



**Green
Government**

An initiative of the National Association of Counties

Solid Waste Management, Recycling and E-Waste

● Introduction

Counties are facing growing problems with waste management as landfills are quickly filling, new sites are difficult to find and waste disposal costs are increasing. According to the U.S. Environmental Protection Agency (USEPA), Americans generated 251 million tons of solid waste in 2006, with organic materials as the largest component. Paper products alone contributed 34 percent of the waste; 12 percent was plastic and 8 percent was metal.

Recycling efforts in 2006 recovered 61 million tons of materials and an additional 21 million tons were recovered through composting. By recycling these 82 million tons of municipal solid waste, the equivalent of 49.7 million metric tons of carbon emissions were prevented from being released into the environment.

The term “waste management” is commonly defined by the three Rs: Reduce, Reuse and Recycle, which are:

- **Reduce:** Reducing consumption and the amount of material thrown away is generally the preferred option for managing waste, because it prevents pollution from occurring in the first place. It lowers disposal costs by reducing the amount of waste that needs to be handled and saves energy and resources that would otherwise be used in production.
- **Reuse:** Reusing involves finding another use for older products. This can involve repairing, donating or selling the products.
- **Recycle:** Rather than sending waste to landfills, recycling involves removing materials such as glass, metal, plastic, and paper and reprocessing them to create new products.

● Collection Methods for Recyclables

Recyclables are typically collected by curbside pickup, drop-off centers or a combination of the two.



Curbside pick-up makes recycling easier for residents. According to the USEPA, by 2006 there were nearly 8,700 curbside collection programs serving approximately 50 percent of the American population. Alachua County, Florida uses curbside pick-up for its recycling program. The county provides the bins to residents and places no limit on the number of bins each household is allowed to use. The program has been successful, recycling 32 percent of waste produced.

Drop-off centers require residents to transport their recyclables to a main collection point. Sometimes, drop-off centers are used as collection points for hazardous or less common materials for recycling in conjunction with curbside pick-up. In other areas, drop-off centers are the only method of recycling collection. The benefit of these centers is that the county does not need to pay anything to collect recycling from households; however, it also requires more effort from residents. Summit County, Colorado uses a drop-off recycling system and prevents 10 percent of waste from going to landfills.

● Pay-As-You-Throw Waste Disposal

A pay-as-you-throw system allows residents to pay only for the amount of waste they produce. The system functions similarly to utility billing, such as for electricity, because charges are determined by use. Charges may be based on weight or volume, with both methods providing a financial incentive to recycle more materials rather than throw them away. In volume-based pay systems, residents are charged by the number and size of the waste containers they fill. These charges may either be incurred based on the number of bags or cans at the curb, or residents may be required to buy special stickers or trash bags that include the cost of collection in the purchase price. In a weight-based system, waste is weighed at the curbside and residents are charged per pound. However, this requires scales to be added onto the collection trucks.

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Well-designed pay-as-you-throw programs can allow counties to generate money to pay for other solid waste programs, including recycling and composting. The USEPA reports that across the country, nearly 2,000 communities are taking part in pay-as-you-throw programs, and studies have shown that these areas have reduced the amount of waste produced by an average of 25 to 35 percent.

The USEPA recommends six steps to begin converting to a pay-as-you-throw program:

1. Estimate the amount of waste generated. Consider both current demand and the increase in future demand as the community grows.
2. Decide whether to charge residents based on weight or volume.
3. Estimate the start-up and ongoing costs.
4. Develop tentative pricing rates.
5. Calculate potential revenues.

Waste Management

www.wm.com

Waste Management is a founding sponsor of the NACo Green Government Initiative.

Waste Management works closely with counties all across the U.S. to assist them with the best landfill options and to educate them on the newest in recycling technologies such as implementing landfill-gas-to-energy projects and recycling fluorescent light bulbs. The old view of Waste Management taking trash away from the curb has been replaced by a new vision – one where they take trash away, but also recycle materials and deliver the energy that powers homes and businesses; while developing new technologies that will make the Earth greener.

6. Adjust the unit pricing program so that costs and revenues balance out.

To implement a pay-as-you-throw program, it is important to inform residents of potential pricing changes. Some residents may not realize that they already pay for waste removal through their taxes and that pay-as-you-throw is simply another method to calculate this cost, rather than an additional fee. This can be accomplished by holding public meetings, issuing press releases, preparing briefs for elected officials, working with retailers and enclosing information with mailings to residents.

Darlington County, South Carolina has implemented a pay-as-you-throw program. The program is self-supporting, requiring no additional funding from the county. Each homeowner pays between \$61 to \$81 each year for waste removal – a \$35 flat fee plus waste disposal bags for 50 cents each at easily accessible locations such as grocery and home improvement stores.

● Processing Recyclables

Multi-stream, dual-stream and single-stream processing are the main methods for collecting recyclables. A multi-stream processing system requires residents to sort recyclables before collection. Dual-stream processing requires residents to sort recyclables into two bins, one for papers and one for containers such as water bottles, aluminum cans, glass bottles and other recyclable, non-paper materials. Single-stream processing, on the other hand, allows residents to place all recyclables into the same container to be later processed at the recycling facility.

Multi-stream processing creates less work for the recycling center but more for the residents themselves, and therefore can only be effective if residents are either very enthusiastic or forced to participate. However, it is generally cheaper for the counties as they do not need to hire additional staff to sort the recyclables for them. Drivers pick up pre-sorted bins and check for contaminants, then put them into segregated compartments in the truck.

Dual-stream processing requires a truck with divided compartments to keep materials separated during transport. An advantage over multi-stream processing is that residents do not have to sort recyclables into several categories, such as glass, plastics, paper, alu-

minum, etc. This allows new materials to be added to the recycling process more easily because there is no need to add new compartments to collection vehicles.

In February 2008, Ocean County, New Jersey switched to dual-stream processing for recycling. Some areas of the county had already begun recycling using a dual-stream system and Ocean County wanted to share in the success. Prior to the change, the county had been requiring residents to separate all recyclables. The county hopes to increase recycling by increasing convenience.

According to the Solid Waste Association of North America (SWANA), there are currently 160 single-stream material recovery facilities in operation. More than 25 percent of the country with access to curbside waste collection also has access to curbside single-stream recycling. This process reduces collection costs, and Waste Management reports that single-stream processing increases recycling rates as much as 30 percent due mainly to its convenience factor. However, there is less quality control in the materials that are deposited for recycling and more contamination, especially the corruption of paper by glass, as well as higher processing costs because the materials require sorting at the recycling facility.

Martin County, Florida switched to a single-stream recycling processing system in October 2007. The county now diverts 57 percent of waste from landfills (a 96 percent increase from before the program).

● Organic Wastes

According to the USEPA, food residuals and yard trimmings make up 24 percent of U.S. solid waste. Many of these materials do not need to be sent to landfills and can instead be used for grasscycling, mulching, composting and donation, described below.

Grasscycling involves leaving grass clippings on the lawn rather than bagging and sending them to a landfill. On the lawn, the leftover blades of grass decompose to return nutrients to the soil, maintain soil moisture, and moderate temperature. Not only does this cut down on the amount of yard waste sent to landfills, it also reduces lawn watering, fertilizer applications and labor.

Kalamazoo County, Michigan switched to grasscycling in 1993. It was an easy, inexpensive conversion for the county; it simply



removed the bags from the conventional lawn mowers already in use. The county saves \$5,000 a year in trash removal costs and 140 hours of staff time during the growing season. Trash pickup is needed less frequently and dumpsters can be a smaller size.

The U.S. Department of Agriculture (USDA) defines mulch as “a protective layer of a material that is spread on top of the soil.” Mulching involves using a mulching mower to grind up tree leaves and branches, which can be used as mulch in flowerbeds to prevent erosion. The USDA identifies the following benefits of mulch:

- protection from soil erosion;
- reduction of soil compaction from heavy rains;
- conservation of moisture;
- maintenance of a more even soil temperature;
- prevention of weed growth; and
- improvement in soil condition as the mulch decomposes.

For more information on mulch, visit www.nrcs.usda.gov/FEATURE/backyard/mulching.html.

Santa Barbara, California produces mulch from the yard trimmings collected from residents and, after the trimmings are processed, residents are allowed to take as much mulch as needed for free.

Composting involves the decomposition of carbon- and nitrogen-rich material by one of the following four methods:

- static pile composting- piling organic waste and leaving it to decompose;
- aerated windrow or pile composting- forming organic waste into long rows and aerating this by embedding pipes or turning piles periodically;
- in-vessel composting- storing organic materials in enclosed equipment with controlled moisture, temperature, and aeration; or
- vermicomposting- using worms to break down organic materials.

Composting does, however, require frequent turning and an isolated area for the pile. As the material decomposes, it can release unpleasant smells and attract vermin.

The Link between Waste and Climate Change

The USEPA estimates that if the U.S. cut the amount of waste it generated to 1990 levels, greenhouse gas emissions could be reduced by 18 million metric tons of carbon equivalent. Increasing the recycling rate from 30 to 35 percent would reduce greenhouse gas emissions by another 10 million metric tons.

Solid waste increases greenhouse gas emissions in the following ways:

- decomposition of waste in landfills produces methane, a greenhouse gas;
- waste transportation to disposal sites creates greenhouse gas emissions due to burning fuel; and
- waste transportation to disposal sites creates greenhouse gas emissions due to burning fuel; and
- disposing materials means that com-

pletely new products have to be created, which generally requires fossil fuels and new raw materials. Trees filter carbon dioxide out of the atmosphere and store it, but throwing away paper requires cutting down more trees, thus preventing them from fulfilling this function. According to the National Recycling Coalition, an entire tree can be saved by recycling a stack of newspapers three feet high.

Additionally, the Grassroots Recycling Network, a national network of recycling professionals and waste reduction activists calling for zero waste policies, reports that extracting new resource rather than reusing them can have dire consequences. This can release chemical substances, waste heat and processing refuse into the air, cause health problems for the people that are exposed to the released chemicals and decrease the area for animal habitats.

Visit www.greencounties.org



Plastic Bag Bans

Annually, 4 to 5 trillion non-degradable plastic bags are used worldwide. Bans on traditional plastic bags have been popping up in many cities across the country, including the city and county of San Francisco, California.

Large markets and pharmacies in San Francisco are no longer allowed to send customers home with purchases in traditional plastic bags; instead, these stores have the option of either using compostable cornstarch bags or recyclable paper bags. According to Boris Delepine, legislative aide to Supervisor Ross Mirkarimi, “The public response has been overwhelmingly in favor of it. We’ve seen a number of other jurisdictions take up similar legislation. And in the weeks and months after passage — actually to this day — I still get inquiries from

As Hennepin County, Minnesota discovered, composting can reduce erosion and replenish soils. The county partnered with one of its cities, Wayzata, to pilot an organic composting program in 2003. Residents are asked to separate bio-degradable material, such as food scraps, pizza boxes, paper towels, and vacuum cleaner bags, out of their trash and place them in a separate waste bin. The material is then removed for composting and the rich soil produced is used in landscaping and road construction. More than 70 percent of Wayzata households participated in the pilot program, reducing garbage by 12 percent and increasing recycling by 23 percent. By 2005, 189 tons of organic material had been collected.

In King County, Washington, nearly 90 percent of single family households can now recycle food scraps in their yard waste cart. Food scraps, food-soiled paper and yard waste are composted at a privately operated compost facility into a nutrient-rich soil amendment that improves the health of our plants, crops, local gardens and parks. Items such as vegetable and fruit trimmings, meats, fish and poultry scraps and bones, plate scrapings, egg shells, coffee grounds, paper towels and napkins—even greasy pizza delivery boxes—can all be recycled in King County customers’ yard waste carts. For more information about the curbside food scraps recycling programs in King County, visit www.recyclefood.com.

cities and counties and state legislatures across the country asking for copies of the legislation in the hopes that they would be able to do the same thing in their jurisdiction.” Similar laws have been considered or introduced in cities including Portland, Boston, Seattle, Austin, Baltimore and the state of New York.

Bans on plastic bags generally have exceptions, however. In San Francisco, for example, restaurants and non-grocery retail stores are still allowed to use plastic bags for the time being. In order to manage the waste created by these bags, suggest that county residents reuse or recycle them. In 2006, more than 812 million pounds of plastic bags and film were recycled. Non-biodegradable bags can be reprocessed to make composite decking or other plastic bags.

Additionally, up to 20 percent of food in the U.S. is discarded, which can be prevented by donating excess food to food banks, homeless shelters or other charities. Some food waste can also be used as animal feed, which supports local farmers. In June 2007, with the help of two non-profit organizations, Food Lifeline and Northwest Harvest, King County, Washington schools donated leftover perishable items that would spoil over the summer, providing 3,900 meals to food banks and meal programs.

Hazardous Wastes

The USEPA defines hazardous wastes as “wastes with a chemical composition or other properties that make it capable of causing illness, death or some other harm to humans and other life forms when mismanaged or released into the environment.” More than 275 million metric tons of hazardous wastes are produced annually. They are flammable, corrosive, reactive and/or toxic.

Many hazardous materials can be commonly found in products used by counties and residents, including:

- cleaners, such as aerosol sprays, solvents, drain cleaners, and metal polish;
- pesticides;
- fluorescent light bulbs;
- automotive products, such as motor oil, antifreeze, transmission fluid, and gasoline;
- televisions and cathode ray tube (CRT) computer monitors;
- fertilizers;

- medical sharps and other household-generated medical waste;
- paint-related products, such as thinners and varnish; and
- pool chemicals.

When handling and transporting hazardous materials, here are some guidelines for county employees during routine operations or for residents bringing materials to a household hazardous waste collection site:

- do not mix chemicals, as this may cause a dangerous reaction;
- leave materials in the original containers and ensure that they are securely closed;
- separate different types of waste;
- put containers of hazardous waste in the rear of the transport vehicle, not on the passenger seats; and
- do not smoke, eat, or drink while handling hazardous wastes, and wash hands afterwards.

For internal county operations the preferred option is to reduce or eliminate the use of products that must be disposed of as a hazardous waste. When this is not possible, the waste must be managed according to federal, state and local regulations.

The US EPA website, www.epa.gov/epaoswer/hazwaste/mercury/collect.htm, offers state and local options for locating a hazardous waste collection center nearby.

Sedgwick County, Kansas runs a household hazardous waste collection facility. In 2001 alone, residents brought 652,093 pounds for disposal. Additionally, the county has set up a “Swap and Shop” where residents have the option of taking home useable waste, such as paint or cleaners, that other residents have brought for disposal.

King County, Washington has collected household hazardous waste from its residents since the late 1980’s and currently



serves more than 40,000 customers and collects more than 3.5 million pounds of hazardous waste per year. More than 95 percent of these materials are reused or recycled. See govlink.org/hazwaste/index.cfm for more information on this program.

Product Stewardship

Materials that contain toxic materials or are difficult to handle, such as electronics, fluorescent lamps and pharmaceutical wastes, can all be managed by “product stewardship” programs. Product stewardship, also known as “producer responsibility,” requires the manufacturers or producers of these products to finance and implement programs to manage their own products at the end of life.

Product stewardship programs are common in Canada and Europe. The programs are legislated by the government and require the manufacturer - or an organization contracted on behalf of the manufacturer (known as a Stewardship Organization) - to establish collection mechanisms for their products.

Manufacturers often work together through an industry association to contract with Stewardship Organizations to set up the take back programs. They establish an infrastructure where consumers can take back their prod-

ucts and often use existing facilities such as retail stores, transfer stations, and recycling depots. Once collected, the products are then recycled or properly disposed by processors contracted by the Stewardship Organization. The role of government is to establish the “outcomes” that producers must achieve, to monitor the programs’ performance and enforce the outcomes. No other government funding is spent on the program.

Closer to home, several states have passed legislation requiring electronics manufactur-

ers to provide take back and recycling programs for their products. Maine, Washington, Oregon, Minnesota, Oklahoma, Texas and Connecticut have all passed legislation and a half dozen more states are currently considering similar legislation. *More information on the product stewardship programs for a variety of products can be found at the Product Stewardship Institute’s website at www.productstewardship.us or at the Northwest Product Stewardship Council website at www.productstewardship.net.*

Waste Reduction Efforts in County Offices

County office buildings, just like any typical office building, can generate a large amount of waste, including paper, packaging, plastics, containers and ink cartridges. The following suggestions can help decrease office waste:

- print double-sided- reduce the use of paper in the office by 50 percent by changing the settings on printers and copiers to print on both sides of the paper, and reuse paper that has only been printed on one side;
- use computers instead of paper- replace sticky notes and paper calendars with computer software and ask county employees to take notes on computers rather than notepads;
- eliminate the use of plastics as much as possible- ask county employees to bring their own eating utensils, mug, and plate, rather than using paper, plastic, or Styrofoam;
- send ink toner cartridges to be recycled- many companies, such as Hewlett-Packard, will accept empty ink cartridges;
- reduce packaging waste- select products that are sent with minimal packaging and reuse any packaging material for county mailings;
- recycle- start recycling programs in county facilities for electronics, paper, aluminum cans and plastic bottles; and
- buy products made from recycled materials- these products are better for the environment because they do not involve the processing of new materials. *For more information, see the NACo Green Government Initiative “Green Purchasing in County Offices” fact sheet at www.greencounties.org.*

Sarasota County, Florida created a Recycling Champions Program in county offices in February 2007. The goal of the program

is to increase recycling and decrease the costs of waste management in the county. In order to be a “Recycling Champion,” county employees have volunteered to oversee facility recycling performance and act as a contact with the Recycling Program to provide feedback. Currently, the county has 49 recycling champions for 88 facilities, and stresses using the appropriate sized recycling or garbage container and pick-up frequency for the amount of garbage produced. As a result, the county annual garbage service has decreased by 880 tons, the annual recycling service has increased by 29 tons, and the county has saved about \$34,000 per year.

Catawba County, North Carolina has implemented the use of the Catawba County Regional EcoComplex and Resource Recovery Facility. This is a system that allows a group of partner businesses to recover useful products or byproducts from other partners’ wastes. This can be used to make energy, or as a raw material to create per capita products.

A pallet-making company buys scraps of wood as materials for its products from the lumber mill nearby, a university research facility will conduct biomass experiments using grass planted over the trash, and a vegetable greenhouse will use carbon dioxide emitted from the burning of landfill gases to speed plant growth.

Alameda County, California provides environmental assessments and technical assistance to businesses to assist in waste reduction. The county has also created a website with information about upcoming events and recycling, with separate information for residential recycling, business recycling, and school recycling. *For more information, visit the website at www.stop-waste.org.*

WasteWise

The USEPA WasteWise program assists organizations in reducing solid and some industrial wastes. The program is cost-free, allows counties to set their own goals, and offers partners the help of the Technical Assistance Team, which can facilitate the calculation of baselines and annual data and goal-setting. Assistance is offered with the following:

- management support;
- waste assessments;
- employee education;
- measuring and reporting; and
- program maintenance.

Successful organizations who have used WasteWise to reduce waste can receive USEPA publicity through publications, case studies, and events. Since 1994, WasteWise partners have reduced waste by 120 million tons and reduced greenhouse gas emission by over 7.3 million metric tons of carbon equivalent.

Register for WasteWise by going to www.epa.gov/wastewise/about/reg.htm.



Compact Fluorescent Light Bulbs and Tubes

Compact fluorescent light bulbs, or CFLs, are an efficient alternative to traditional incandescent or halogen bulbs. They last up to 10 times longer than traditional incandescent light bulbs, use nearly 75 percent less energy and produce 90 percent less heat. However, as more households and businesses make the switch to CFLs, there are concerns about proper disposal due to the 4 milligrams of mercury each bulb contains.

The only current federal regulations on the recycling of CFLs are for large commercial users of tubular fluorescent lamps, but the USEPA does recommend recycling CFLs when possible, and residential CFL recycling programs are growing around the country. If recycling is not an option, the CFL should be wrapped in a plastic bag and disposed of in the same manner as batteries, paint or motor oil- at a local household hazardous waste collection site. If such a site does not exist in the area, place the sealed plastic bag in the regular trash. *For more information on compact fluorescent light bulbs, see the NACo Green Government Initiative fact sheet "Energy Efficient Lighting in County Facilities" at www.greencounties.org or www.WMLampTracker.com for commercial fluorescent lamps.*

To learn more about residential CFL recycling programs in your area, visit www.ThinkGreenFromHome.com, www.earth911.com (or 1-800-clean-up) or use the search function located at www.epa.gov/epaoswer/hazwaste/id/univwast/lamps/live.htm to find fluorescent bulb recycling and collection programs.

Medical Sharps and Pharmaceutical Waste

More than 3 billion disposable needles and syringes, and an additional 5 billion lancets (collectively called "medical sharps") enter the municipal solid waste (MSW) stream each year in the U.S. from two main sources: people managing their own health care at home by self-injecting medication (representing two-thirds of the needles used) and intravenous drug users. As syringes become an increasingly popular mechanism for the self-injection of medications (e.g., "biologics"), the number of needles disposed is expected to significantly increase. Self-injectors routinely discard medical sharps in municipal solid waste generated in homes and in public settings, recycling bins (in plastic containers) and down household toilets.

These disposal methods create the potential for injury or the transmission of infectious diseases to homeowners as well as sanitation workers and others who handle the waste. In addition, since people dispose of needles almost everywhere, needles are a basic hazard to the general public. They also create costly maintenance problems when loose sharps become jammed in conveyor belts and front-end loaders, and cause other equipment damage. Waste Management is participating in the process of developing solutions to the medical sharps issue through a multi-stakeholder dialogue.

The U.S. Geological Survey's 1999-2000 nationwide investigation of pharmaceuticals, hormones, personal care products (such as aspirin) and organic pollutants revealed 82 different contaminants found in at least one water sample. These contaminants included antibiotics, prescription and nonprescription drugs, steroids, hormones, mood stabilizers and sex drugs. Of the water sampled, 80 percent had been contaminated by at least one of these pollutants and 34 percent contained 10 or more contaminants. On March 10, 2008, CNN reported that a five-month study conducted by the Associated Press had shown traces of pharmaceutical waste to be found in the drinking water of 41 million Americans.

The amounts of contaminants in the water are much lower than a medical dose. The Washington Post explains that Edward Bower, chairman of the Department of Geography and Environmental Engineering at Johns Hopkins University, says that "concentrations are thousands of times lower than therapeutic doses." However, the USEPA reports that shellfish behavior, such as spawning, is negatively affected by exposure to antidepressants; calcium-channel blockers inhibit sperm activity in some aquatic organisms; and medicines can also disrupt the hormones that control these organisms' metabolism. The Associated Press report also expresses concern with bacteria's contact with antibiotics, causing immunity. Although there have been no known effects on humans at this



point, scientists are worried about the possible unknown long-term effects from repeated exposure, especially to fetuses in the womb.

The New Hampshire Department of Environmental Sciences suggests residents follow these suggestions for the proper and safe disposal of pharmaceutical waste:

- only purchase necessary medications;
- refuse sample medications unless actually intending to use them;
- find a pharmaceutical disposal program or ask if the local hazardous waste collection center will accept the medications; and
- if disposing of medicines in the trash, keep them in their original containers, add water to solid drugs or absorbent material to liquid drugs before sealing to prevent unintended drug use then place the closed container in a sealed bag.

For more information on locating a hazardous waste collection facility, please see the "Processing Hazardous Waste" section on page 4. To locate a pharmaceutical disposal program, ask local pharmacies for more information, as not all areas have established a system.

Alachua County, Florida allows residents to discard unwanted medications for free at four locations across the county. Accepted medications include prescription drugs, chemotherapy agents and over-the-counter medications. This service has collected and disposed of more than 800 pounds of medications since January 2004.

Electronic Waste

Electronic waste (also referred to as "e-waste") includes all electronics near or at the end of their useful lives. Sometimes this occurs due to malfunctions; other times electronics become obsolete as new products



enter the market. According to the USEPA, 1.5 to 1.9 million tons of unused or unwanted electronics were sent to landfills in 2005, and only 345,000 to 379,000 tons were recycled.

Computers contain large amounts of toxic materials that can be released into the environment if sent to landfills. The Silicon Valley Toxics Coalition states that the following toxic materials can be present in computers:

- lead, which causes damage to the nervous system, blood system, and kidneys;
- cadmium, which accumulates in the kidneys;
- brominated flame-retardants, which can cause neurotoxic effects, especially in babies;
- poly-vinyl chloride (PVC) which, when incinerated, produces fatal fumes; and
- mercury, which causes damage to the brain.

A good approach is to buy equipment that will have fewer environmental effects and will be in use longer. *To evaluate potential computer purchases' green features, visit www.epeat.net.* Look for equipment with the following qualities:

- reduced toxics content;
- greater recycled content;
- higher energy efficiency (see ENERGY STAR products in the "Additional Resources" section at the end of this fact sheet);
- longer life expectancy;
- replaceable parts that are readily available;
- easy upgradeability; and
- features that make recycling easier when it is eventually necessary.

Rather than sending unwanted equipment to landfills, the USEPA suggests a list of steps and questions that counties can use to consider other options:

- Assess the equipment. Does it still work?
- Consider options for reuse. Is there a school or non-profit organization that could use it?
- Consider repair. If the equipment cannot work, is it possible to repair it or use the parts to repair other systems?
- Choose a recycling company. Does the recycler have necessary permits? Does

Zero Waste Goals

Several counties across the country have made a commitment to reduce the amount of waste they produce to zero within a set time frame. Two star examples are Logan County, Ohio and Boulder County, Colorado.

In March of 2007, Logan County, Ohio signed a zero waste resolution and declared the county a "zero waste zone," setting a goal to produce zero waste by the year 2020. To meet this goal, the county plans to reuse recycled materials when possible and expand county programs to provide residents and businesses increased opportunities to participate in recycling and composting. Full-time, drop-off recycling sites have been established.

Additionally, the county is implementing incentives to encourage the production of less waste and educate the community about green purchasing, resource conservation, and recycling. The county stages Zero Waste events, at which they assist regular events to produce less waste. For example, on March 14, 2008 the Bellefontaine Kiwanis Club's Annual Pancake Breakfast diverted 98.8 percent of waste from landfills. About 85 pounds of waste from the

event were composted, about 25 pounds of cardboard, box board and plastic containers were recycled, about 44 pounds of waste were donated and only about 1 pound of waste was sent to the landfill. *For more information on Logan County's recycling programs and Zero Waste events, visit www.logancountyrecycles.com.*

In 2005, Boulder County, Colorado set a zero-waste goal by 2025. To reach this goal, the county implemented a Zero Waste Pilot Program in the downtown county courthouse complex. The program has placed color-coded, three-bin waste collection systems in several areas of the building, allowing employees to separate waste into trash, recyclables and composting material. Additionally, each employee has been educated on the importance of the program and has a mixed recyclables bin at their desk, and composting of paper towels is encouraged in the bathroom. This county plans to spread this program to all county buildings by the first quarter of 2009.

As of 2007, the county had diverted 36 percent of residential and commercial waste and 92 percent of industrial waste from landfills.

the recycler pay for transportation? What is the recycler's disposal policy?

If donating computers, make sure to call local charities first to ask if they accept them because not all charities are able to do so. There are several larger, nonprofit organizations that are devoted specifically to distributing computers to those who need them. Additionally, make sure to remove all data in the computer to ensure that private information is not released. Some computer recycling companies will wipe data from the hard drive, but not all of them offer this service, so be sure to ask if they do in advance. *For a few non-profit organizations dedicated to collecting and redistributing used computers, see the Additional Resources section at the end of this fact sheet.*

Cell phones are made of metal and plastics, all of which can be reused; however, people recycle fewer than 20 percent of cell phones. The USEPA provides a listing of places to recycle old cell phones, cell phone batteries chargers, or other cell accessories, located at www.epa.gov/cellphones/cell-recycling-locations.htm. Another idea is to check with local women's shelters that may provide those they help with donated cell phones for emergency use.

When recycling cell phones or personal digital assistants (PDAs), make sure to:

- end service;
- clear the memory by using data erasing tools or conducting a factory hard reset; and
- remove the Subscriber Identity Module (SIM) card. The SIM card is a memory chip in the cell phone that contains personal information, phone book, text messages and other important data.

The USEPA has partnered with several manufacturers and retailers to create programs for consumers to recycle electronics (referred to by the program as eCycle). The list of partners can be viewed at www.epa.gov/plugin and the following products may be eligible for eCycling:

- computer hard drives;
- computer monitors;
- computer keyboards;
- printers;
- televisions;
- DVD players;
- VCRs;
- cell phones and accessories;
- pagers;

- digital equipment;
- scanners; and
- MP3 players.

King County, Washington's Take It Back Network combines county efforts with those of government agencies, retailers, charitable organizations, repair shops and recyclers to help consumers recycle electronic waste such as computers, cell phones and fluorescent light bulbs. The Take It Back website, available at www.metrokc.gov/dnrrp/swd/takeitback/index.asp, links to a list of locations where residents and businesses can drop off electronic materials for recycling.

Santa Clara County, California, also presents an excellent example of an e-waste management plan. The county purchases environmentally-preferable electronics whenever possible and only from companies that agree to take back these products when they have reached the end of their useful lives. If feasible, the county uses electronics until they no longer function.

● Industrial Waste

The USEPA defines industrial waste as "by-products of industrial processes." This can include waste from coal combustion or metal casting. Rather than discarding these materials, it is less expensive for counties to reuse them, and sometimes the quality of the new product is even enhanced by the addition of the reused materials. Recovering these materials also reduces the need to create new replacements from raw materials, lowers disposal costs, helps communities, enhances the public image of the county and conserves space in landfills. *For a chart elaborating on*

new uses for industrial materials, visit www.epa.gov/epaoswer/osw/conserves/resources/ind-mat.htm.

Reusing industrial materials can help preserve natural resources because there is less need for new materials and energy-intensive manufacturing. Additionally, counties can save money by reusing industrial waste because it will not be necessary to pay disposal fees.

The USEPA defines products from coal combustion as "the byproducts generated from burning coal in coal-fired power plants," and these materials also make up a large portion of industrial waste. Counties with coal mines, however, can reap significant benefits from reusing this waste, such as reduced disposal costs and revenue from the sale of these materials and from using these instead of newer, more expensive components. The products formed from this waste are also generally stronger, more workable and more resistant to chemical attack than are those produced without them.

Foundry sand from the metal casting industry is another contributor to industrial waste. New, virgin sand is used to make casting molds and then reused until it is no longer suitable for this process, after which it is discarded. The USEPA estimates that more than 85 percent of this used sand is landfilled. However, counties can use foundry sand from facilities in their district elsewhere. For example, the construction season can be extended until later in the year by using sand around buildings because sand freezes less easily than does soil. This reduces the need to mine more sand and the sale can profit the



metal casting industry. For more information about recycling foundry materials, visit www.foundryrecycling.org.

● Construction and Demolition Debris

Construction and demolition (C&D) materials consist of the debris generated during the construction, renovation, and demolition of buildings, roads, and bridges. C&D materials often contain bulky, heavy materials that include:

- concrete;
- wood (from buildings);
- asphalt (from roads and roofing shingles);
- gypsum (the main component of drywall);
- metals;
- bricks;
- glass;
- plastics;
- salvaged building components (doors, windows, and plumbing fixtures); and
- trees, stumps, earth and rock from clearing sites.

The composition of C&D materials varies significantly, depending on the type of project from which it is being generated. For example, material from older buildings is likely to contain plaster and lead paint, while new construction materials may contain significant amounts of drywall, laminates and plastics.

The USEPA estimates that 136 million tons of building-related C&D materials were generated in the U.S. in 1996. The majority of this waste comes from building demolition and renovation and the rest comes from new construction. Roughly equal percentages of building-related waste are estimated to come from the residential and commercial building sectors, and the estimated per capita generation rate for building-related debris in 1996 was 2.8 pounds per person per day.

The majority of C&D material ends up in two types of landfills:

- municipal solid waste landfills, which handle household waste; or
- C&D landfills, which are devoted exclusively to C&D materials.

Unknown amounts of C&D materials are also believed to go to combustion facilities or unpermitted landfills. The USEPA estimates that approximately 1,900 C&D landfills operated nationwide in 1994. Municipal solid

waste landfills are subject to USEPA landfill criteria, while state and local governments mostly regulate C&D landfills.

Reducing and recycling C&D materials conserves landfill space, reduces the environmental impact of producing new materials, creates jobs and can reduce overall building project expenses through avoided purchase/disposal costs.

To increase construction and demolition recovery:

- consider making requirements for construction and demolition debris recycling part of the process to obtain a permit;
- establish a clear reduction goal;
- include C&D recovery plans and requirements in the design and the contract;
- educate contractors and sub-contractors on material recovery; and
- follow up with contractors about the progress of recovery efforts during the project.

Alameda County, California has a goal of diverting 75 percent of waste from landfills by 2010 and increasing the amount diverted in later years, and has created a Green Building Program to encourage conservation of resources, building reuse, recovery of construction and demolition debris and the use of materials with recycled content. Additionally, the county has established a model ordinance for any construction or demolition occurring in the county. In order to obtain a permit for this activity, applicants must submit a Waste Management Plan with estimates of debris type, quantity and proposed disposal facility, as well as the amount of this waste that could be diverted from landfills.

Arlington County, Virginia reuses all of the concrete from the county's government projects in a closed loop system. For example, when a sidewalk or a curb is rebuilt, the concrete is brought to the Solid Waste Bureau which processes the concrete in a grinder and sends it back out to the county to be reused in future projects.

To learn more about management options for construction and demolition materials visit the USEPA website at www.gov/epa/answer/non-hw/debris-new/index.htm or the King County GreenTools website at www.metrokc.gov/dnrp/swd/greenbuilding/construction-recycling/index.asp.

● Processing Non-Recyclable Waste

Unfortunately, it is not possible to recycle or reuse all waste. Non-recyclable waste can either be sent to an energy to waste facility or landfilled.

Waste-to-energy is the process of turning trash into clean renewable energy. The USEPA reports that combined, these facilities produced 17 million megawatt-hours of electricity per year. Some incinerators use refuse-derived fuel (RDF), which separates recyclables out of the trash first and then shreds the material to be burned. The USEPA also reports that the combustion of municipal solid waste is one of the cleanest forms of energy combustion.

Modern waste-to-energy plants use the most sophisticated pollution filters available. Scrubbers use a lime slurry to neutralize acid gases and filters remove ash particles. Temperatures of over 2,000 degrees inside of the combustion unit destroy volatile organic compounds, and residual ash is tested regularly to ensure that it meets state disposal requirements. The majority of this ash is then used for daily cover in landfills, while 10 percent of the ash is used for other purposes, such as road construction.

A landfill is an area where solid waste is collected. A landfill site cannot be located in an environmentally sensitive area and must be designed to meet specific regulations in order to ensure the safety of the environment and the people who work with it. The landfill must have a flexible membrane, called a composite liner, overlaying 2 feet of clay on the bottom and sides of the landfill and the waste must be frequently compacted and covered. Additionally, there must be a collection system for leaking contami-



nants (leachate-generated when liquids pass through the waste), groundwater monitoring and long-term care requirements for after the landfill is closed.

Landfills do release gas emissions comprised of carbon dioxide and methane gases, which can contribute to greenhouse gases, but there are now regulations in place to require capture of these gases and programs to convert this gas into energy. *(Look for more information on landfill gas-to-energy projects in a future NACo Green Government Initiative fact sheet coming in the Fall of 2008 at www.greencounties.org.)*

● Conclusion

As waste increases, so does awareness of the importance of waste reduction and recycling. Although new forms of waste present increasing challenges, counties are implementing innovative, environmentally-friendly waste management plans in increas-

ing numbers. New technology is constantly developed, leaving in its wake a mass of obsolete electronics. This e-waste is a growing problem, especially due to the hazardous materials contained in these products. Compact fluorescent light bulbs are also increasing in popularity due to their energy efficiency and, while this is a positive step from the view of saving energy, these bulbs require special disposal techniques.

Despite this, the future of waste management innovation seems bright. This has resulted in a trend towards including recycling plans in county waste management policies as well as an increase in zero-waste resolutions. People are beginning to realize that putting “the three Rs” to work in daily activities can minimize the amount of materials entering landfills, lower waste disposal costs, and create a healthier environment, and counties are making it easier for residents to recycle by creating more drop-off areas



closer to homes as well as curbside pick-up. Education of residents and employees also continues, helping teach the importance of waste reduction.

● Additional Resources

● Computers for Learning

www.computers.fed.gov/public/aboutProg.asp

Computers for learning provides computers to school and education nonprofit organizations.

● Earth 911

earth911.org

This site provides information on recycling, composting, e-waste, proper disposal of household items, and other environmental topics.

● ENERGY STAR Qualified Products

www.energystar.gov/index.cfm?fuseaction=find_a_product

The ENERGY STAR label identifies products in more than 50 categories that use less energy, save money, and help protect the environment. Some of these products also last longer, creating less waste.

● Electronic Product Environment Assessment Tool (EPEAT)

www.epeat.net

The EPEAT registry is designed to help purchases evaluate and compare computers based on environmental attributes.

● Freecycle

www.freecycle.org

Freecycle allows the exchange of unwanted objects from their former users to people who can use them. Several counties, such as San Miguel County, have established Freecycle Chapters.

● International Association of Electronics Recyclers

www.iaer.org/search

This database allows counties to search for recyclers based on location and industry segments.

● MAR program

www.techsoup.org/mar/default.aspx

The MAR program provides computers to nonprofits, schools, and low-income families.

● National Cristina Foundation

www.cristina.org

The National Cristina Foundation provides computers to nonprofit organizations, schools, and public agencies.

● Product Stewardship Institute

www.productstewardship.us

The Product Stewardship Institute (PSI) is a national non-profit membership-based organization that works with state and local government agencies to partner with manufacturers, retailers, environmental groups, federal agencies, and other key stakeholders to reduce the health and environmental impacts of consumer products. PSI encourages product design changes and mediating stakeholder dialogues.

● Solid Waste Association of North America (SWANA)

www.swana.org

SWANA works to advance environmentally and economically sound management of solid waste.

● Think Green® From Home

www.thinkgreenfromhome.com

Waste Management has created a program to allow residents to recycle without even leaving the house. This site allows residents to order a recycling kit, pack recyclable materials in it, and mail it back, after which they can track recycling contributions online.

● Waste Reduction Model (WARM)

www.epa.gov/climatechange/wycd/waste/calculators/Warm_Form.html

This tool allows solid waste planners and organizations to track reductions of greenhouse gas emissions and energy savings from waste management projects. It allows for the comparison of waste management scenarios.

● WasteWise

www.epa.gov/wastewise

This is a free, voluntary program sponsored by the USEPA to help organizations eliminate solid waste.

About the NACo Green Government Initiative

The NACo Green Government Initiative serves as a catalyst between local governments and the private sector to facilitate green government practices, products and policies that result in financial and environmental savings. Launched in 2007, the Initiative provides comprehensive resources for local governments on all things green, including energy, green building, air quality, transportation, water quality, land use, purchasing and recycling.

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