide, models these practices to the community, and encourages customers to purchase products for waste reduction.




Reducing waste, better management of the remaining waste, and conserving natural resources is the key to resource conservation. "Greening up" the hardware store's bottom line is a win:win for everyone—the store, the customers, and the environment. Like the stores described in this guide, any hardware store can reap the benefits for years to come because...

Resource Conservation Pays.

– and –

Less Waste Is Smart Business For A Better Environment.

Best Management Practices for Waste Reduction

Reduce , reuse, refill, repair , then recycle 
to reduce operation costs and conserve natural resources

Prevent Waste at its Source

Reduce waste by using less material

Buy plate glass in wood billet crates

Henricksens Ace Hardware, North St. Paul, Minnesota (12,000 square feet of retail) buys plate glass in wood billet crates rather than stocking 40 to 50 different sizes of pre-cut plate glass. One sheet of billet glass can be used for multiple glass cuttings; therefore, less glass is wasted than when using pre-cut glass. The glass in billets costs 36 percent less per square foot than pre-cut glass, and it requires less storage space than the boxes of pre-cut glass. Cost savings are realized in the purchase cost of glass and the amount of glass purchased; avoided labor costs to knock down the pre-cut cardboard boxes; avoided waste disposal costs of glass; avoided cardboard disposal; and avoided wood packaging waste because the empty billets are given away to customers. A loading dock and forklift are recommended to receive the heavy billets.

Volume of waste avoided:	44 cubic yds/year of wood & cardboard; 99% volume reduction 1 cubic yd/year of glass; 50% volume reduction
Weight of waste avoided:	7 tons/year of wood & cardboard; 99% weight reduction. 750 pounds/year of glass; 50% weight reduction
Cost savings:	\$3100/year; 37% cost savings

Use bin tags to price merchandise

Alexandria Ace Hardware, Alexandria, Minnesota (7,200 square feet of retail) switched from applying individual product price tickets to using bin tags to identify pricing and then scanning products at the counter. This saved 94 percent of costs, including reductions of labor cost. They were able to reduce the number of people needed each week for price ticketing from two to one, increased the accuracy of product pricing, and increased their efficiency in inventory monitoring. By eliminating individual price tags, the store was also able to eliminate using toxic chemicals to remove price tickets from products, and thus also reduced the toxicity of their waste stream.

Cost savings:	\$5100 the first year of conversion (\$2,200 in labor alone); 94% cost savings
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Buy products in bulk

Frattallones Ace Hardware, Arden Hills, Minnesota (17,000 square feet of retail; owns eight Ace stores) employs two people full time in a small engine repair shop at their store in Circle Pines, Minnesota. Instead of buying oil in individual quart containers, they switched to buying it in gallon containers. Unfortunately, there were no cost savings since it costs less for dealers to buy quart containers than gallons because the quarts are a more competitively priced volume and there are no shipping costs to dealers. However, there were significant savings in avoided waste, especially if they went one step further and purchased motor oil in 55 gallon drums, and then measured out the individual quantities and recycled the drums back to the supplier.

Volume of waste avoided: 0.1 cubic yds/year for gallon containers; 14% volume reduction
 0.6 cubic yds/year for 55 gallon drums; 100% volume reduction

Weight of waste avoided: 40 pounds/year for gallon containers; 43% weight reduction
 90 pounds/year for 55 gallon drums (all reused); 100% reduction

Reduce packaging waste

A packaging evaluation is an essential part of the purchasing procedure at Palo Alto Ace Hardware, Palo Alto, California. If given a choice between purchasing products in individual packages or bulk, they purchase in bulk and display without packaging. While this policy requires more customer assistance, it is also an opportunity to explain to the customer the environmental benefits of reduced packaging. Bulk purchasing is available for many types of products throughout the store, but works particularly well in the plumbing and electrical departments and with small hardware items—fasteners, bolts, screws, etc.

Make purchases cooperatively with other hardware dealers

Denny and Kathy's Ace Hardware, St. Cloud, Minnesota (14,000 square feet of retail) purchases products in bulk quantity with other dealers. Products are shipped directly from the manufacturer and delivered to each individual store for no additional cost. This procedure has cost savings, not direct waste savings. However, products can be purchased more efficiently for better inventory management, which indirectly reduces waste. Antifreeze, sand tubes, potting soil, and small equipment are some of the products purchased in this manner. For example, 20 dealers cooperatively purchased tube sand directly from the manufacturer. The product was dropped off at each store for no additional freight charge saving each dealer the \$35 drop charge if they had ordered the products as individual dealers. Plus, there was a \$1.30 per tube savings (including freight charges) by ordering direct rather than ordering through the warehouse.

Cost savings: 48% cost savings to each of 20 hardware dealers

Maximize computer and printer capacity



Edit daily and monthly inventory reports on screen and save to a file. Print reports on the back of previous reports

Denny & Kathy's Ace Hardware has reduced their paper use for report printing by editing daily and monthly inventory reports on the computer screen and saving to a computer file rather than printing out the reports on paper. This has allowed the store to reduce printed monthly inventory reports from 90 pages to 10 pages, which are printed on the clean back side of previous monthly reports for additional paper savings. They estimate that double-sided copying for reports saves 30 percent on paper purchases per year; \$100 per year.

Volume of waste avoided: 3000 sheets of paper/year for report printing; 96% volume reduction
Weight of waste avoided: 32 pounds/year of paper; 96% weight reduction
Cost savings: \$18/year; 96% cost savings



Use start/stop printing feature

Denny and Kathy's Ace Hardware saves money on bin tag purchases by being able to start, stop, and resume laser printing of bin tags later on the same sheet of tags. This eliminates wasted bin tag sheets and saves on purchasing costs.

Cost savings: \$23/year; 25% cost savings



Computerize inventory management

Denny and Kathy's Ace Hardware has reduced the employee hours spent on tracking inventory and ordering by 75 percent—from 30 hours per week to 7 hours per week—by using the Pace computer system (Ace Hardware's custom software package) for electronic inventory management. Each time an item is purchased at the cash register, the inventory number is scanned by the computer for price and automatically deducted from the inventory amount. While some employee labor is still necessary to cross check the shelf units against the computer inventory, major efficiencies in labor are realized when taking inventory, and ordering and pricing.

Alexandria Ace Hardware attributes a 4-percent increase in their gross profit margin to using the Pace Computer system for inventory management. The computer's accuracy in tracking inventory has enabled the store to be more accurate about product pricing, catching any human errors quickly, and to reduce inventory without a loss in sales. They are now able to turn their stock more often, keep inventory adequate and increase profits.

Cost savings: \$2070/year in labor costs; 77% cost savings at Denny & Kathy's Ace Hardware

Reduce energy consumption

Install energy-efficient T8 fluorescent/electronic ballast lighting

When Frattallones Ace Hardware retrofitted the lighting in their store with energy-efficient T8 fluorescent lights, the local utility projected a yearly savings of 30 to 40 percent on their utility bills, plus they got a sizeable rebate from the utility to help finance the lighting improvement. An added benefit of the new lighting was a brighter, more customer-friendly atmosphere in the store, which will likely influence customer sales. To calculate the payback period, the utility continues to charge the store an average of their pre-improvement electricity costs; until the cost of the lighting improvement is paid for by the difference between the pre-improvement bill and current electric bill (after improvements).

Cost savings: \$4200 per year (amortized over 10 years); 38% cost savings
(based on an electric utility rate of \$0.07 /kwh)

Payback on investment: 3 years

Retrofit exit signs

Frattallones Ace Hardware converted their exit signs from two 20-watt incandescent bulbs to two LED (light emitting diode) bulbs, which have a life of 25 years and an annual operating cost of \$1.09 per sign. The first year cost savings include the avoided cost of replacement bulbs and avoided labor cost to change the incandescent bulbs. Frattallones has five exit signs in the store, which results in a collective first year savings of \$165 in energy costs and a total savings of \$3,045 (assuming a constant electric rate) over the 25 year life of the LED bulbs.

Volume of waste avoided: 0.01 cubic yards/year for 25 years; 95% volume reduction

Weight of waste avoided: 2 pounds/year for 25 years; 96% weight reduction

Cost savings \$33/exit sign in year one, \$24/exit sign/year for 24 years;
97% cost savings (savings are based on a utility rate of \$0.07 /kwh)

Payback on investment: 8.5 months for the LED lighting retrofit kit

Install a programmable thermostat

Frattallones Ace Hardware installed programmable thermostats in their eight stores to reduce winter heating and summer cooling costs. In the winter, the thermostat temperature was reduced during closed evening hours and programmed to turn up before the store opened in the morning. In the summer, the thermostat temperature was increased during closed evening hours and programmed to cool down the store before it opened in the morning. According to Honeywell's Programmable Thermostat package, an average 12 percent savings can be assumed for Minnesota with 2 settings per 24 hours; cost savings are based on the store's annual energy use for heating and cooling.

Cost savings: \$2042/year; 12% energy cost savings

Use motion-sensing lights or timers in low-use areas of the store

Bryant Hardware (Servistar/Coast to Coast) in Minneapolis, Minnesota, has a 1,800 square foot hardware store. They installed two motion sensors, with a 100-watt incandescent bulb in each, in basement lights. The motion sensors are set for 5 minutes and are turned on approximately 15-20 times per day.

Cost savings: \$37/year; 86% energy cost savings

Alexandria Ace Hardware keeps their extra inventory in the basement of the store plus their rest room is located in the basement. They installed timers on all lights in the basement except one, which they keep on continuously for safety reasons. The timers are set for a maximum of ten minutes. Energy savings are based on estimates of daily use.

Cost savings: \$180/year; 89% energy cost savings

Note: Normally, installing compact fluorescent light bulbs in motion sensors would be the most cost effective choice of bulb. In this case, however, regular incandescent bulbs would be the best choice because of the need to instantly illuminate the area for safety reasons, and compact fluorescents take a few seconds to come on.

Use energy-efficient outdoor accent lighting

Alexandria Ace Hardware has 185 feet of accent lighting (9 watts per bulb; 1 bulb per foot) at both the front and back of the store. If they changed to using strings of miniature lights (0.25 watts per light; 2-3 lights per foot) for outdoor accent lighting, they will see substantial savings in operating costs. While the accent effect may be slightly diminished with the smaller bulbs, the cost savings justify the change in bulbs. The labor to replace bulbs is assumed to be the same for either type of lighting. Cost estimates take into consideration seasonal variations in the amount of daylight.

Cost savings: \$400/year; 94% energy cost savings

Install insulating window film or "reflective" film

Installing insulating window film can increase the "R" value of a single pane window by 90 percent to save on heat loss and heating costs. The savings are based on the square footage of windows at Henricksens Ace Hardware, which is located in the northern climate of Minnesota. In warmer zones, the savings will decrease as the heat loss and minimum heating-degree-days decrease. Frattallones Ace Hardware permanently installed window film on two small office windows to reduce winter heat loss and summer heat gain. For a large window area, reflective or "solar" film applied directly to the inside of windows can reduce heat gain in the cooling season and heat loss in the heating season.

Cost savings: \$200/year for a single paned window; 11% cost savings
\$75/year for a double paned window; 4% cost savings

Reduce water heating costs with point-of-use tankless water heaters

Henricksens Ace Hardware installed a tankless electric water heater under the sink in their employee break room. With this type of heater, water is heated instantly to a specified temperature as water is demanded. They also installed 2-gallon point-of use hot water heaters under the sink in two rest rooms. These heat and store two gallons of hot water to be used as called for. Both tankless and 2-gallon water heaters are considered point-of-use water heaters.

Henricksens does not have a 50-gallon hot water heater, but the cost savings here are based on an assumed use for comparison purposes. A 50-gallon hot water heater and a 2-gallon hot water heater cost about the same to heat a gallon of hot water and both cost more than the tankless hot water heater to operate. With a 50-gallon hot water heater, there is additional water and energy wasted because water that is stored in the pipes between the tank and the faucet loses heat upon standing in the pipes. Water sitting in the pipes has to be run out completely before hot water can arrive at the tap; this wastes up to \$75 per year in energy costs to heat the hot water. In addition, since water is heated to a specified temperature in a 50-gallon water heater, when water is not called for, which is most of the day, the water is continually losing heat and energy is wasted in re-heating the water. This energy waste is not accounted for in the calculations; therefore, the savings would be even more than shown. A tankless water heater saves energy and water by heating water only as it is demanded at the tap.

The comparison of the tankless hot water heater to a 50-gallon electric hot water heater assumes that a 50-gallon hot water heater would be located 30 feet from the rest rooms and the employee break room, and it has a 3/4-inch delivery pipe. The savings assume that hot water use is primarily for hand washing in the bathrooms and cup washing in the break room, and average faucet use per day for six employees and several customers. The water runs for approximately one minute (1.6 gallons/minute) using 50 percent hot water and 50 percent cold water when washing hands or cups. The tankless hot water heater is the most efficient hot water heater to install in rest rooms, break rooms or other utility areas because it heats hot water only when called for rather than heating and storing water.

Cost savings for a tankless hot water heater:	\$175/year compared to a 50-gallon electric water heater; 65% cost savings \$110/year compared to a 2-gallon water heater; 53% cost savings
Payback on investment for a tankless heater:	2.5 years when compared to a 50-gallon electric water heater; 4 years when compared to a 2-gallon water heater. Though the payback is significant, the newer tankless water heaters are built with solid brass and state-of-the-art design to last many years.

Install low-flow aerators on faucets

Henricksens Ace Hardware installed low-flow aerators on faucets in their rest rooms and break room to reduce the water flow from 4.6 gallons per minute to 1.6 gallons per minute. This reduces the amount of hot water used for hand washing and the cost of heating hot water. The savings assume that six employees wash their hands in the bathroom sink four times each day. The water is run for one minute using 50 percent hot water and 50 percent cold water. The hot water is heated by a 2-gallon point-of-use hot water heater that costs \$0.017 to heat one gallon of water; the utility rate is \$0.065/kwh.

Cost savings: \$200/year for hot water heating; 65% cost savings

Additional best management practices to reduce energy use

- When replacing floor tiles, use light-colored tiles to reflect light for a brighter lighting effect with the same amount of overhead lighting.
- When re-painting, use a light color. The higher reflectivity of a light color may allow a reduction in the number of light bulbs needed in a given area or the wattage of the bulbs.
- Use metal reflectors above wall shelving to direct and concentrate lighting on products for better illumination. Denny & Kathy's Ace Hardware has reflectors behind wall displays along the outside wall to provide bright product illumination without additional lighting.
- Insulate hot water tanks and delivery pipes.
- Modify light fixtures. Convert magnetic ballast fixtures to electronic ballast fixtures because they use less power. Or, convert four-bulb fluorescent lighting fixtures to 2-bulb fluorescent fixtures. 3M Silverlux reflectors can be installed to effectively "bounce" more light out of the fixture from two bulbs to equal the dispersed light of four bulbs. The ballast of the extra two bulbs is disconnected for more energy efficiency. This reduces the number of 4-foot fluorescent bulbs needed to light the same area by 50 percent. Each reflector costs approximately \$35 and \$3.75 in labor to change the fixtures.
- Replace yellowed or hazy lenses, diffuser, and globes with new ones that will stay brighter and clearer and transmit more light. This will result in savings only if the increased light output allows the removal of some lamps and/or the use of lower wattage lamps.
- Install high intensity discharge (HID) lights (mercury vapor, metal halide or sodium) in the parking lot. Low-pressure sodium lights are the most energy-efficient of the HID lights. Use photocell timers to turn lights on and off by the amount of daylight instead of by specific hours. Use partial lighting before and after "public" hours.
- Use vapor barrier paint on inside perimeter walls and ceiling. Put extra insulation in the ceiling to increase heating and cooling efficiency.
- Apply elastomeric roof coating which forms a thick, rubber-like blanket of roof protection that expands and contracts with the roof. The product comes in white, black or gray; the use depends on the climate and desired end result. The white coating is over 90 percent reflective to the sun's rays, which can cool roof temperatures in warmer climates from 200 degrees F to 80 degrees F, and reduce cooling needs inside the store. The black coating is used in colder climates to absorb heat on the roof to reduce inside heating costs; gray both absorbs and reflects for moderate climates. Most products are warranted for seven years protection.
- Install high-efficiency heating, ventilating and air conditioning (HVAC) equipment and motors; check with the local utility for possible rebates.

- Use ceiling fans to “de-stratify” warm air layers near the ceiling and distribute them to the lower space for people's comfort during the heating season, and reverse the fans in summer to draw hot air away.
- At loading docks; install a curtain of plastic strips or a flexible windbreak (dock seal) to reduce heat or air conditioning loss.
- Install daylight sensing controls that will automatically reduce artificial lighting when there is sufficient light available.
- Install “light tubes” — highly reflective air-duct-like tubes-to efficiently draw sunlight from above the roof down into the building's interior. This is a very effective lighting source.

Case Study: Advanced Energy-Efficiency Technology At Martinez Ace Hardware

When Bill Wygal decided to build a new Ace Hardware store in Martinez, California, the fifth store in the family-owned group, the construction focus was on technology and energy efficiency. It is a 16,000 square foot store with a 16,000 square foot yard/outdoor sales area. The store stocks over 30,000 SKUs and has a special contractor order office where over one-half million products can be special ordered, a delivery service, a community involvement program, and over 20 other enhanced customer services.

The building has 34 skylights with electronic sun trackers that move every five minutes in order to keep available sunlight directed down through the skylight and distributed to the inside by a heat-trap prism reflector on the inside of the building. This results in a mid-day candle power of over 200 foot-candles per skylight while minimal heat is let into the building. The skylights are manufactured by So Luminaire Company in Arizona. The skylights are operated by a computer-regulated energy management system, which continuously monitors and regulates the amount of light needed in any given area. This system shuts down indoor lights as the natural light concentrated by the skylights increases during the day, and it turns the lights on later in the day as natural light decreases. By 10 a.m. there is usually enough concentrated light to shut down all the inside lights.

To keep the heating and air conditioning costs down, six 10-ton high SEER rating HVAC units with sensors in the duct work are tied to the energy management system, which calls for heat or air conditioning only as needed. The building was constructed with R30 insulation covered with a white paper membrane on the ceiling. For additional resource efficiency, the outdoor landscaped area was planted with water-conserving plants and motion activated lights have been installed in rest rooms.

Additional technology includes: wireless call boxes that allow a customer to call for service with the push of a button; the latest paint matching technology linked to an automatic dispensing device; and computerized custom category pricing which gives the store the ability to further extend discounts by item or category to customers.

Reduce Water Consumption

Use faucet aerators to conserve water

Henricksens Ace Hardware installed low-flow aerators on sinks in rest rooms and the employee break room. With the low-flow aerator, the flow was reduced from 4.7 gallons per minute to 1.6 gallons per minute as measured by the amount of time it took to fill a one gallon plastic bottle with and without an aerator on the faucet.

Volume reduction of waste: 3 gallons of water /minute; 22,450 gallons/year; 65% savings

Note: When installing a faucet aerator, the reduced water flow will vary depending on the water pressure. The higher the pressure, the more water delivered.

Install a double-handled toilet lever

Water consumption can be reduced by up to 70 percent by installing a double-handled toilet lever on toilets installed prior to 1994, at which time federal plumbing codes mandated all subsequent toilets be 1.6 gallons per flush. The lever has two handles: a reduced water flow lever for flushing liquid waste, which reduces the water used to approximately 1.6 gallons, and a lever for flushing solid waste, which uses the full water amount. Assuming 5 gallons per flush with an older conventional toilet, a 70 percent reduction in water use, and 12 employees (a medium sized hardware store) using the rest room three times during an average work shift, there could be significant water savings using this product.

Volume of waste (water) avoided: 39,000 gallons of water saved/year; 70% water savings

Note: Installing water-conserving flappers or early-closing toilet flappers on older, conventional toilets will also reduce water consumption substantially.

Reduce the Toxicity of Materials Used and Sold

Use concentrated, non-toxic cleaners in refillable containers

The cost and waste reduction benefits of using a concentrated non-toxic cleaner were compared to various name brand cleaning products (a window cleaner, toilet bowl cleaner, and an aerosol spray cleaner) used at Henricksens Ace Hardware for general purpose cleaning. Diluting concentrated cleaners in a refillable pump spray container to the strength needed for the specific job is more economical to purchase and eliminates the waste generated by using individual products. In addition, using a pump spray container eliminates the release of volatilized chemicals into the air, and prevents the disposal of residual cleaning materials left in the bottom of an aerosol container. The concentrated cleaner was also compared to a name brand floor cleaner, but was not found to be economical. Instead, for economy and waste reduction, use industrial-strength floor cleaner concentrates.

Volume of waste avoided: 0.01 cubic yards/year; 96% volume reduction

Weight of waste avoided: 4 pounds/year; 99% weight reduction

Cost savings: \$44/year; 99% cost savings

Use a reel lawnmower for lawn maintenance

Guse Hardware (Servistar) in Minneapolis, Minnesota, has a lawn boulevard (4 x 100 feet) to maintain. Instead of using a 4-cycle or 2-cycle gas-powered lawn mower, they use a reel lawn mower to cut the grass with no additional total labor. This eliminates toxic air emissions from a gas-powered lawn mower. The next preferable choice for lawn cutting would be to use a rechargeable electric lawnmower. The rechargeables indirectly produce negligible amounts of secondary air emissions resulting from the power production to recharge the lawn mower. If a gas-powered lawnmower must be used, choose a 4-cycle engine because they produce 50 percent less air emissions than a 2-cycle engine. The savings shown below are based on a mowing time of 15 minutes, northern climate seasonal mowing requirements, a comparison of the reel lawnmower to a 4-cycle engine lawnmower, and air emission standards provided by the California Air Resources Board. Choosing non-chemical alternatives for lawn pest control and limiting the amount of fertilizer used also reduces the toxicity of lawn maintenance. As another idea for a low-maintenance lawn, Henricksens Ace Hardware is considering planting native prairie grasses along a boulevard strip (15 x 100 feet) for aesthetic appeal to the customers and community, and to lower on-going maintenance requirements.

Volume of waste avoided: 0.6 pounds of hydrocarbons/year; 100% volume reduction
This is equivalent to a California 1995 model car driven 1,078 miles

Cost savings: Gas, mower maintenance, and 80% on lawnmower purchase cost

Use zero-VOC floor tile adhesive

Alexandria Ace Hardware recently laid 5,900 square feet of new flooring throughout the entire store. They used Ace's recommended vinyl floor tiles and recommended tile adhesive, which contains low amounts of volatile organic chemicals (VOCs), small amounts of solvents, and is a water-based latex adhesive. The manufacturer of the recommended tile adhesive also makes a zero-VOC/no solvent product that could be substituted for the low VOC/low solvent product to reduce the amount of VOC and solvent vapors emitted into the air. While overall performance of the two products is essentially the same, the zero-VOC product has a slightly shorter working time for the installer and does not clean up as easily. In choosing a tile adhesive, these products pose an interesting question for the dealer-convenience or environmental responsibility? The toxicity reduction should answer the question.

Comparison of zero-VOC product to low-VOC product for installation of 5,900 square feet of floor tile.

Toxicity reduction to waste: 4 to 8 pounds of VOC; 100% toxicity reduction
5 pounds of aromatic solvents; 100% toxicity reduction

Cost savings: \$24 for 5,900 sq. ft. of floor tile installed; 18% cost savings

Use latex instead of oil-based paints

Henricksens Ace Hardware has 10,000 square feet of walls painted with oil-based paints. When the walls need repainting, they will use latex paints to reduce the amount of toxic volatile organic chemicals (VOCs) released into the air when compared to oil-based paints. With latex paints, there will also be cost savings. The same amount of paint (25 gallons) would be required whether they use semi-gloss latex or semi-gloss oil-based paint. Zero-VOC paint is the best choice for painting walls. In early 1999, Ace Hardware will have a zero-VOC/low odor paint that has competitive performance to other paints, including durability and scrubability compatible to flat latex paint.

Toxicity reduction from using latex vs. oil-based paint:	54 pounds of VOC /10,000 sq. ft; 52% VOC reduction Using a zero-VOC paint would be a 100% VOC reduction
Cost savings:	\$70/10,000 sq. ft; 29% cost savings

Help Customers Reduce Waste

Rent tools

Denny and Kathy's Ace Hardware has a tool rental center. When renting tools, customers save money by not buying new tools for occasional jobs and waste is avoided when old tools are kept out of the waste stream. Tool rental is large profit center for the store.

Offer energy-efficiency alternatives

Denny and Kathy's Ace Hardware makes window inserts for customers out of acrylic plastic sheets (Plexiglas™) to use in place of disposable window film. The inserts are used primarily in the winter months to increase the R value of a window. The R value of a single pane window can be increased by 90 percent with either the insert or disposable window film to reduce heat loss. A three-square-foot acrylic plastic window insert costs the customer \$5.00 while a comparable amount of disposable plastic window film costs \$1.59. However, the acrylic sheet is reusable for many years, and immediately eliminates wasted plastic window film.

Volume of waste avoided:	3 square feet/ year for each window (3 sq. feet); 100% waste reduction
Cost savings:	100% cost savings
Payback on investment:	3 years

Offer commercial customers less-toxic alternatives

Denny & Kathy's Ace Hardware recommended that a large commercial customer reduce the toxicity of a degreasing product by switching from an aerosol can to a trigger sprayer container, which costs 50 percent less. The company was using over 800 15-ounce aerosol cans each year at a cost of \$11.99 per can. The company switched to a similar product in a 28-ounce trigger sprayer container that cost \$5.50 per container. The company used approximately the same quantity of sprayer containers as aerosol cans; however, the switch in products resulted in a 100-percent reduction in product toxicity by eliminating aerosolized propellants and the company saved \$5000 a year — a 54-percent cost savings. Denny & Kathy's recommendation not only helped the company save money, it also strengthened a long-term customer relationship.

Stock less-toxic products

Hardware stores can be a catalyst to help the community reduce the toxicity of their waste by offering customers a variety of less-toxic alternative products in addition to normal inventory items for the same use. Non-toxic pest control and lawn and garden products are in particular demand. Stringent government regulations on the use of toxic pest controls and concerns about pet and public health has consumers demanding healthier products for their home and garden.

The less-toxic products can be identified on bin tags as “environmentally friendly” or fact cards on “how and why” to use the products can be placed next to the products on the shelf—most manufacturers can provide these materials. Some hardware stores have invited local master gardeners or other pest control experts into the store to give mini-customer seminars or answer customer questions. Educating the customer and identifying suitable products provides an opportunity for the customer to choose between a product that promotes waste reduction or traditional products.

There are many types of less-toxic products that can be sold, such as: citrus-based cleaners, deck strippers, and other citrus-based products; products in trigger sprayer containers; biodegradable products; traps for rodents, ants, flies, fleas, yellow jackets, slugs, snails and roaches; natural based flea killers and ant bait; fly swatters, natural pet care products, garden ornaments to scare away garden predators; natural fertilizers and weed/grass killers; compost activators; diatomaceous earth insect killers; natural-based insect and pest repellants, garden dusts and fungicides; electronic pest controls; weed blocks and nettings; and many more. Initially, these products will take special effort to order, but the profits will far outweigh the effort as the store establishes a reputation for carrying eco-friendly, non-toxic alternatives.



Additional Best Management Practices For Waste Reduction

- **Building exterior**
Installing a low-maintenance building exterior reduces the need to use chemicals or paint to restore the finish. Materials such as concrete, stucco, and brick require comparatively no outside maintenance.
- **Floor maintenance:**
Install low maintenance flooring such as concrete that has colored chips embedded in it, or linoleum flooring, which is durable and made of natural ingredients, instead of vinyl.
- **Water run-off control:**
Install holding ponds where store parking lots are adjacent to sensitive water run-off areas (i.e. wetlands, creeks, streams, rivers). A holding pond can collect and settle out parking lot run-off, which is primarily oils and salts, and slow the rate of discharge into surrounding waters. Wetland plant vegetation can be planted around the holding pond to filter nutrients and as attractive landscaping.
- **Small engine repair services:**
Use refillable pump spray cans and bulk products as an alternative to aerosol brake cleaners, carburetor cleaners or rust penetrants. This reduces the waste of empty aerosol cans, which are typically landfilled because they are difficult to recycle, and it prevents chemicals from being atomized into the air and eliminates the waste of residual product that remains in empty aerosol cans.

Recycle motor oil. Professionally launder and reuse oil rags. If large quantities of oil soaked rags are produced, there are solvent and oil recapture companies which "spin dry" the rags to reclaim the oil and then launder the rags.

Replace solvent-based parts cleaners with non-hazardous, water-based parts washing alternatives. Hot soap or jet-spray washers and aqueous cleaners reduce the exposure risk to workers from hazardous materials and reduce the risk of fire from ignitable solvents. These may require changes in cleaning equipment and practices.

If using a solvent-based parts washer:

- Use washers with lids rather than open buckets or pans to prevent unnecessary evaporation, spillage and to minimize health risks.
- Discontinue the use of solvents containing chlorine or other halogens; instead use less-toxic blends such as mineral spirits or terpenes (hydrocarbons derived from wood or citrus fruits). Always recycle hazardous waste through a hazardous waste management company.
- Mechanically pre-clean parts with a scraper or wire brush.
- Drain parts above the washing tank to recapture fluid and prevent spills.
- Extend the solvent life by using washers with a solvent filtering feature or use a washer with two reservoirs for solvent-one for initial cleaning, one for rinsing. The rinsing solvent eventually becomes the cleaning solvent.



Reuse the Same Product or Resource Again

Materials Exchange

Your store's trash may be another company's treasure. Successful material exchanges can be one-time transfers or continuing relationships where one company's waste material is used by another company.



Exchange cardboard boxes with another company

Henricksens Ace Hardware reduces waste by giving empty cardboard boxes to a wholesale locksmith company, which picks them up twice a week and reuses the boxes to ship their products to customers. Henricksens Ace saves \$500 a year in the avoided labor costs of breaking down cardboard. The locksmith saves \$5000 a year in avoided purchasing costs for packaging.

Volume of waste avoided: 175 cubic yards/year; 99% volume reduction

Weight of waste avoided: 2 tons/year; 99% weight reduction

Cost savings: \$1,500/year; 100% cost savings



Exchange other packaging materials

Denny & Kathy's Ace Hardware receives polystyrene packaging peanuts from a telephone repair company. They use the peanuts as packing material for shipments to their commercial accounts. The telephone company saves the cost of waste disposal; Denny and Kathy's Ace saves on the purchase cost of packing material.

Volume of waste avoided: 4.5 cubic yards/year; 100% volume reduction

Weight of waste avoided: 30 pounds/year; 100% weight reduction

Cost savings: \$200/year in avoided packaging costs; 100% cost savings



Exchange scrap material

Bryant Hardware in Minneapolis, Minnesota shares two disposal containers for cardboard and waste with three other businesses. They save 75 percent of their acrylic plastic (Plexiglas™) scraps from window replacement for a youth, who picks up the scraps every three months and uses them for electronic projects. The exchange reduces the amount of waste for disposal, and reuses the material for another purpose. Donating mismatched or returned paint to community groups and donating plate glass scraps to local crafters are additional examples of a materials exchange.

Volume of waste avoided: 1 cubic yard/year; 75% volume reduction

Weight of waste avoided: 2 pounds/year; 75% weight reduction

Reuse products over and over in their original form

Reuse wooden pallets

Denny & Kathy's Ace Hardware has, on average, 10 standard wooden pallets per week that can be returned to vendors or their distribution warehouse, or given away to the public. The wooden pallets become avoided waste by returning to the manufacturer for reuse, plus the store avoids a surcharge some vendors charge on pallets that are not returned.

Volume of waste avoided: 56 cubic yards/year; 100% volume reduction
Weight of waste avoided: 21 tons/year; 100% weight reduction

Reuse building materials

Ace Home Center in Hackensack, Minnesota has 5,400 square feet of retail hardware and a medium-sized lumber operation. This store is so efficient about reusing scrap building materials and recycling that the waste from both the retail store and lumber yard only fills one 3-cubic-yard waste container each week. They reuse crooked and other odd lumber scraps to build latrines, dog houses and sheds, which they sell at considerable profit to the store each year. Shingles that have been discontinued or are odd colors or pieces are used on the projects, thus avoiding waste disposal costs.

The latrines and doghouses are totally constructed out of scrap lumber; the sheds have 50 percent virgin material. During 1997, Hackensack Ace sold 55 latrines (\$257 each), 20 dog houses (\$70 each) and 22 sheds (\$1000 each). Scrap plywood that is not used for these projects is given to the public, which further reduces the store's waste by 0.75 cubic yards per year.

Volume of waste avoided: 18 cubic yards/year of wood waste; 100% volume reduction
8 cubic yards/year of shingles; 95% volume reduction
Weight of waste avoided: 5 tons/year of shingles; 95% weight reduction
Cost savings: \$165/year in avoided waste disposal for shingles; 95% cost savings
\$330/year for avoided waste disposal of wood waste; 100% cost savings
Estimated gross sales (1997) of reuse construction projects: \$27,000 (includes latrines, dog houses, and 50% of shed sales)

Reuse metal lumber banding and lumber wrappers

Ace Home Center reuses the metal banding on lumber shipments to re-band smaller units of lumber for customer delivery. Occasionally, some lumber is banded with plastic, which has to be disposed of in the regular waste container, though the plastic volume is small.

Volume of waste avoided: 3 cubic yards/year of metal banding; 100% volume reduction
Cost savings: \$180/year for banding material; 100% cost reduction

Reuse lumber wrappers

Ace Home Center in Hackensack, Minnesota, gives durable lumber wrappers to the public to reuse for outdoor projects such as covering boats and woodpiles.

Volume of waste avoided: 18 cubic yards/year of lumber wrappers; 98% volume reduction
Cost savings: \$180/year avoided waste disposal costs for wrappers; 98% cost reduction

Reuse plastic pallets and totes

Most Ace distribution centers use solid molded plastic pallets to ship merchandise to the stores. Once unloaded, the plastic pallets nest together for compact storage until they are back-hauled to the warehouse when the next weekly shipment is delivered. The plastic material is durable and requires less storage space compared to wooden pallets. Using plastic pallets avoids the wood waste that would be generated with traditional pallets. Cost and waste savings are based on the number of plastic pallets returned by Hackensack Ace Hardware in 1997. They returned an average of eight plastic pallets per week-over 400 per year to the warehouse. At the time of writing this report, the Ace distribution center serving Hackensack Ace had discontinued the use of plastic pallets due to changing logistics, but will be reinstating a new reusable container system. The savings do not take into account wood pallet waste from manufacturer-direct merchandise shipments.

Volume of waste avoided: 64 cubic yards/year of pallet waste; 100% volume reduction
Cost savings: \$330/year in avoided wood pallet disposal; 100% cost savings
Reductions in labor costs

Reuse plastic merchandise totes

“Broken-out” merchandise is delivered to dealers from the Ace distribution center in plastic, reusable totes, which can be nested when empty and are returned to the warehouse for reuse. These totes can be loaded onto a cart to wheel around the store for efficient unpacking and stocking. Some stores receive their merchandise in reusable plastic carts that roll directly off the truck and then around the store; these are also back-hauled to the warehouse. With both the totes and carts, labor waste is reduced up to 50 percent because it takes less time to unpack and stock the shipment. The use of plastic totes reduces delivery waste from “broken-out” merchandise by 100 percent.

Reuse office paper

Fratallones Ace Hardware converts three reams of scrap office paper into note pads each month. This avoids the cost of purchasing note pads and reduces the amount of disposed paper waste.

Volume of waste avoided: 0.1 cubic yards/year
Weight of waste avoided: 180 pounds/year
Cost savings: \$510/year

Reusable cloth towels

Alexandria Ace Hardware switched to using washable cloth roll towels. About 15 rolls of rented cloth towels provide the same service as 12 packages of paper towels. There were minor cost savings in switching to cloth towels, but major savings in the amount of waste avoided.

Volume of waste avoided: 13 cubic yards/year; 100% volume reduction (Uncompacted waste volume)
Weight of waste avoided: 165 pounds/year; 100% weight reduction
Cost savings: \$42/year; 22% cost savings

Use reusable HVAC filters

Electrostatic permanent air filters-filters that can be cut to size and washed for reuse-are not just for homes. Use them in the store's heating, ventilation and air conditioning equipment to reduce the cost of replacing air filters and the associated waste disposal costs. The savings listed are a comparison of permanent, washable air filters to the amount of disposable air filters used and changed each month at Henricksens Ace Hardware. The permanent filters cost \$18 compared to \$0.89 for a disposable filter. However, the permanent filters are warranted for five years. Henricksens Ace would need to initially purchase eight permanent filters for use over five years instead of using 480 disposal filters in the same amount of time.

Volume of waste avoided: 1 cubic yard/year; 98% volume reduction
Weight of waste avoided: 33 pounds/year; 90% weight reduction
Cost savings: \$56/year (amortized over 5 years); 50% cost savings
Payback on investment: 20 months

Note: Labor costs would remain relatively comparable using either type of filter. The reusable filters would require labor to routinely wash the filters as compared to the labor to order, stock and change disposable filters.

Repair, donate or sell waste for reuse

Sell mismatched paint

Mismatched paints can be sold to customers at a reduced price that allows the store to at least recover their purchase cost, and it keeps paint out of the hazardous waste stream. Alexandria Ace Hardware sells approximately 55 gallons of mismatched paint each year to customers for \$6 per gallon.

Repair damaged goods for reuse

Denny & Kathy's Ace Hardware repairs some damaged goods, and then either resells them at a discount or donates the goods to community groups, such as a homeless shelter, women's shelter, Habitat For Humanity, etc. This keeps damaged goods out of the waste stream, allows a useful life for the goods, and saves several hundred dollars each year in waste disposal costs.

Donate waste material to community groups

Donate plate glass scraps to a local artisan or paint to a community theater or service club for community projects. Donating waste materials is a type of materials exchange since the process both reduces waste and reuses the product. If no source can be identified to accept the waste, put a notice on public bulletin boards or run a classified ad.

Use repairable, refillable, durable products

Refill printer toner cartridges

Alexandria Ace Hardware purchases three remanufactured toner cartridges each year for their laser printer instead of purchasing new printer cartridges. Remanufactured toner cartridges are used cartridges that are disassembled and cleaned of toner dust, and worn parts are replaced. New toner is installed, and the cartridges are reassembled and tested for quality before shipping. The cost of a remanufactured toner cartridge is generally 30 to 60 percent less than a new cartridge, without any reduction in quality. They can be used many times and eventually recycled. For each reuse, a half quart of oil is saved that would have been used to manufacture a new cartridge.

Volume of waste avoided: 0.1 cubic yards/year; 100% volume reduction
Weight of waste avoided: 6 pounds/year; 100% weight reduction
Cost savings: \$230/year; 55% cost savings

Reuse cash register cartridges

Frattallones Ace Hardware uses over 240 cash register ribbon cartridges each year between their eight Ace Hardware stores. The cartridges can be re-stuffed with new ribbon, which eliminates the waste of used cartridges. Re-inking can be done; however, the quality of the ribbon is often inconsistent. Re-stuffing the cartridge provides essentially a new ribbon in a reused container. The larger the quantity sent to the vendor, the greater the cost savings.

Volume of avoided waste: 0.03 cubic/yards per year; 100% volume reduction
Weight of avoided waste: 30 pounds/year; 100% weight reduction
Cost savings: \$80/year; 9% cost savings

Note: This action is generally only cost-effective if large quantities of used ribbon cartridges are generated as is the case with Frattallones, a large store group with a central office location.

Use refurbished or remanufactured office equipment

Purchase and use refurbished or remanufactured office equipment and furniture. Rent, borrow or share equipment that is used infrequently. The office for Frattallones eight hardware stores is located at the Arden Hills store. They use refurbished desks and a copier to reduce some capital operating costs. At all stores, they use reconditioned cash registers, which cost two-thirds less than a new cash register. Refurbished office equipment usually costs less than new equipment and using it keeps waste from going to the landfill.

Cost savings: 66% cost savings on cash registers

Additional best management practices for reusing waste

- In the office, set up an area for reusable office supplies next to the new office supplies. Include envelopes, file folders, dividers, binders, shipping boxes and packaging. Use refillable pens, pencils and durable tape dispensers rather than disposable items. Use both sides of paper whenever possible.
- Provide reusable mugs for employees (if washing facility exists).
- Reduce the use of plastic trash can liners by reusing old packaging bags as liners.
- Purchase products in containers that can be reused or recycled locally.



Recycle Waste

After source reduction (preventing waste at its source) has been accomplished in every way possible, then recycle the waste that is left. Recycling is different than source reduction. Source reduction prevents waste; recycling uses waste in lieu of virgin material in the manufacture of a product. Both reduce waste going to the landfill. Some products, like aluminum, steel, or glass, can be easily recycled many times. Other products, like mixed plastic, are typically recycled once. Recycling saves money and resources because it costs less to produce materials from recycled stock and the manufacturing process consumes less energy.



Recycle cardboard

Alexandria Ace Hardware started recycling their cardboard waste in 1996 and realized an immediate drop of \$64 in their monthly waste disposal costs. They recycle 90 percent of their cardboard and reuse the remaining 10 percent to ship back defective merchandise to the manufacturer and for boxing up customer purchases. Labor for breaking down the cardboard is the same for either regular waste disposal or cardboard recycling.

Volume of waste avoided: 260 cubic yards/year; 90% volume reduction
Weight of waste avoided: 40 tons/year; 90% weight reduction
Cost savings: \$770/year; 38% cost savings



Bale cardboard and recycle

Blaine True Value is an 18,000 square foot retail hardware store located in Blaine, Minnesota. They bale their cardboard and store it for pick up later by a cardboard recycling company. The store generates four bales per week during winter, early spring and late fall, and six to eight bales per week during the busy spring/summer season. The store is paid a fluctuating market value per ton for the baled cardboard.

Volume of waste avoided: 82 tons/year
Cost benefit: \$4,900/year from sale of cardboard bales (\$60/ton)
Payback on baler investment: 17 months based on a \$7000 purchase cost and an average of 5-7 bales of cardboard per week.

Santa Barbara Home Improvement (Ace Hardware) in Santa Barbara, California covers nearly three acres. They take two to three tons of baled cardboard to the recycling center each week in their own dump truck. Current market value for their cardboard is \$25/ton, although it has been as high as \$80/ton in the last several years. In contrast to other areas of the country, smaller retailers in that area of California can have their un-baled cardboard picked up at no charge.

Cost Benefit: \$3,500/ year to \$10,500/ year (dependent on market value)

Note: The cost and payback period for purchasing a baler is the primary limitation with this practice; storage space for the bales is another. Only larger retailers are likely to generate enough cardboard waste to make this practice cost-effective.

Recycle aluminum can

Denny and Kathy's Ace Hardware has an employee recycling program for aluminum cans, glass bottles and plastic bottles. Recycling containers are set up in the employee break area. As the containers fill up, the recyclable material is taken to a recycling center because there is no commercial pick up. They recycle a 30-gallon container of uncrushed cans each month. By recycling, waste is avoided and there are savings in the materials and energy cost of making new cans from recycled material. Aluminum cans are recycled many times compounding the waste and resource savings over the life of the original material. The hardware store can make a minor profit by recycling aluminum cans. Both Alexandria Ace Hardware and Henricksens Ace Hardware began an employee recycling program for aluminum cans. Alexandria Ace puts the money from recycling towards an employee pizza party.

Volume of waste avoided: 0.7 cubic yards/year; 99% volume reduction
Weight of waste avoided: 90 pounds/year; 99% weight reduction
Cost benefit: \$32/year from the sale of aluminum cans at \$0.35/pound

Recycle glass and plastic

Denny & Kathy's Ace Hardware recycles plastic and glass bottles in addition to aluminum cans. They recycle approximately 120 gallons of plastic bottles each month and 30 gallons of glass bottles. There is currently no cash market for plastic or glass in small quantities. However, by recycling, the store keeps waste out of the landfill, saves on natural resources, and helps supply-markets for recycled-content products. Denny & Kathy's Ace take the plastics to a recycling center because they do not have the volume to qualify for commercial pickup. They consolidate their glass bottles with another merchant in the plaza.

Volume of waste avoided: 3 cubic yards/year of plastic; 100% volume reduction
0.5 cubic yards/year of glass; 100% volume reduction
Weight of waste avoided: 290 pounds/year of plastic; 100% weight reduction
570 pounds/year of glass; 100% weight reduction

Recycle scrap aluminum and metals

Denny & Kathy's Ace Hardware accumulates scrap aluminum and metals in separate containers in their service area, and then takes the scrap to a metal recycling dealer several times a year. They are paid for the scrap at the current rate of \$0.30 per pound for aluminum and \$0.04 per pound for scrap metal. A small profit is realized on the recycled aluminum and metal, and waste is avoided.

Volume of waste avoided: 0.5 cubic yards/year of aluminum ; 0.45 cubic yards/year of metal
Weight of waste avoided: 170 pounds/year of aluminum; 540 pounds/year of metal
Cost benefit: \$51/year from aluminum; \$22/year from metal

Recycle plastic film pallet wrap

Santa Barbara Home Improvement Center (Ace Hardware) in Santa Barbara, California wanted to recycle the plastic pallet wrap on shipments received from the Ace distribution center and other manufacturers. Their distribution center, located in Prescott Valley, California, was already baling plastic film pallet wrap and reselling the material as stock for new products. Santa Barbara requested, and was granted permission, to send their compacted wrap back to the distribution center in the returnable merchandise totes that are back-hauled from the store to the center each week. Their plastic pallet wrap fits compactly in 2-3 totes per week; this amount is from a store that spans nearly three acres. Frattallones Ace Hardware (17,000 square feet) accumulated their plastic pallet wrap for one week, which fit into one returnable tote.

Cost Savings: Depending on the size of store and the amount of plastic film pallet wrap, savings could be 5 % to 10% of yearly waste disposal costs.

Note: Cost-effective plastic film pallet wrap recycling often requires cooperation between the store and its distribution center. Very few hardware dealers have access to plastic film pallet wrap recycling.

At the Prescott Valley Ace Distribution Center, 15 dealers out of 300 serviced by the center take advantage of the recycling opportunity for pallet wrap, although it's not widely publicized. The distribution center found handling the incoming plastic wrap was a non-issue since the volume was small per dealer and fit into totes already being back-hauled. The center receives approximately 0.5 tons/year of plastic wrap from each of the 15 dealers, which cumulatively make up about 10 percent of the distribution center's 90 tons of plastic pallet wrap recycled each year. At a market value of \$40/ton, plastic film wrap recycling at the distribution center nets approximately \$3600/year to the Ace Hardware Corporation. If 75 percent of the 300 dealers serviced by the distribution center participated in the recycling opportunity, there could be an additional \$4200 (more than a 50 percent increase) in recycling profits for a total recycling revenue of \$8,000 per year.

Ace Hardware Corporation has 15 distribution centers. If each distribution center baled their own plastic film pallet wrap and back-hauled 75 percent of their dealers' wrap for recycling, and assuming a continuing market exists for the wrap, the Ace Hardware Corporation could realize recycling profits greater than \$100,000/year (at \$40/ton). Other hardware distributors could see similar income from recycling of plastic film pallet wrap.

Recycle computer paper

Denny & Kathy's Ace Hardware keeps an empty computer paper box beside their printer for computer paper recycling. They recycle approximately eight boxes of computer paper per year. The savings are based on the size and content of a box of Ace computer paper. They print long reports on the back of previous reports before recycling.

Volume of waste avoided: 0.2 cubic yards/year of computer paper
Weight of waste avoided: 240 pounds/year of computer paper
Cost savings: No current market found for office paper

Recycle pipe threading metal scraps

Henricksens Ace Hardware has a pipe threading machine, which has a collection tray for tiny metal tailings and an oil receptacle for oil that is reused in the threading process. The metal tailings can be recycled most efficiently by taking the small amount that accumulates to a local machining shop several times a year to be recycled with that shop's metal tailings.

Volume of waste avoided: 5 gallons/year of metal tailings

Weight of waste avoided: 20 pounds/year of metal tailings

Note: Other best management practices for pipe threading include: reusing oil then recycling it when the oil is replaced; and wiping up spilled or excess oil with rags that can be professionally laundered and reused instead of using disposable rags.

Buy recycled-content products

For recycling to succeed, both businesses and consumers must purchase products made with recycled-content material. Post-consumer content is that portion of a product made from material that has been used by a business or consumer. Recycling, followed by a commitment to purchase recycled-content products, assures manufacturers of stock materials to use in the manufacture of new products, and helps to “close the loop” from recycling a product back to manufacturing a new product.

Davis Ace Hardware in Davis, California, has made it a store policy to purchase recycled-content products for use in the store and to promote these products to their customers, whenever possible. The store had a buy-recycled promotion in conjunction with the city's recycling program. They gave away a reusable bag (made from recycled 2-liter plastic pop bottles) to every customer who purchased a recycled-content product. The city paid for the program advertising. An end-cap of popular recycled-content products was set up, including customer education materials, and other products were identified on the self. The store couldn't keep the end-cap stocked because the products were competitively priced and sold very fast once they were identified to the customers.

Note: The biggest barrier to purchasing and selling recycled-content products is identifying these products. Though many manufacturers include recycled material in their products, they either fail to identify the content on the label or they don't market the product as including recycled-content. Another barrier is the lack of identification of recycled-content products in hardware merchandising catalogs. A limited list of recycled-content products can be found at the end of the report. An excellent catalog, *Recycled Plastic Products Source Book*, can be ordered at no charge from the American Plastics Council; call 800-2-HELP-90.

Establish customer recycling programs for special wastes

Customer recycling services for special wastes such as fluorescent bulbs, nickel-cadmium batteries, motor oil, and other types of batteries helps establish customer loyalty, conserves natural resources, and keeps hazardous materials out of the environment. There is even a small profit to be made with some services. Before initiating a program, always check with local solid waste officials to insure proper regulations and procedures are followed regarding the disposal of these special wastes.

Recycle nickel-cadmium batteries

The four Ace Hardware stores participating in this study collect used nickel-cadmium (Ni-Cad) batteries from customers for recycling. Customers can recycle their old nickel-cadmium battery for no charge when they come to the store to purchase a new battery. The store collects the batteries in a small, self-mailer box provided by the Rechargeable Battery Recycling Corporation (RBRC), a non-profit corporation funded by battery and product manufacturers. When full, the box is sent (postage pre-paid) back to the corporation where the cadmium is recovered and recycled. Through a promotion first introduced in Minnesota by the Minnesota-Dakotas Retail Hardware Association, Alexandria Ace Hardware has collected and returned 116 pounds of nickel-cadmium batteries since they began their recycling program in 1996. According to RBRC, 13 to 22 percent of each battery cell is cadmium. In March 1997, the Ace Hardware Corporation sent collection boxes to all 5,000+ dealers. In March 1998, over 2,946 pounds of nickel-cadmium batteries had been collected by RBRC from Ace dealers.

Weight of hazardous waste avoided:	15 to 25 pounds of cadmium waste was avoided by Alexandria Ace; 80 to 650 pounds of cadmium waste was avoided by Ace Hardware dealers across the country
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Note: Nickel-cadmium batteries are found in cordless power tools, telephones, camcorders, notebook computers. Cadmium is a toxic heavy metal that can endanger public health if allowed to enter the waste stream. Make sure batteries can be easily removed from products.

Recycle other batteries

Advances in battery manufacturing have resulted in the reduction or elimination of hazardous materials in alkaline batteries. Most new alkaline batteries are labeled "no mercury added." However, many alkaline batteries entering the waste stream were manufactured prior to the advances and still contain mercury and some manganese. Old alkaline batteries should be recycled. Alkaline batteries manufactured after January 1996 are "safe" for disposal, but still contain trace amounts of mercury. It can take many years to move the older batteries through the waste stream. Lithium batteries contain reactive cobalt, lead acid batteries contain lead, and button batteries contain mercury. Recycling any of these batteries removes the toxic elements out of the waste stream and the other reusable components are separated for eventual reuse. If collecting batteries at the store, keep them in a vented box and area; ship in a plastic bag to prevent spillage of corrosive material. At Davis Lumber in Davis, California, buckets of assorted batteries (not nickel-cadmium) are collected from customers for recycling. The City of Davis picks up the batteries and disposes of them at no charge to the store. Ask your local solid waste department if they would be interested in a similar collaborative community project.

Recycle fluorescent light bulbs

Denny & Kathy's Ace Hardware collects used fluorescent bulbs from both residential and commercial customers. For each bulb, customers are charged a drop fee to cover labor handling in the store and transport by a licensed hazardous waste company to the recycling company. The drop fee varies depending on the size of bulb (i.e. \$0.95/4 foot, \$1.50/8 foot). Once at the recycling center, mercury is recovered from the bulb for proper hazardous waste disposal or reuse and the rest of the bulb is broken down into its different components, all of which are recycled. After accounting for the in-store labor and transportation cost, the store makes a slight profit off the recycling of each bulb; approximately \$0.40 per bulb. In addition, about 50 percent of people dropping off fluorescent bulbs buy new bulbs while in the store. In 1996, Denny and Kathy's Ace collected over 7,000 fluorescent bulbs. While some customers complain about the charge, once educated about the recycling process and the waste disposal costs involved, and they realize that the entire bulb is recycled, they generally accept the fee. Denny & Kathy's Ace Hardware finds that most people want to do what's right for the environment once they know what's involved.

When Alexandria Ace Hardware began a fluorescent light bulb recycling program, they put a notice about the service in their monthly commercial statements. They collected more bulbs in the four months after the notice than in the following twelve months.

Volume of waste avoided:	7,730 fluorescent bulbs in 1996 at Denny & Kathy's Ace
Weight of waste avoided:	(100% reused) 4,700 pounds of glass, 169 pounds of aluminum, 102 pounds of phosphor, 6 ounces of mercury
Cost benefit to store:	Approximately \$3,000/year from recycling fluorescent bulbs

Note: Regulations for disposal of fluorescent bulbs vary from state to state. In Minnesota, fluorescent bulbs generated from both residential and commercial use are prohibited in the waste stream. In other states, only used bulbs from commercial applications are prohibited. Eventually, fluorescent bulbs will be prohibited in landfills or at waste incinerator sites on a national basis. National consumption of mercury-containing fluorescent and high intensity discharge (HID) lamps exceeds 650 million annually; their disposal results in over 28,000 pounds of mercury entering the environment each year.

Since a fluorescent bulb uses about one quarter the energy used by an incandescent bulb, they are by far the best lighting choice to protect the environment. The largest source of mercury in the environment comes from coal-fueled power plants. Spent lighting products are the second largest source of mercury contamination in the municipal solid waste stream, and the easiest to eliminate. Recycling of fluorescent bulbs keeps toxic mercury out of the environment, where even a few ounces of mercury can endanger the health of wildlife, fish and humans. Recycling the bulbs also helps conserve natural resources by recovering other bulb components that can be used in new products. Ace Hardware is developing a nationwide dealer program for fluorescent bulb recycling.

Recycle motor oil

St. Louis Park True Value Hardware in St. Louis Park, Minnesota, participates in Valvoline's First Recovery collection program for used motor oil. For an \$85 per month participation charge, the store receives a 55 gallon polypack drum on casters (a 220 gallon container is also available), store signage, technical support, and up to two collections each month. Valvoline provides the store with indemnity against any liability for handling hazardous waste. Used oil filters can also be collected. Both oil and oil filter containers must be kept inside the store. The store feels that the customer traffic generated by the service and the added sales of motor oil far offset the cost to participate, and the service keeps toxic materials found in motor oil, such as cadmium, chromium, lead, and benzo(a) pyrenes, out of the environment. The collected oil is 100 percent re-refined and primarily used as #4 marine diesel fuel. A Valvoline study showed 60 percent of customers using the service came to the store specifically to deposit used oil and 40 percent of those purchased additional motor oil at an average purchase cost of \$13. Check with local officials regarding local and state regulations before initiating a motor oil collection program.

Volume of waste avoided: 165 gallons of used motor oil/year

Case Study: Used Paint Collection and Paint Discounts Bring Customers in the Door

Denny & Kathy's Ace Hardware in St. Cloud, Minnesota, co-sponsored a one-week used paint collection with Tri-County Solid Waste, a household hazardous waste facility located near the hardware store. Cooperative advertising was done with Tri-County and in conjunction with other plaza merchants during an Earth Fair held the same week. "Greenback" coupons for a one-dollar discount on a new gallon of paint were given gallon for gallon to anyone dropping off paint at Tri-County Solid Waste during the event week. The Earth Fair was held in July 1997, and the paint coupons were redeemable for up to three months. During the event week, 88 people delivered over 500 gallons of used paint to the facility; 51 took the discount coupons. By the end of coupon redemption period, 40 percent of the participants had returned to the store to use the coupons and purchase new paint. Whether the participants were new or returning customers, the event translated into direct sales to the hardware store and savings to the environment. Paint was kept out of the waste stream by being recycled or disposed of properly as a hazardous waste, and the metal cans were recycled.

Resource Conservation Pays

- In savings to the store's bottom line
- In savings to the customer
- In savings to the environment

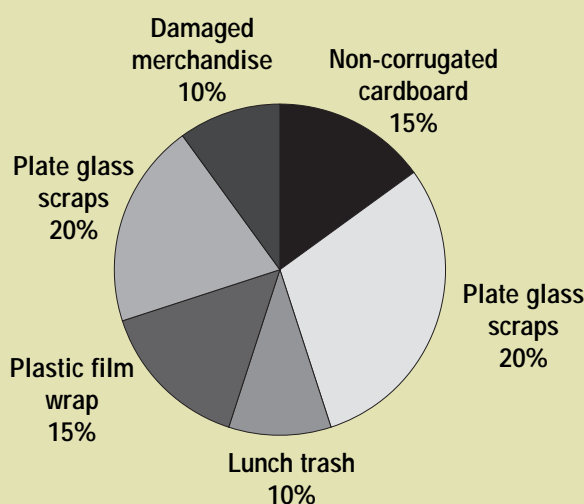
 Reduce,
 reuse, *then*
 recycle.

Denny & Kathy's Ace Hardware – St. Cloud, Minnesota

The store has 14,000 square feet of retail space; 4,000 square feet were added several years ago. The store is located in a shopping plaza in St. Cloud, which is nearing a population of 100,000 (including the surrounding communities.) They are about 60 miles from the Minneapolis/St. Paul metro area. The owner has operated the store since 1981.

The owner is chairman of the Twin Cities Ace dealer group, has initiated group employee training, and actively supports community conservation and waste reduction programs. Both the owner and his son, a store employee and active conservationist, have been instrumental in helping the Ace Hardware Corporation establish a dealer-supported Conservation Initiative. The store's employees are supportive of a waste reduction ethic.

Waste Analysis



(un-compacted, percentage by volume)

Waste Disposal

A 3-cubic-yard waste disposal container is picked up weekly. The store contracts for waste disposal separately from other plaza merchants; however, the plaza owners are considering consolidating waste disposal for all plaza merchants.

Recycling

The store has an active recycling program for cardboard, aluminum cans, glass bottles, plastic bottles, scrap aluminum and metal, fluorescent tubes, nickel-cadmium batteries, and computer paper. They reuse and recycle pipe-threading oil, consolidate glass with another merchant for recycling and have store signage to direct customers to a gas station for oil recycling. When a customer buys paint, the store encourages them to bring old paint to the county household hazardous waste facility located near the store.

Best Management Practices for Source Reduction

- Retrofitted to T8, electronic ballast lighting.
- Retrofitted exit signs with LED bulbs.
- Installed a programmable thermostat.
- Put outside lights on timers.
- Uses biodegradable, non-toxic cleaners.
- Uses refurbished office equipment.
- Installed light-colored flooring to increase the light reflectivity 20 percent without increasing the amount of overhead lighting,
- Installed metal reflectors behind overhead shelf lighting for more directed lighting.
- Added additional insulation and vapor barrier to the outside wall.
- Reuses shipping boxes and receives packing materials from another vendor.
- Purchases office supplies in bulk quantities.
- Does cooperative purchasing with other stores for volume discounts.
- Uses a Pace Computer system for electronic inventory management and purchasing.
- Offers tool rental service, and screen, plate glass, and small engine repair.
- The store gives scrap cardboard and wooden pallets to the public and gives mismatched paint to community groups or sells it at a discount.
- The store works with commercial accounts to help them reduce waste and purchasing costs.

Issues

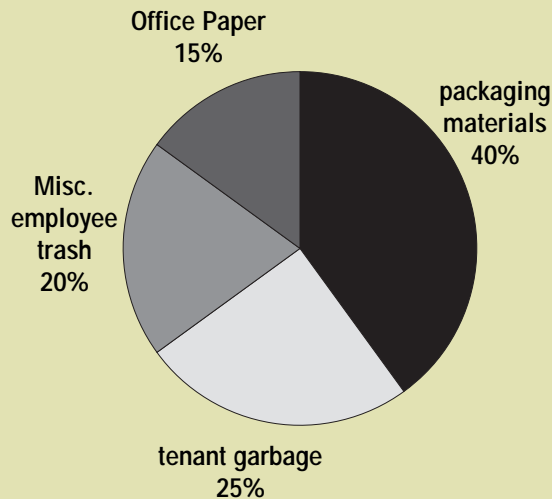
There is no recycling pick up for aluminum and metal scraps so these materials are delivered to the scrap metal company. There is no recycling available for plate glass.

Alexandria Ace Hardware – Alexandria, Minnesota

The store has 7,200 square feet of retail space; family owns and operates (father/daughter) two additional hardware stores in Glenwood, Minnesota (12,000 square feet retail) and Long Prairie, Minnesota (9,000 square feet retail). Alexandria is the management office for all three stores.

The family has been in the hardware business in Alexandria for 35 years. The store is located in the business district of Alexandria, which is a town of 8,000 population located in a county of 30,000 population. With many lakes in the area, the population doubles during the summer season from seasonal residents and tourists.

Waste Analysis



(un-compacted, percentage by volume)

Waste Disposal

Store has a 2-cubic-yard waste container picked up twice weekly. Their waste includes tenant waste from apartments above the store. The store hopes to increase waste reduction efforts and reduce waste pick up to once weekly, which would be a 50 percent reduction in waste and saving of \$53 per month.

Recycling

The store has an employee recycling program for aluminum cans with the aluminum proceeds designated for an employee party. They also recycle cardboard and offer recycling programs for fluorescent bulbs and nickel-cadmium batteries to both commercial and residential customers.

Best Management Practices for Source Reduction

- Installed timers on basement lights.
- Converting fluorescent lights from magnetic to electronic ballasts.
- Replaced dark floor tiles with lighter floor tiles.
- Installed a programmable thermostat.
- Had an energy audit at their Glenwood store.
- Uses reusable cloth towels in the bathroom.
- Encourages employees to use reusable mugs and lunch containers, and has waste reduction posters in the break room for employee education.
- Uses remanufactured toner cartridges.
- Reuses file folders, turns used paper into scratch pads, and practices double-sided copying.
- Sells wooden pallets and mismatched paints to customers at a reduced price.
- Uses the Pace Computer system for inventory management and purchasing.

Issues

The store's waste disposal company discontinued the collection of small quantities of office paper for recycling and the store does not have room for another two-cubic-yard waste container just for office paper. Therefore, all office paper waste is disposed of in the regular waste stream.

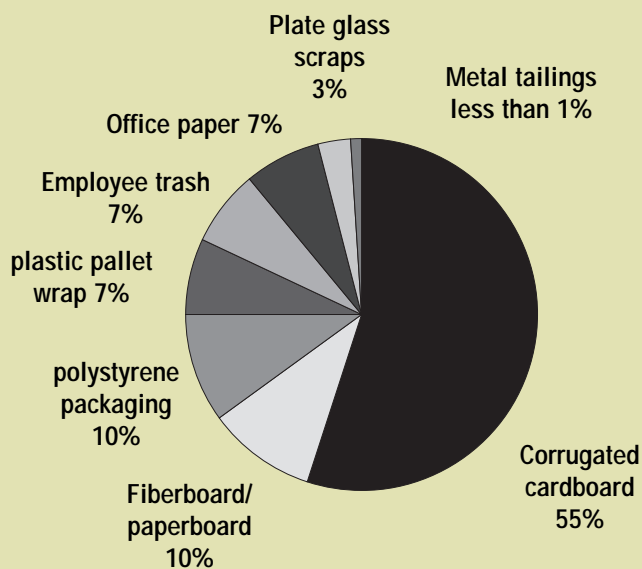
There are no utility rebates for lighting retrofits at two of their three stores. There is no recycling available for plate glass scraps.

Henricksens Ace Hardware – North St. Paul, Minnesota

The store has 12,000 square feet of retail space; the owner is a second generation hardware retailer. The store has been at its current location for 10 years and is located in the seven-county Minneapolis/St. Paul metropolitan area.

The store is free-standing and successfully competes with a Home Depot Warehouse located in a shopping center across the freeway. Management and employees are supportive and highly motivated about waste reduction.

Waste Analysis



(un-compacted, percentage by volume)

Waste Disposal

A 6-cubic-yard waste container is picked up once a week.

Recycling

The store has an active recycling program for aluminum cans, plastic bottles, fluorescent bulbs, nickel-cadmium batteries and metal pipe threading tailings. They give away broken wooden pallets to customers and recycles others to vendors and the Ace warehouse.

Best Management Practices for Source Reduction

- Store has a materials exchange with another vendor for corrugated cardboard, which eliminates the cost of disposal or recycling.
- Provides window screen replacement, glass replacement and pipe threading services.
- For purchasing efficiency and waste reduction, the store buys plate glass in wood billet crates instead of pre-cut packaged glass.
- Uses the Pace computer system for cost-effective purchasing and inventory management.
- Store has a super-insulated building shell with 12-inch walls and 4 inches of foam insulation, a low-maintenance concrete exterior, and they have installed a vertical plastic strip curtain on the loading dock to minimize heat loss.
- Parking lot has low-pressure sodium vapor lights installed on photocell sensor switches.
- Donates used materials (i.e. paint and glass scraps) to community groups.
- Installed on-demand and point-of-use hot water heating for increased energy efficiency.
- Low-flow faucets installed throughout the store for water conservation.
- Store has a low-maintenance/no-chemical-use lawn on the boulevard between merchants, and is considering planting native prairie grasses for no maintenance and aesthetic attraction.

Issues

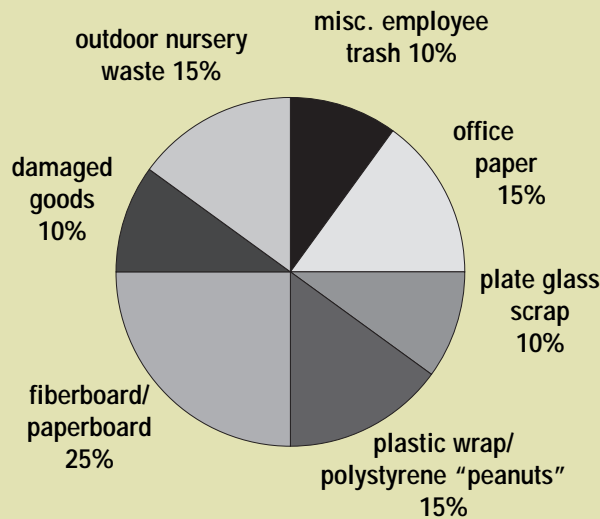
There are no recycling services available for plate glass scraps or plastic pallet wrap. There are no viable cost incentives to reduce waste since the disposal costs are standard whether the container is full or almost empty. No utility rebates for lighting retrofits. It is difficult to conduct in-store employee training because of varying employee schedules.

Frattallones Ace Hardware – Arden Hills, Minnesota

The store has 17,000 square feet of retail; the Arden Hills store is the corporate offices for the family-owned and managed (father and two sons) group of eight Ace Hardware stores.

The stores range in size from 5,000 square feet to 30,000 square feet of retail and all are located in the metropolitan Minneapolis/St. Paul area. The Arden Hills store has a large seasonal nursery and outdoor equipment display.

Waste Analysis



(un-compacted, percentage by volume)

Waste Disposal

The Arden Hills store has a 6-cubic-yard waste container, which is picked up once weekly, and an 8-cubic-yard cardboard recycling container.

Recycling

Store recycles metal scraps and returns wooden pallets to vendors. They provide fluorescent bulb recycling to customers. Recycle cardboard.

Best Management Practices for Source Reduction

- Installed programmable thermostats.
- Completed a lighting retrofit with T8 fluorescent lights and installed LED bulbs in exit signs at the Arden Hills store.
- Installed new HVAC equipment with high-efficiency motors and interior, high ceiling mercury vapor lighting. The new lighting helps decrease heating costs (since the mercury

vapor lights burn hotter than fluorescent bulbs) and were eligible for a sizeable rebate.

- Buys glass in billets instead of precut glass.
- Buys small items in bulk and displays them in bins instead of individual packaging.
- Uses refurbished cash registers at all stores, and the office uses refurbished desks computers, a copier and other equipment.
- The office reuses paper as scratch pads, copies double-sided, reuses file folders, uses recycled-content paper,
- Store converted four-bulb fluorescent fixtures to three-bulb fixtures in the office.
- By upgrading their Pace computer system, the store is able to switch to two-copy instead of three-copy invoices for paper reduction.
- Installed window film on office windows.
- Uses citrus-based cleaners.
- Sells mismatched paint at a discount or gives it to community groups.
- The store purchases many products directly from the manufacturer in bulk quantities that are distributed between stores.

Issues

There are no utility rebates available in several communities where the group's stores are located. The local electric utility gave customers rebate coupons for qualifying compact fluorescent bulbs, but only those that were specially packaged for the utility rebates. The cost of ordering additional inventory – bulbs with the special packaging – when they had adequate stock discouraged this store from participating in the rebate program.

There are no available recycling programs for plate glass, which is a large percentage of the store's waste. They feel many products are over packaged. There is a lack of information about waste reduction opportunities.

Customers often object to the cost of recycling fluorescent bulbs. Since Minnesota law mandates disposal of fluorescent bulbs, it should also help support collection services to encourage customer participation and compliance with the law.

Waste Assessment Checklist

The following checklist summarizes a variety of waste management practices that your store could potentially practice for optimal waste management. All of the practices listed here are documented or discussed in this guide. Use this checklist as a store assessment tool to help formulate a Source Reduction Plan best suited for your store.

In your business operations, do you:

Y	N	Use remanufactured toner cartridges
Y	N	Re-ink printer and/or cash register ribbons
Y	N	Maximize on-screen computer editing to minimize report printing
Y	N	Use recyclable carbon-less forms
Y	N	Make cooperative inventory purchases with other dealers
Y	N	Purchase office supplies and some products in bulk quantities
Y	N	Purchase recycled-content and minimally packaged products
Y	N	Use refurbished office equipment

Does your store currently recycle:

Y	N	Aluminum cans
Y	N	Office paper
Y	N	Glass bottles
Y	N	Plate glass scraps
Y	N	Plastic bottles
Y	N	Plastic film wrap
Y	N	Cardboard
Y	N	Metal scraps For Pipe Threading
Y	N	Wood pallets
Y	N	Wood waste, other than pallets

Does your store offer consumer recycling programs for:

Y	N	Spent fluorescent tubes
Y	N	Batteries (which type?)
Y	N	Motor oil and/or antifreeze

Cleaning procedures: Do you use:

Y	N	Concentrated cleaners in refillable pump spray bottles
Y	N	Non-toxic cleaning products
Y	N	A pressure washer instead of solvents to clean equipment

Has your store completed the following building and/or property maintenance within the past three years?

Y	N	Remodeled ceiling to increase energy efficiency
Y	N	Installed low-maintenance flooring
Y	N	Practiced low-maintenance or no-chemical lawn care
Y	N	Applied elastomeric roof coatings or other heat-reflectant sealants
Y	N	Installed a holding pond to slow water runoff from the parking lot
Y	N	Remodeled store with a low-maintenance exterior finish
Y	N	Used latex or zero-VOC paints
Y	N	Used vapor barrier paints

Has your store taken these energy and water conservation actions:

Y	N	Retrofitted store lighting with T8 fluorescent lighting
Y	N	Converted lighting from magnetic to electronic ballasts
Y	N	Installed efficient shelf lighting
Y	N	Retrofitted exit signs with LED (light emitting diode) bulbs
Y	N	Installed reflective window film on the storefront and/or office windows
Y	N	Installed a new HVAC system with high-efficiency motors
Y	N	Installed photosensitive timers on outside lighting
Y	N	Installed motion sensors in low-use areas of the store
Y	N	Use a programmable thermostat
Y	N	Low-flow plumbing throughout the store
Y	N	Utilized passive solar heating

Does your store participate in these reuse opportunities?

Y	N	Wooden pallets returned to vendors
Y	N	Wooden pallets donated to the public
Y	N	Receive merchandise on plastic, returnable pallets
Y	N	Mismatched paint donated to community groups
Y	N	Materials exchange with another company (i.e. cardboard, packing peanuts or other)
Y	N	Cloth towels used in rest rooms
Y	N	Use washable furnace/air filters

How to establish a source reduction program that works for your store

1. Communicate your commitment to source reduction with employees.

You, the manager, must first understand the importance of conserving natural resources before communicating this need to employees.

2. Get a commitment from key employees.

Ask several key employees to help in this cost and environmental savings effort. Establish a Source Reduction Team.

3. Assess costs.

Examine purchasing, inventory and maintenance records to gain insight into your store's maintenance and operation costs, utility bills, disposal costs, and waste generation patterns. Target opportunities for waste reduction.

4. Conduct a waste assessment for your store

Tour the store and parking lot with your Source Reduction Team and use the waste assessment checklist to identify current waste management practices and opportunities for new practices.

5. Identify waste generated

A waste sort can be helpful to further identify waste reduction opportunities. Dump out the contents of the waste disposal container onto a large sheet of plastic and sort into different waste categories (i.e. lunchroom waste, plate glass, cardboard, fiberboard/paperboard, office paper, employee waste, plastics, defective merchandise, cans, etc). Estimate the percentage of weekly waste for each category. This exercise will help you identify the major types of waste in your store's waste stream. Then include specific ways to reduce the major categories that can be included in your store's waste management plan. Including employees in this exercise is a great way to motivate them by creating an awareness of the waste generated by the store.

6. Gather employee ideas

Encourage employees to share waste reduction ideas. There is no such thing as a bad idea. Train and ask new employees also.

7. Implement changes

Once source reduction opportunities are identified, the team can develop a plan and begin implementing changes in purchasing, handling, disposal and generation practices. Always start with the most cost-effective and beneficial ideas first. Monitor success by documenting the amount of waste reduced and the cost changes. Promote results to employees and the community.

Local Resources for Waste Management

Check with state, county or city public officials responsible for waste management. Visit their offices to find out how your store is impacted by current waste management regulations or ordinances, and solicit their suggestions on waste management, resource conservation and recycling.

Fluorescent Bulb Recycling

Recyclights

401 West 86th Street
Minneapolis, MN 55420
800-831-2852 (fax) 612-948-0627
www.recyclights.com
enviro@recyclights.com

Recycling centers in Minnesota, Ohio and Florida and will provide service to retailers anywhere in the United States. Other services include HID lamp recycling, alkaline and lithium battery recycling, PCB and DEHP ballast recycling. Call Jan Nisicwicz, 612-948-5516 for specific regulations that apply to your state and for cost of service.

Mercury Technologies of Minnesota, Inc.

Pine City Industrial Park, PO Box 13
Pine City, MN 55063
800-864-3821
ecmis.mtm@norsol.com

Has an established program working with independent hardware stores in Minnesota as lamp drop-off sites. Also provides lamp recycling services nationwide.

Mercury Technologies International

A nationwide company for collection and recycling of fluorescent lamps. Contact any of the processing facilities for a collection site near your store:

Allentown, PA	800-554-AERC
Hayward, CA	800-628-3675
West Melbourne, FL	800-808-4MTI

Lamp Recyclers, Inc.

712 Packerland Drive. PO Box 10794
Green Bay, WI 54301
800-558-1166.

Recycles fluorescent and HID light bulbs, PCB ballast, non-PCB ballast, and batteries; provides services throughout the Midwest.

Battery Recycling

Rechargeable Battery Recycling Corp.

Prestige Park, Suite 300,
2233 NW 41st Street,
Gainesville, FL 32606
www.rbrc.com

To sign up for nickel-cadmium battery recycling, or to order more pre-addressed mailers, call 352-376-6693.

Recyclights (see Fluorescent...)

Alkaline, button, and lithium batteries can be sent (at dealer expense by UPS) to Recyclights for battery recycling. There is a charge per pound which varies with type of battery (e.g., button batteries are \$1.90/lb.)

Battery Council International

401 North Michigan Avenue
Chicago, IL 60611
312-644-6610 x 3558

Motor Oil Recycling

Valvoline First Recovery

3499 Blazer Parkway
Lexington, KY 40509

For information on the DIY program for used motor oil and used oil filter recycling, contact Dottie Larson at 606-357-2731.

Used Oil Disposal Services in Minnesota

www.pca.state.mn.us

Minnesota Pollution Control Agency Fact Sheet #6.00 lists companies that will pick up and transport used oil and non-hazardous waste. Call Hazardous Waste, 651-296-6300 or 800-657-3843.

Contact your state environmental protection agency for resource listings in your state.

Technical Assistance in Minnesota

Minnesota Technical Assistance Program

612-627-4646 or 800-247-0015

www.mntap.umn.edu

MnTAP offers non-regulatory advice for businesses on source reduction, pollution prevention and waste management. Provides phone assistance, site visits, interns, fact sheets and printed material, including lists of outlets for industrial scrap pallets, wood waste, and manufacturers of water-based parts washers.

Minnesota Materials Exchange

www.mnexchange.org

The on-line listing of the Minnesota materials exchange. Lists of materials wanted by companies or excess materials available to other companies on an exchange program. Contact Barb Nesheim, MnTAP at 612-627-1900.

Waste Reduction Assistance

Minnesota Waste Wise Program

30 East Seventh Street, Suite 1700

St. Paul, MN 55101

651-292-4681 or 800-821-2230.

www.mnchamber.com/affiliate/waste.htm

A voluntary program that encourages businesses to reduce waste and increase recycling. In cooperation with the Minnesota Office of Environmental Assistance and county governments, they provide direct assistance, including resource materials, on-site waste audits, and individual plans for Minnesota businesses.

U.S. EPA Waste Wi\$e Program

800-EPA-WISE (800-372-9473)

www.epa.gov/epaoswer/non-hw/reduce/wstewise/index.htm

A voluntary national program to assist businesses in designing their own solid waste reduction program that includes waste prevention, recycling and the purchase of recycled-content products.

Minnesota Office of Environmental Assistance

520 Lafayette Road North, 2nd Floor

St. Paul, MN, 55155

651-296-3417 or 800-657-3843

www.moea.state.mn.us

Remanufactured Toner Cartridges

Company names provided by Minnesota Waste Wise. Also see yellow pages under "Office Supplies"

Matrix Laser Care

Bloomington, MN 612-881-5724

Laser Sharp

Hastings, MN 612-437-8855

Recycled Computer Products

Plymouth, MN 612-546-9205

Quality Laser, Inc.

Minneapolis, MN 612-338-3296

Lighting and HVAC Improvements

Contact your local utility regarding energy audits, rebates for lighting and HVAC improvements, other financial assistance, and recommendations for lighting and HVAC consultants.

U.S. EPA's Energy Star Programs

202-775-6650

www.epa.gov/energystar/

The **Green Lights Program** helps businesses cut lighting bills with energy-efficient lighting. They provide free technical support, modeling software to examine the cost savings potential to your store, and a financing directory listing utility rebates and other financing suggestions in your area.

The Energy Star Buildings Program

provides assistance for heating, cooling, and ventilation upgrades, where profitable.

Buying Recycled-Content Products

Minnesota Recycled Product Directory

A guide to products, made by Minnesota companies, that contain recycled materials. A searchable database is available online at www.moea.state.mn.us, or call the Minnesota Office of Environmental Assistance for a printed version of the directory, 800-657-3843 toll free.

Business Products Industry Association

301 North Fairfax
Alexandria, VA 22313
800-542-6672

Provides stores with information on recycled products and recycling programs of manufacturers of business products; resource guides.

American Plastics Council

1801 K Street NW, Suite 701L
Washington, DC 20006
800-2-HELP-90 (800-243-5790)
www.plasticsresource.com

Request the free *Recycled Plastic Products Source Book*.

Buy Recycled Business Alliance

703-683-9025 x403 or x209
www.nrc-recycle.org/brba

A program of the National Recycling Coalition that helps companies identify and increase their use of recycled-content products.

Other Resources

National Paint & Coatings Association

1500 Rhode Island Ave NW
Washington DC 20005
202-332-3194
www.paint.org

Information hot-line on paint disposal and related concerns. Books, pamphlets and newsletters on pertinent subjects including post-consumer waste disposal, management information, labeling, etc.

Recycled-Content Products Available to Hardware Stores

This is a partial list of recycled content products that contain up to 100 percent recycled material and are commonly purchased by hardware and lumber retailers. SKU numbers are not listed because they will vary by hardware distributor. Check your hardware distributor merchandise list or your suppliers for specific product numbers.

Lawn & Garden

- bird feeders – Rubbermaid
- bird houses, feeders – American Earth Friendly
- composters – Phoenix Recycling
- composters – Barclay Recycling
- fertilizer – Milorganite
- garden hose (made from recycled tires) – Colorite
- garden hose – Gilmour
- garden tools – Recycled Plastics Marketing
- garden trellises – Conversion Products, Inc.
- landscape edging (Edgemaster) – Master Mark Plastics
- lattice panels – Master Mark Plastics
- mulch (100% newsprint & wood fiber) – MAT, Inc.
- plant containers and related products – National Polymers, Inc.
- sprinkler hose (Moisture Master) – Aquapore

Household Hardware

- bags (Glad “Lunch & More”) — First Brands
- bins/trash cans — Tucker
- cookbooks — Storey Publishing
- cutting boards — Polycycle, Inc.
- door mats (Masterpiece Collection) — Royal Rubber
- fire starters and charcoal starters — Nature’s Fire
- flashlights — Discas Recycled Products Corp.
- floor mats, indoor/outdoor — Akro
- fly swatters, flying discs — Weisenbach Specialty Printing, Inc.
- gift cards, tags, wrapping paper — Recycled Paper Products
- glass pitchers & glasses — Jolin & Young
- mailboxes — Coon Mfg., Inc.
- outdoor grills — Weber Stephen
- paper products (Green Forest brand) — Fort Howard Paper Company
- paper towels (c-fold & multi-fold) — Scott Paper
- photo mailers, bubble wrap, envelopes — Manco
- pipe wrap insulation — Plasto Flex Corporation
- recycling bins — Safco Products
- snow shovel (SnoDozer) — WirthCo Engineering Inc.
- stepstool — Storehouse
- trash bags — Carlisle
- trash bags — North American Plastics
- wall clocks, soap dishes — EnviroSafe Products, Inc.

Pet Products

cat litter (100% recycled material) — Nature Fresh
cat litter — American Argo
dog bowls — Amazing Recycled Products
dog collars — Resource Rivival
pet bedding, cat litter — The Barnaby Company

Automotive Products

ice scrapers, oil pans , snow brushes — Gary Plastic Packaging Corporation
motor oil, synthetic (Enviro-Care) — Exorbet

Office Products: Paper (Minnesota)

computer forms, computer paper — O.E.I. Business Forms (612-469-5505)
computer paper, pads and tablets — Performance Computer Forms (612-469-1400)
envelopes — Johnson, Anderson & Associates (612-496-6699)
expanding files, indexed file folders, jackets — Smead Manufacturing (612-437-4111)
xerographic paper — Boise Cascade (800-259-2652)

Building Materials

fencing — Energy & Environmental Concepts, Inc
insulation — Envirosafe Products, Inc.
insulation, cellulose (Nature Guard) — Greenstone Industries
pipe (corrugated) — Prinsco. Inc.
plastic decking — Trex Company
plastic decking — Master Mark Plastics
plastic lumber (100% post-consumer) — Energy & Environmental Concepts, Inc.
plastic lumber — Phoenix Recycling
plastic lumber outdoor furnishings — Spray Control Systems
roof coating, rubber — Environmental Rubber Products
roofing shingles (coal slag & paper content) — Certainteed Corporation
thermal ceiling tiles — King & Company
thermal ceiling tiles — USG
wood polymer lumber — Mobil Chemical Company

Waste Reduction Survey of National Ace Hardware Dealers

The following survey was sent to all U.S. Ace Hardware dealers in March 1997 in cooperation with The WATER Foundation's research project, *Waste Reduction In The Retail Hardware Industry*, funded by the Minnesota Office of Environmental Assistance. The survey documents conservation practices and the amount of waste produced and disposed of in the retail hardware industry, and identifies profitable waste reduction practices to model to other dealers. The survey was also sent to a number of midwestern state retail hardware associations.

A five percent response (260 surveys) was received from Ace dealers. The responses by region are: 13 percent northeast; 14 percent southeast; 43 percent mid-west; 18 percent west; 11 percent south-west, and 1 percent international. Some dealers did not answer every question, which accounts for the variation in total responses to individual questions. The survey questions are the major "best management practices" for waste reduction in the retail hardware industry. Many of these practices are documented for cost and waste benefits in this manual.

In Your Business Operations, Do You:

Y (117) 45%	N (142) 55%	Use remanufactured toner cartridges
Y (173) 79%	N (47) 21%	Use on-screen computer editing to minimize report printing
Y (153) 69%	N (68) 31%	Use recyclable carbon-less forms
Y (118) 53%	N (106) 47%	Make cooperative inventory purchases with other dealers
Y (204) 89%	N (24) 11%	Purchase office supplies and some products in bulk quantities
Y (187) 87%	N (28) 13%	Purchase recycled-content & minimally packaged products
Y (120) 57%	N (91) 43%	Use refurbished office equipment
Y (126) 58%	N (90) 42%	Practice double-sided photocopying
Y (157) 77%	N (47) 23%	Is lack of recycling vendors a barrier to recycling?

Does Your Store Currently Recycle:

Y (178) 78%	N (49) 22%	Aluminum cans
Y (125) 57%	N (96) 43%	Glass bottles
Y (75) 36%	N (174) 87%	Plate glass scraps
Y (72) 34%	N (137) 66%	Plastic bottles
Y (19) 9%	N (184) 91%	Plastic film wrap
Y (170) 76%	N (55) 24 %	Cardboard
Y (80) 38%	N (130) 62%	Metal scraps
Y (189) 83%	N (37) 17%	Wood pallets
Y (67) 33%	N (134) 67%	Wood waste, other than pallets
Y (157) 77%	N (47) 23%	Is lack of recycling vendors a barrier to recycling?

Does Your Store Offer Consumer Recycling Programs for:

Y (16) 9%	N (170) 91%	Spent fluorescent tubes
Y (67) 35%	N (127) 65%	Batteries Types: Auto (15) Ni-Cd (2) Other (2)
Y (23) 12%	N (165) 88%	Motor oil and/or antifreeze

Cleaning Products Used:

Y (151) 70%	N (64) 30%	Concentrated cleaners in refillable pump spray bottles
Y (130) 64%	N (73) 36%	Non-toxic cleaner
Y (102) 52%	N (94) 48%	Use a pressure washer for parts cleaning

Building and/or Property Maintenance Completed within the Past Three Years

Y (67)	33%	N (135)	67%	Remodeled ceiling to increase energy efficiency
Y (54)	26%	N (150)	74%	Installed low-maintenance flooring
Y (73)	39%	N (113)	61%	Practiced low-maintenance or no-chemical lawn care
Y (30)	15%	N (170)	85%	Applied heat reflectant (elastomeric) roof coatings
Y (30)	15%	N (170)	85%	Installed holding ponds to slow parking lot water runoff
Y (79)	41%	N (115)	59%	Applied a low-maintenance exterior
Y (112)	57%	N (86)	43%	Used latex paints vs. oil-based paints
Y (26)	14%	N (156)	86%	Used vapor barrier paints

Energy & Water Conservation Actions Taken:

Y (82)	40%	N (125)	60%	Installed T8 lighting with electronic ballasts
Y (83)	42%	N (117)	58%	Converted to electronic ballasts
Y (32)	17%	N (152)	83%	Installed efficient shelf lighting
Y (31)	16%	N (160)	84%	Retrofitted exit signs with LED bulbs
Y (34)	17%	N (163)	83%	Use window film on storefront and/or office windows
Y (58)	28%	N (150)	72%	Installed a new HVAC system with high-efficiency motors
Y (101)	51%	N (97)	49%	Have high-efficiency outdoor lighting
Y (42)	21%	N (159)	79%	Installed motion sensors in low-use areas of the store
Y (108)	50%	N (106)	50%	Use a programmable thermostat
Y (23)	14%	N (137)	86%	Installed low-flow plumbing
Y (12)	6%	N (184)	94%	Utilize passive solar heating

Does Your Store Participate in these Reuse Opportunities?

Y (187)	87%	N (28)	13%	Wooden pallets are returned to vendors
Y (166)	79%	N (43)	21%	Wooden pallets are donated to the public
Y (46)	23%	N (158)	77%	Receive merchandise on plastic, returnable pallets
Y (179)	83%	N (37)	17%	Mismatched paint is donated to community groups
Y (44)	22%	N (158)	78%	Have a materials exchange with another company
Y (34)	16%	N (176)	84%	Use cloth towels in the restroom
Y (28)	14%	N (171)	86%	Use reusable furnace/air filters

Are there other innovative waste reduction and/or conservation measures that your store has taken?

Make product selections based on packaging, if less packaging buy more; installed attic wind turbine; donated parking lot for community recycling bins, which a local church maintains; discounts off shovels when customers bring in an old shovel, which is then given a local artisan for reuse; installed grates in entry to catch water and dirt which saves store labor, chemicals and prevents accidents; burn lumber scrap as fuel; skylights to increase store lighting; give computer paper to preschools; bottle bar oil in plastic jugs for customers; sell wood pallets to a refurbisher; turn down heat and wear long sleeves; use paper from previous sign kit for scrap paper.

What are your biggest barriers to waste reduction and conservation of natural resources (i.e. waste haulers, lack of utility rebates, vendors, employee cooperation, lack of resources, etc.)

Lack of utility rebates; employee cooperation; lack of services for hazardous waste disposal (i.e. fluorescent tubes, batteries, motor oil); lack of time; lack of markets for products so vendors can charge less; waste container rentals; storage space for recycling material; lack of services in rural areas and it is not cost effective to drive to where services are; no community recycling/no community commitment; paying to recycle cardboard; cardboard pickup costs more than regular waste disposal (Ohio); lack of knowledge and education; commercial businesses are penalized for recycling when consumers can drop off materials for free.

Waste Reduction Survey of Minnesota-Dakotas Retail Hardware Stores

Name of Store:_____	Contact Person:_____
Address:_____	
City:_____	State:_____ Zip:_____
Telephone:_____	Fax:_____
Square footage of store:_____	Retail Hardware Affiliation:_____
Number of dumpsters for store:_____	Volume:_____ Pickups per week:_____
Mail completed survey to: Minnesota-Dakotas Retail Hardware Association 23 Ninth Avenue South, Hopkins, MN 55343-7565	
Or fax survey: Fax: (612) 933-4595	

In Your Business Operations, Do You:

Y (8) 22%	N (28) 78%	Use remanufactured toner cartridges	# used/year: 2-8
Y (15) 42%	N (21) 58%	Maximize on-screen computer editing to minimize report printing	
Y (17) 47%	N (19) 52%	Use recyclable carbon-less forms	
Y (17) 47%	N (19) 52%	Make cooperative inventory purchases with other dealers	
Y (27) 75%	N (9) 25%	Purchase office supplies and some products in bulk quantities	
Y (28) 78%	N (8) 22%	Purchase recycled-content and minimally packaged products	
Y (15) 42%	N (21) 58%	Use refurbished office equipment	
		What type: <i>desks, copiers, cabinets, chairs, comp.</i>	
Y (10) 28%	N (26) 72%	Practice double-sided photocopying	
Y (2)	N	Other: <i>Scrap paper for note pads, have computer ribbons re-inked</i>	

Does Your Store Currently Recycle:

Y (32) 89%	N (4) 11%	Aluminum cans
Y (17) 47%	N (19) 52%	Office paper
Y (17) 47%	N (19) 52%	Glass bottles
Y (3) 8%	N (33) 92%	Plate glass scraps
Y (11) 31%	N (25) 69%	Plastic bottles
Y (3) 8%	N (33) 92%	Plastic film wrap
Y (29) 81%	N (7) 19%	Cardboard
Y (13) 36%	N (23) 64%	Metal scraps
Y (22) 61%	N (14) 39%	Wood pallets
Y (5) 14%	N (31) 86%	Wood waste, other than pallets
Y (21)	N	Is lack of recycling vendors a barrier to recycling?

Does Your Store Offer consumer recycling programs for:

Y (24) 67%	N (12) 33%	Spent fluorescent tubes
Y (25) 69%	N (11) 31%	Batteries Type: auto, Ni-Cd, Button, alkaline
Y (5) 14%	N (31) 86%	Motor oil and/or antifreeze

Cleaning Products Used:

Y (23) 64%	N (13) 37%	Concentrated cleaners used in refillable pump spray bottles
Y (15) 42%	N (21) 58%	Non-toxic cleaners
Y (12) 33%	N (24) 67%	Use a pressure washer instead of solvents to clean equipment

Building and/or Property Maintenance Completed within the Past Three Years

Y (9)	25%	N (27)	75%	Remodeled ceiling to increase energy efficiency (2 suspended ceilings)
Y (7)	19%	N (29)	81%	Installed low-maintenance flooring Material: wood, carpet, vinyl
Y (9)	25%	N (27)	75%	Practiced low-maintenance or no-chemical lawn care / no lawn
Y (7)	19%	N (29)	81%	Applied elastomeric roof coatings or other heat-reflectant sealants
Y (0)	0%	N (36)	100%	Installed holding ponds to slow water runoff from the parking lot
Y (5)	14%	N (31)	86%	Applied a low-maintenance exterior finish Type: 2 brick, 3 steel
Y (19)	53%	N (17)	47%	Used low-emission latex paints
Y (4)	11%	N (32)	89%	Used vapor barrier paints

Energy & Water Conservation Actions Taken:

Y (10)	28%	N (26)	72%	Installed T8 lighting with electronic ballasts
Y (8)	22%	N (28)	78%	Converted to electronic ballasts
Y (4)	11%	N (32)	89%	Installed efficient shelf lighting
Y (2)	6%	N (34)	94%	Retrofitted exit signs with LED (light emitting diode) bulbs
Y (8)	22%	N (28)	78%	Use window film on storefront and/or office windows
Y (5)	14%	N (31)	86%	Installed a new HVAC system with high-efficiency motors
Y (9)	25%	N (27)	75%	Have high-efficiency outdoor lighting
Y (3)	8%	N (33)	92%	Installed motion sensors in low-use areas of the store
Y (10)	28%	N (26)	72%	Use a programmable thermostat
Y (6)	17%	N (30)	83%	Installed low-flow plumbing (i.e. faucet aerators, double-handled flush)
Y (5)	14%	N (31)	86%	Utilize passive solar heating
Other:				Thermopane windows

Does Your Store Participate in these Reuse Opportunities?

Y (26)	72%	N (10)	28%	Wooden pallets are returned to vendors
Y (14)	39%	N (22)	61%	Wooden pallets are donated to the public
Y (6)	17%	N (30)	83%	Receive merchandise on plastic, returnable pallets
Y (23)	64%	N (13)	36%	Mismatched paint is donated to community groups
Y (12)	33%	N (24)	67%	Have a materials exchange with another company
Y (11)	31%	N (25)	69%	Use cloth towels in the restroom
Y (2)	6%	N (34)	94%	Use reusable furnace/air filters

Are there other innovative waste reduction and/or conservation measures that your store has taken? Do you know how these measures have impacted your bottom line?

Try to purchase by pallet load when possible; upon construction doubled insulation in walls & ceiling, now don't turn on heat unless below zero; county offers a used appliance recycling program which is good for us because we sell over 300 new appliances per year; cardboard recycling reduced garbage costs by \$25/month; fix customers items rather than throw them out, it's pure profit if staff is not busy; as a community service we pick up 1,000# of glass/week from local liquor store and take to recycling center, then donate money to American Legion; bought solar motion detector light;

What are your biggest barriers to waste reduction and conservation of natural resources?

Availability of recycling vendors and resources; mindset that you should only recycle if it makes you money, rather than because it's the right thing to do; hauler has problem disposing of recyclables; all the above; basic knowledge of what to recycle and who will take (i.e. pallets); low priced electricity discourages energy conservation plus utility does not offer any conservation rebates; intensive labor of recycling (i.e. repackaging, delivering, paper work); lack of holding space; education; cost of conservation efforts not significant versus same effort directed towards retail activities; no recycling for plate glass, metal and aluminum scraps; could we simplify fluorescent tube recycling by building in the cost of recycling in at the wholesale level?