Chapter One

Solid Waste Overview

1. Introduction

United States citizens are the largest producers of solid waste in the world. (Figure I-1). In 2012, Oregonians produced a cumulative 2.4 million tons of garbage! This equates to 1,248 pounds of waste per person. The good news? This is the lowest per capita disposal rate in Oregon in the 21 years that this information has been collected.

The good news is that much of the waste each household produces can be reduced, reused, or recycled into new products. Solid waste is a true “resource” when properly managed. At least one half of all household waste is easy to recycle, and almost all of that waste can be converted to another use to avoid disposal.

The choice of whether to throw away resources or reuse them is up to each individual. The choice comes each time a purchase is made or an item is set out for recycling or garbage collection. There are many benefits to choosing a lifestyle that maximizes waste reduction and recycling. They include:

- conservation of natural resources
- energy savings
- pollution reduction

As populations became concentrated in larger towns and cities, garbage heaps grew. People could not just pack up and move to another city. As cities spread out and were farther from food...
In 2009, almost 30 million tons of plastics were generated in the United States, and only around 2 million tons were recovered.

Food scraps were 12.7% of waste generated 2008, while yard trimmings were 13.2%. Only 2.5% of all waste food was composted in 2008 -- the rest went to landfills or incinerators.

In 2009, 3.4 million tons of aluminum were generated in the U.S. and only .69 million tons were recovered.

In 2010, Americans recovered 63.5% of U.S. paper— an 89% increase in recovery since 1990. However, we threw away $2.8 billion worth of paper!

Americans wasted around 11 million pounds of sand with the glass bottles discarded in 2009. That amount could fill every room in the White House with sand 12 feet deep!

Only 10 percent of the 140.3 million cell phones retired in 2007 were recycled.

Figure 1-2. Waste stream constituents. (Source: Keep America Beautiful, Recycling Facts & Stats, 2013)
sources, organic waste was no longer useful -- it became “garbage.” Old habits of throwing wastes out the door to animals or into the garden posed public health problems in the densely populated cities.

Some Asian cities solved their garbage problem by hauling organic wastes out to farms and composting it to revitalize croplands. Another solution was to take garbage out to the countryside and dump it in piles. Around 500 B.C., Athens issued the first-known law against throwing garbage into the streets. Scavengers were required to dump wastes at least one mile outside the city walls. Thus the open dump was officially born.

Remarkably, 2,500 years after Athens’ first garbage edicts, open dumps still exist in advanced industrial society. Of course, dumping practices have evolved over time. As cities grew and spaces for dumping trash became scarce, dumps became centralized and evolved into burial pits that were covered with soil. These are known as sanitary landfills. In 2006, 138 million tons of municipal solid waste was deposited in landfills in the United States.

3. Modern Garbage

Many wastes sent to the landfill are made of materials that were unimaginable to a Greek citizen in 500 B.C. The modern solid waste stream includes glass, complex metal alloys, plastics, construction materials, paper, and products such as paints, pesticides, and cleaning agents—many of them classified as hazardous wastes. Composition of the waste stream varies from area to area throughout the world, the country, and the state. This variance is due to factors such as the extent of industrialization, climate patterns, cultural differences, demographics, and socio-economics.

Municipal solid waste (MSW), usually known as trash or garbage, is made up of the things commonly thrown away. This household type of waste ranges from package wrapping, food scraps, and grass clippings to old sofas, computers, and refrigerators. MSW includes material from both residential and commercial locations, but does not contain industrial, hazardous, or construction waste.

Since 1980, the total annual generation of MSW has increased more than 50 percent to its 2007 level of 256 million tons per year - topping 2005 by 3 million tons (Table 3). It is estimated that residential waste (including waste from apartment houses) to be 55 to 65 percent of total MSW generation. Waste from schools and commercial locations, such as hospitals and businesses, constitutes 35 to 45 percent of MSW. Local and regional factors, such as climate and level of commercial activity, contribute to the variations. Despite sustained improvements in waste reduction, household waste remains a constant concern because trends indicate that the overall tonnage created continues to increase.

The United States’ individual MSW generation rate has remained relatively constant since the 1990s at about 4.5 pounds per person per day (Table 4). The recycling rate is currently at 1.5 pounds per person per day. After accounting for what was recycled, each person is discarding about 3 pounds per day. In 2007, recycling and composting diverted 84.8 million tons from disposal.

EPA and Oregon include different variables in their calculations of total and per-capita MSW generation. The biggest difference is that, unlike EPA, Oregon does include construction and demolition waste as part of MSW generation. Therefore EPA’s and Oregon’s numbers are not comparable.

The Oregon Department of Environmental Quality (DEQ) periodically analyzes waste composition throughout the state. It samples and weighs the waste entering the disposal facilities. The waste is then categorized into major components such as paper, glass, plastic, and wood waste. Figure I-5 shows what is in the garbage in the state of Oregon.

DEQ reported that Benton County disposed of a total of 54,061 tons of solid waste in 2012 and Linn County disposed of 76,745 tons.

Each year DEQ evaluates all of Oregon’s “waste sheds” (which are generally defined by county borders) recycling programs. It is a large undertaking that involves comparing what was recycled by government agencies, non-profit organizations, and private companies with what was disposed of as garbage.
The recycling numbers provided by DEQ's annual Opportunity to Recycle Report are important because they give government municipalities the information needed to make good choices about how waste is managed. For example, if high-grade paper recycling appears to decline, a county's solid waste management advisory council may decide to earmark more resources toward the recovery of office paper. Ideally, an additional analysis of what materials are in the garbage is done periodically so that the recycling rates can be put into perspective. This additional study may reveal that paper in the garbage also declined, so the reduction may be attributed to less paper being used and not a dip in the percentage being recycled.

Waste generation is the sum of disposal and recovery. It is a rough measure of the total discards in a waste shed. In 2012, each person in Linn County generated approximately 1,276 pounds of waste. Benton County residents generated 1,351 pounds of waste per person. In 2001, the Oregon Legislature established waste generation goals for the State. These goals were: a) no increase in per capita waste generation beginning in 2005, and b) no increase in total waste generation beginning in 2009.

The State also set goals for each county. Linn County’s goal was to achieve 40% recovery by 2005 and maintain that rate. Benton County aimed to recover 45% of the waste stream by 2005, with a goal of 50% recovery by 2009. The goals were different because they were based on initial recovery rates for the two counties. For
What’s In Our Garbage
Waste Composition - 2009

- Paper - 16.99%
- Plastic - 11.56%
- Food - 16.99%
- Other Organics - 1.59%
- Wood - 11.51%
- Glass - 1.95%
- Yard Debris - 4.61%
- Metals - 6.98%
- Other Inorganics - 11.09%
- Other Hazardous Materials - 0.45%
- Medical Waste - 0.77%

Other Organics includes: tires, rubber products, diapers and disposable hygiene, carpet, textiles, dead animals, roofing, tarpaper, furniture, and miscellaneous organics.

Other Inorganics includes: rock, concrete, brick, soil, sand, dirt, animal feces, cat litter, gypsum wallboard, fiberglass insulation, and miscellaneous inorganics.

Figure 1-5. DEQ’s 2009 Waste Composition for Oregon
2012, DEQ reported that Linn County had a recovery rate of 51.1% and Benton County achieved 47.4% recovery.

By statute, the recovery rate includes only post-consumer materials collected for recycling, composting, or burning for energy recovery. Post-consumer materials are finished materials generated by a business or consumer that would normally be disposed of as solid waste. Waste from manufacturing and industrial processes (pre-consumer materials) do not count toward recovery. Other reconditioned and reused materials like commercial scrap metal, which includes metal demolition debris, discarded vehicles or parts of vehicles, major equipment, and appliances handled by scrap metal dealers, do not count toward recovery.

Although important, these numbers need to be kept in perspective. Heavier materials have a disproportionate influence on the recovery rate because DEQ’s recovery rates are based on weight. Some items, like mercury containing fluorescent lighting or PVC plastics, are an insignificant portion of the waste stream by weight, but are important to reduce and/or recycle due to their toxicity. From an environmental standpoint, some materials may be more important to recycle than others due to the scarcity of the resources used to manufacture them from virgin material, the energy used to produce them, etc. It would be a mistake to exclusively focus on the numbers without taking into account these factors. While the counties are required by law to achieve certain recycling rates, the DEQ's calculated recovery rate is a tool to help government agencies, and others involved in the recycling industry, develop their programs.

Technological advances, along with consumerism, have created disposable products that have made life simpler and safer. It is difficult to find the balance between maintaining the current U.S. quality of life and regaining control over the increasing solid waste problem. The question is how to establish and maintain a standard of living that is sustainable. Several European countries including France, Italy, and Germany have standards of living comparable to the United States. However, significantly less waste is generated (Figure I-1), a fact attributable to fewer disposable products, less packaging, more reliance on refillable containers, and high recycling rates.

In many countries, such as Japan, recycling is necessitated by limited natural resources and the lack of landfill space. In the United States, three reasons for the increasing interest in waste reduction and recycling are:

1) the cost of making landfills and Waste-to-Energy facilities environmentally safe and limiting their impact on groundwater, air quality, and other resources;
2) the need to conserve scarce resources;
3) a shortage of places to put garbage in certain areas of the country.

The number of municipal solid waste landfills has steadily declined over the years. At the same time, average landfill size has increased. At the national level, landfill capacity appears to be sufficient, although it may not be in some regional areas.

As urban areas have expanded and the amount of waste has increased, land suitable for dumping garbage has become scarce. The spread of suburban development leaves few large parcels of land available for landfills. Across the country, potential neighbors who do not want a landfill located near their homes are rejecting proposed disposal sites. This is called the “Not In My Back Yard” syndrome or “NIMBY.” In Benton County, residents who live near Coffin Butte Landfill occasionally complain about odor issues and truck traffic.

Communities are legitimately concerned over the siting of landfills near residential areas. Years of unregulated dumping have sometimes resulted in a mixture of toxic materials in landfills. The United States Environmental Protection Agency (U.S.EPA) identified many landfills as “Superfund” sites requiring special attention due to their toxic nature.

How do landfills become toxic? As materials biodegrade in a landfill, they mix. As rainwater passes through the landfill, it leaches out water-soluble materials and forms a leachate solution. Past solid waste management techniques did not
require potentially hazardous materials to be identified and then handled separately or buried in a specific location in a landfill. When not contained, leachate can contaminate streams and groundwater.

Landfills also produce **methane** gas as a result of organic materials decomposing in the absence of oxygen. Methane gas is explosive in high concentrations and may migrate into neighboring homes if not controlled or vented. Methane gas is also a major ozone depleting gas. Even when burned for energy recovery, approximately 20 percent of the gas still escapes and affects the ozone layer.

Due to these and other problems, the U.S. EPA has adopted new standards for the siting, operation, and closing of landfills. It requires that new and existing landfills install impermeable liners below the burial areas to collect leachate for treatment, that methane gas be vented or utilized, and that systems be established to monitor potential surface and groundwater contamination. These monitoring and control activities must continue 30 years after the landfill is closed. Many landfills in Oregon closed because they were not able to meet these requirements.

**Waste-to-Energy (WTE) Facilities**, also called **Mass Burn Facilities**, have experienced some of the same difficulties as landfills in obtaining sites and permits. The NIMBY factor can be strong in some communities. In the early 1980s, siting a WTE facility in Marion County was a difficult process. A task force reviewed disposal options and eventually required a vote of confidence from the community before the project could continue. Air pollution and the burning of medical waste were issues of concern that had to be resolved before the facility was approved.

WTE facilities and landfills, with the recent adoption of federal landfill regulations, are tightly controlled and monitored by regulatory agencies. The environmental controls (i.e., air pollution control equipment, etc.) in place in these facilities minimize the impact on human health and the environment.

Waste disposal sites are no longer an easy, inexpensive solution to solid waste disposal needs. The need for landfills may never be eliminated, but the use of them as repositories for discarded resources must decrease. This will happen only as habits change.

### 4. Solid Waste Management in Linn and Benton Counties

A typical solid waste management system has three components: collection, transfer, and disposal. While the State of Oregon sets standards for collection, storage, transportation, and disposal of solid wastes, the system is managed at the local level. Cities within Linn and Benton Counties contract with Republic Services through franchise agreements for waste collection, transportation, and landfilling. Waste from both counties goes to Coffin Butte Landfill.

#### A. Legislation

Two pieces of legislation that have had a significant effect on recycling in Oregon are the **Bottle Bill** and the **Oregon Recycling Act**. (More information and specific language is available in the appendix.)

The first can and bottle bill in the U.S. was proposed in Oregon in 1969. The beverage industry quickly responded to the effort with a counter proposal. They succeeded in convincing legislators that an anti-litter educational campaign would solve the growing problem of littered cans and bottles. Industry was given two years to implement the program, at the end of which the Joint Committee on Rules and Resolutions concluded that the program was ineffective. Oregon passed the first bottle bill as an anti-litter law in 1971. The law resulted in a dramatic reduction in beverage container litter and gained widespread public support. Four years after implementation, the bottle bill had a public approval rating of 90 percent.

Waste reduction is even more important than recycling and this fact was understood by the legislators who established the recycling rates in 1997. In 1991, the Oregon Legislature passed SB 66. SB 66 established a statewide recovery goal, which necessitated that large urban areas reach higher recycling rates to offset anticipated lower rates from parts of the state that are farther from markets. SB66 was amended in 2001 by
HB3744. HB3744 required that Benton County achieve 50% by 2009. Linn County was required to achieve and maintain 40% recovery. State goals were also established:

(a) In 2009, the amount of recovery from the general solid waste stream shall be at least 50 percent;
(b) In 2005 and subsequent years, that there be no annual increase in per capita municipal solid waste generation; and
(c) In 2009 and subsequent years, that there be no annual increase in total municipal solid waste generation.

B. Collection

In most parts of Linn and Benton Counties residents can pay to have their garbage picked up at their home or business, or for a fee, haul their waste to a disposal or transfer station. Private companies who are regulated through county and city franchise agreements collect the garbage. Collection rates and service levels are set by these local governments.

C. Transfer

In Linn and Benton Counties, haulers take most of the garbage collected from residents and businesses to the Coffin Butte Landfill located north of Corvallis. Linn County has a transfer station located in Lebanon and Benton County has one in Monroe. Individuals and businesses can drop-off waste and recyclables at either of these sites. All trash deposited at the transfer stations is loaded into large containers and hauled to Coffin Butte.

The transfer stations and recycling depots currently accept:

- newspaper
- mixed waste paper
- magazines
- phone books
- corrugated cardboard
- container glass
- aluminum and tin cans
- rigid plastic containers
- milk jugs
- scrap metal
- motor oil
- E-waste
- vehicle batteries

D. Disposal

Coffin Butte was established as an open burn site for garbage in 1944. At that time the site was considered a dump, an open hole in the ground where garbage was placed. Dumps don’t really exist anymore. Now Coffin Butte is a landfill.

![Diagram of a modern mass burn facility](image.png)

*Figure 1-6. Diagram of a modern mass burn facility*
A landfill is different because it is a carefully designed structure which is built into the ground. It isolates garbage from the surrounding environment (groundwater, air, rain). This isolation is accomplished with a bottom liner and daily covering. The daily cover is to deter pests and prevent waste from blowing away. Sometimes waste materials such as contaminated soil can be used as daily cover. The bottom liner is in place to prevent groundwater contamination.

There are two types of landfills. In a sanitary landfill, the bottom liner is made of clay. In a municipal solid waste landfill, the liner is made of a synthetic material, usually thick plastic. Figure I-7 illustrates the cross-section of a generic municipal solid waste landfill, like Coffin Butte. To minimize the amount of rainwater that enters the landfill, it is divided into cells, or sections. Only one cell is open at a time. The garbage is dumped into a cell and compacted by heavy equipment such as compactors.

1. Leachate

Rainwater that enters the landfill becomes leachate. As the water makes its way through the waste it gathers many different substances. The leachate is collected by slotted pipes which are present at the bottom of the cells. There are two common fates for leachate. One option is to pipe it into a large storage tank and treat it either on site or take it to a waste-water treatment facility. The other option is to re-circulate the leachate through the landfill to speed the breakdown process and create more methane. Coffin Butte hauls it to the Corvallis Waste Water Treatment Facility.

2. Landfill Gases

In addition to leachate, landfills also produce gases, referred to as landfill gases (LFG). Since waste is compacted and then covered, little oxygen is present; therefore, when bacteria decompose the organic material, methane and carbon dioxide are produced. If not properly collected, methane can creep out of the landfill and into nearby houses, causing fires or explosions. Pipes within the landfill collect the methane. At Coffin Butte, the methane is used to create electricity which goes into the grid and powers approximately 5,000 houses. A flare is used to burn excess methane.

3. Medical Waste

During the 1989 legislative session, a law (HB 2865) was passed that affected the treatment, storage, and disposal of infectious wastes. Medical waste is handled differently from regular garbage and cannot be sent to Coffin Butte Landfill. Instead, the medical waste is sent to the Marion County WTEF. It is loaded onto a special conveyor and fed directly into one of the boilers.

Incinerating medical waste helps to reduce the risk of it creating a health or safety hazard.

E. Key Waste-Reduction Programs

Several programs in Linn and Benton County help reduce the quantity of waste generated.

1. Classes, Educational Opportunities, and Tours

**Master Recycler**

The Linn and Benton County Master Recycler class offers a way to learn more about waste reduction and recycling. The classes are held one evening a week for eight weeks beginning in January and are augmented with guided field trips to many solid waste and recycling facilities.
The majority of field trips are on Saturdays.

Those accepted for the classes receive more than thirty hours of training in solid waste issues and opportunities. Expert guest speakers supplement staff from the sponsoring organizations of Oregon State University Campus Recycling and Republic Services. Topics include what happens to garbage as well as recycling and reusing; waste prevention; composting; vermicomposting; household hazardous waste reduction; sustainability and green building; products made with recycled content; and water conservation.

In return, students are asked to pay back the training time through a variety of outreach activities. These might include setting up or expanding a recycling program at one’s workplace, staffing recycling information booths at public events and shows, or organizing a workshop in one’s own neighborhood.

Tours & Presentations
Oregon State University has a variety of sustainability programs. Tours of Kelly Engineering Center, a LEED certified building, provide insight about sustainable buildings. Campus Recycling tours explain how collection and separation of recyclables is handled on campus. There is also a food composting program in some of the dining halls. The department of Health and Human Services gives tours of the university hazardous waste facility. This tour provides information about how dangerous materials are handled safely. Coffin Butte Landfill tours are also available. During this tour, participants see where non-recyclable refuse ends up and learn about landfill function and design.

In The Schools
Republic Services and Oregon State University fund a recycling education position for Linn and Benton counties. The Recycling Coordinator visits schools to teach about the environmental and societal benefits of recycling and reducing waste. The Coordinator teaches students and teachers how to conduct waste audits and analyze the impact of their school on the world around them. The Coordinator can provide educators with lesson plans and background information on waste reduction and recycling. The Coordinator also works with the Oregon Green Schools Program and helps schools set waste-reduction goals.

2. Business Waste Reviews and Recycling

In an effort to make places of business more effective and efficient, Republic Services will provide a free waste review. It will assist in determining ways to reduce the amount of waste generated and received from other sources.

3. Composting

Composters
Republic Services customers have the option of getting a composter instead of a yard waste bin. This is designed to encourage people to compost their own wastes at home. Customer can choose to have both options for an extra cost.

Working Composters
The Benton County Fair Grounds has a compost demonstration site. Each year, workshops are held in May and September to teach about composting and vermicomposting.

4. Special Waste Collection

Medical Waste
Improper disposal of medical wastes can create a public health and safety hazard. Oregon law prohibits the disposal of infectious medical waste into the garbage. Offenders face fines of up to $500 per incident. Residential medical waste needs to be handled by a pharmacy. Businesses
that generate medical waste must have their local franchised waste hauler collect and dispose of this material. Arrangements for collection can be made through Stericycle at 800-755-3291.

**Computer Recycling**
Electronic waste is an increasing problem. Old computer components may be recycled. Computers are accepted for no charge at four locations in Linn and Benton Counties:

Republic Services of Corvallis  
110 NE Walnut Blvd  
Corvallis, Oregon 97330  
(541) 754-0444

Republic Services of Albany-Lebanon  
1214 SE Montgomery St  
Albany, OR 97322  
(541) 928-2551

Coffin Butte Landfill  
29175 Coffin Butte Rd  
Corvallis, OR 97330  
(541) 745-7144

Goodwill Stores

Acceptable components include monitors, CPUs, printers, modems, mice, graphics/sound cards, keyboards, scanners, and computer related peripherals. Items of value are removed for re-use such as hard drives and memory. Remaining items are typically de-manufactured, which means that they are torn apart and recycled, with valuable resources such as copper and gold extracted from the parts.

**Fluorescent Light Bulb Recycling**
Fluorescent light bulbs contain hazardous materials such as mercury. When recycled, these materials, as well as the metal and glass, are reclaimed and reused and don’t contaminate the environment. Burnt out bulbs may be taken to a hazardous waste collection event. In Benton County, collection events are held four times a year. Linn County has a collection event one weekend each October. To find the date of the next event, call a local Republic Services office.

**Household Battery Recycling**
Household batteries can impact the environment by leaching into the air and water when disposed of improperly. Small batteries are made from metals such as mercury, nickel, cadmium, silver, and zinc. Collection bins for battery recycling are located at Robnets, Bi-Mart, and, for OSU students and faculty, at the Valley Library. Batteries may also be taken to a household hazardous waste event. The following types of batteries are accepted through both of these programs:

- Flashlight, toy, and smoke detector batteries (AAAA through D and 9-volt cells)
- Lantern batteries (6-volt through 9-volt)
- Rechargeable battery packs (NiCd, NiMH, or Lithium Ion)
- Hearing aid, calculator, and watch batteries (small button cells)

**Lead-acid vehicle batteries**
Lead-acid or car batteries can be recycled at household hazardous waste collection events. They can also be recycled at battery retailers.

**Used Motor Oil Recycling**
Residents of Linn and Benton Counties can recycle motor oil by placing it next to their recycling roll cart. Oil must be in a container with a tight lid, such as oil container or milk jug, 2 gallons or smaller in size. Used motor oil can also be recycled at the recycling depots.

5. **Miscellaneous**

**Oregon Green Schools Program**
Linn and Benton Counties participate in the Oregon Green Schools (OGS) Program. The Oregon Green Schools Association (OGS) is a non-profit organization begun in 1995 to assist Oregon schools in setting up, maintaining, and recognizing effective permanent waste reduction and resource efficiency programs that improve the school environment and community. Participating schools receive educational support, guidance, resources, and recognition for their efforts. Additional information on the Green Schools Program is available on their website at www.oregongreenschools.org/about.html.
Citizen Involvement

Solid Waste Management Advisory Council
Both Linn and Benton County have an advisory council that makes recommendations to the Counties on waste reduction and disposal policy issues. The councils meet once per month to discuss policies on how to reduce both waste flow and toxicity in the county. Positions are available from time to time.

5. Alternatives for Solid Waste Management

As mentioned earlier in the section on landfill operation, the State of Oregon has established the following solid waste management hierarchy:

1. Reduce the amount of solid waste generated - waste prevention
2. Reuse material for the purpose for which it was originally intended
3. Recycle material that cannot be reused
4. Compost material that cannot be reused or recycled
5. Recover energy from solid waste that cannot be reused, recycled, or composted
6. Dispose of solid waste that cannot be reused, recycled, composted, or from which energy cannot be recovered (by landfilling or other State-approved method)

These methods of solid waste management and other solid waste terms are defined as follows:

Waste prevention refers to methods to reduce the amount of solid waste created. Examples include: buying bulk foods, choosing reusable items rather than disposable, or borrowing tools that are only used occasionally. Waste prevention can reduce toxins in the waste stream. Purchasing rechargeable batteries is an example of toxicity source reduction.

Reuse refers to using materials for their intended use again. Examples of reuse strategies include: reusing packaging, donating to and buying items from thrift stores, refilling bottles, and sharing magazines with neighbors.

Recycling refers to systems that collect, process, and market individual materials from the waste stream to be manufactured into new products.

Composting refers to systems that allow biological decomposition of organic material.

High Grade processing refers to systems in which loads rich in recyclable material, such as office paper or corrugated cardboard, are run through equipment that separates out the contaminants.

Material Recovery Facilities (MRFs) are facilities that recover materials for recycling or other use. The remainder of the waste is sent to either the landfill or the waste-to-energy facility.

Mixed Waste Processing Facilities, sometimes referred to as “dirty” MRFs, manually and/or mechanically separate recyclable materials from mixed solid waste. A “clean” MRF separates co-mingled recyclable materials.

Source separation means that recyclables are segregated from other wastes at point of generation—home or work—and are collected separately from garbage.

Mixed Recycling (also called commingling) is a collection method where recyclable materials are collected together and separated manually or by special machinery.

Waste-to-Energy refers to systems that burn mixed solid waste to reduce its volume and create energy as heat and/or electricity. Marion County utilizes the Covanta Waste-to-Energy Facility in Brooks.

Landfilling refers to the process of burying solid wastes (or ashes that result from incineration). Many larger landfills generate electricity by capturing and burning methane gas.

Each of these methods may have several variations. For instance, waste-to-energy systems that burn garbage can include facilities to remove materials before and after burning. All of the options mentioned above are used in developing an integrated waste management plan. At this time, however, any integrated solid waste management system must include a landfill compo-
nent because not all waste can be reduced, re-
used, recycled, composted, or incinerated.

In the past, solid waste management systems re-
lied on landfills. Now, most communities are
diversifying their approach to solid waste man-
agement by developing source reduction, recy-
cling, mixed waste processing and/or incineration
systems to reduce the volume of waste heading
for the landfill.

6. The Future of Garbage

There are limits to natural resources in Oregon
and the capacity of the environment to absorb
impacts of increasing consumption of resources
and solid waste disposal. Oregon residents can
conserve resources and energy by developing an
economy that encourages waste prevention and
recycling.

Meeting state, regional, and local recycling goals
requires both technical and behavioral change.
Success depends on understanding the solid
waste situation and options for waste reduction
and recycling. With knowledge, citizens can
make informed decisions about waste disposal
practices.
<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>TECHNIQUE</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
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<tbody>
<tr>
<td>Waste Reduction</td>
<td>- Education.</td>
<td>- Low cost.</td>
<td>- Relies on behavior changes.</td>
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<td>- Packaging changes.</td>
<td>- Becomes a habit.</td>
<td>- Hard to measure impact.</td>
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<td></td>
<td>- Rate incentives.</td>
<td>- Saves money, energy, and resources.</td>
<td>- Opposition from manufacturers.</td>
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<td>- Home composting.</td>
<td>- Reduces dependence on landfills/incinerators.</td>
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<td>- Careful shopping.</td>
<td>- Creates more jobs than other alternatives.</td>
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<td>- Reuse of products.</td>
<td>- Proven for many wastes.</td>
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<td>- Purchasing durable products.</td>
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<tr>
<td>Reuse</td>
<td>- Education.</td>
<td>- Saves money, energy, and resources.</td>
<td>- Relies on behavior changes.</td>
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<td>- Change of habits.</td>
<td>- Reduces dependence on landfills/incinerators.</td>
<td>- Hard to measure impact.</td>
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<td>Recycling</td>
<td>- Education.</td>
<td>- Saves money, energy, and resources.</td>
<td>- Relies on behavior changes.</td>
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<td>- Citizen participation.</td>
<td>- Reduces dependence on landfills/incinerators.</td>
<td>- Dependent on markets for materials and new products.</td>
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<td>- Collection.</td>
<td>- Creates jobs.</td>
<td>- Uses more energy and resources than waste reduction and reuse.</td>
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<td></td>
<td>- Processing.</td>
<td>- Easy - if collected by hauler.</td>
<td>- Specific programs vary from region to region.</td>
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<td>- Market development.</td>
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<td>- NIMBY</td>
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<tr>
<td>Composting</td>
<td>- Education.</td>
<td>- Saves money, energy, and resources.</td>
<td>- There are a number of different home composting methods - some easier than others.</td>
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<td></td>
<td>- Home composting.</td>
<td>- Reduces dependence on landfills/incinerators.</td>
<td>- Relies on behavior changes.</td>
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<td></td>
<td>- Commercial composting.</td>
<td>- Creates jobs.</td>
<td>- Hard to measure impact (amount recycled).</td>
</tr>
<tr>
<td></td>
<td>- Collection.</td>
<td>- Easy - if collected by hauler.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Processing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Market development.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Waste</td>
<td>- Mixed waste is sorted to recover recyclables.</td>
<td>- Includes recycling and all its benefits.</td>
<td>- Requires large capital investment.</td>
</tr>
<tr>
<td>Processing</td>
<td>- Other materials are landfilled or incinerated.</td>
<td>- Not dependent on behavior changes.</td>
<td>- Recyclables often not clean enough for markets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Potentially high recovery rate.</td>
<td>- Equipment malfunction.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Encourages a “throw-away” attitude.</td>
</tr>
<tr>
<td>(Incineration)</td>
<td>- Sometimes includes removal of recyclables</td>
<td>- No behavior changes needed.</td>
<td>- Air emissions.</td>
</tr>
<tr>
<td></td>
<td>before burning.</td>
<td></td>
<td>- Wastes resources.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Requires large capital investment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Expensive.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- NIMBY.</td>
</tr>
<tr>
<td>Landfilling</td>
<td>- New local landfills with environmental</td>
<td>- Proven method.</td>
<td>- Expensive to ship wastes to distant sites.</td>
</tr>
<tr>
<td></td>
<td>controls.</td>
<td>- No behavior changes needed.</td>
<td>- Wastes resources.</td>
</tr>
<tr>
<td></td>
<td>- Landfills in distant, non-urban areas.</td>
<td>- Low cost.</td>
<td>- Expensive to meet EPA standards.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Risk of water pollution.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- No education.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- NIMBY.</td>
</tr>
</tbody>
</table>
PREFLECTION – Think about your trash.

- What is the largest component of the trash in your household?
- How close do you come to filling up the rolling trash cart each week?
- How often do you put out your rolling recycle cart?
- What items do you throw away because you don’t know if/where they can be recycled?

ACTION – Conduct a household waste audit using the form on the next page. Include all with whom you share your living space in this activity. Be creative about ways that children and teens can share in the project with you.

WASTE AUDIT TIPS
- Use gloves, if desired.
- Dump garbage bags out on a plastic tarp and sort in to buckets (easy to weigh and estimate volume – subtract the weight of the bucket)
- After sorting, recycle items that can be recycled.

REFLECTION – Consider audit results

- What surprised you most about your household waste?
- What from your “preflection” was confirmed?
- How do the results from your personal waste audit compare with the statistics in Figure 1-5 in Chapter 1?

RE-ACTION – Strategize for change at home.

- Decide on an easy first step to reduce the amount of trash you have each week.
- Set a realistic long-term goal regarding the amount of waste generated in your household.
- Determine three steps you can take to get to that goal.
## Home Waste Audit

People involved in audit: ___________________________ Date ____________

<table>
<thead>
<tr>
<th><strong>Recyclables</strong></th>
<th>Weight (pounds)</th>
<th>Volume (gallons)</th>
<th>Weight - % of total</th>
<th>Volume - % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed paper, newspaper, magazines, cardboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum and tin (cans, foil)</td>
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<tr>
<td>Glass jars and bottles</td>
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<tr>
<td>Plastic containers</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Compostable food waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other misc. items List:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Non-Recyclables</strong> (trash)</th>
<th>Weight (pounds)</th>
<th>Volume (gallons)</th>
<th>Weight - % of total</th>
<th>Volume - % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-compostable food waste</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other Misc. items List:</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Speciality Recyclables</strong></th>
<th>Weight (pounds)</th>
<th>Volume (gallons)</th>
<th>Weight - % of total</th>
<th>Volume - % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other List:</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TOTALS</strong></th>
<th>Weight (pounds)</th>
<th>Volume (gallons)</th>
<th>Weight - % of total</th>
<th>Volume - % of total</th>
</tr>
</thead>
</table>