

CHAPTER 5 DISCARDS: SOLID WASTE AND RECOVERY SYSTEMS

INTRODUCTION

What happens to our stuff after we are done with it?

We have learned in previous chapters that of all the stages of the life cycle of materials it is the making and using of products that have the most negative impacts on the environment. For this reason, so far, this handbook has focused on the *reduce* part of the 3R's. If we do not consume products they will not be made, used and discarded in the first place.

The decisions we make about our discards still have significant effects on the environment and the economy. Discards management (the reuse and recycle part of the 3R's, plus garbage) is one part of the full cycle of materials management, and it can save energy and natural resources and reduce pollution.

But we don't always fully understand those impacts, and thus we don't always make good choices about what to do with our materials when we are ready to part with them. While we dutifully place materials out on the curbside and even load up our cars and carry materials to recycling depots and reuse organizations, we typically know very little about what happens to these materials after they go away.

This chapter presents a big picture view of the infrastructure that collects, sorts and distributes our discarded materials and considers its environmental impacts. This will hopefully empower you to make better decisions and better explain those decisions to others.

The good news is it is pretty easy to do the right thing with our discards in Oregon. Households, businesses and local authorities work together to manage our natural resources by reusing, composting, recycling and sometimes burning discards for energy. We can also properly dispose of materials that belong in the landfill.

Each part of our solid waste management system plays a role in protecting the environment. Of course, our system is not perfect. You will read elsewhere in the handbook and learn from speakers and tours about the challenges our system faces. But first, it is important to understand the existing system.

TERM

Waste

Solid waste:

Any discarded (abandoned or considered waste-like) materials. Solid wastes can be solid, liquid or semi-solid.

Waste:

See also Solid Waste. Unwanted or undesired material. A material that has outlasted its purpose or is left over. The trait of using resources carelessly, imprudently or without thrift. Loss of resources.

Waste management:

The processes of the collection, treatment and disposal or return to markets of materials after their use phase. Proper waste management reduces the negative impacts waste has on environment and society.

TERM

Waste generation: the act of consuming goods and services that result in discarded material. The resulting discards are usually measured in weight, generated by a specific area or entity over a certain time period. This waste must then be processed through reuse, recycling, composting, incineration or landfilling.

TERM

Recovery: the extraction of discarded materials for reuse, recycling, composting or energy generation in order to capture some of the energy and natural resources used to make products and avoid the consumption of virgin resources to make new products.


DEEP DIVE


For more details you can consult the Oregon DEQ 2021 Waste Recovery Report (available online). DEQ releases a new waste recovery report each fall for the previous year.

QUANTITY OF DISCARDS IN OREGON

The challenge at hand

Before we explore the various parts of the waste management system, it is worth pausing to appreciate the sheer volume of the material that is processed.

Oregon facilities managed 6,494,204 tons of waste that was generated in 2021. Waste generation is the total tonnage of material our collection system manages either by recovering it (reuse, recycle, compost, incinerate) or by disposing of it. The total tons of waste generated equates to per-capita generation of 3,044 pounds per person (8.3 pounds per day), a nine percent increase from 2,792 pounds per person (7.6 pounds per day) in 2020.

Of the waste generated, a total of 4,046,936 tons went into landfills and incinerators, up 17.9 percent from 2020. Recovered material came to 2,447,267 tons or 37.7 percent of waste generated.

While these trends are concerning, an unprecedented wildfire season at the end of 2020 resulted in the disposal of more than 6,000 damaged structures in 2021. The Department of Environmental Quality estimates that fire debris accounted for close to 71 percent of the increase in overall disposal. Had the fire debris not been generated, the recovery rate would have been 40.4 percent in 2021, and the waste generation rate would have only gone up by two percent, not nine. Still, 2021 stands as a reminder for how increased wildfires, floods, and severe weather events can directly impact waste generated.

THE RECOVERY HIERARCHY

Setting priorities on conservation

As early as 1983, Oregon legislators set forth our state's first comprehensive commitment to integrated waste management, when they passed the Opportunity to Recycle Act; the Oregon Recycling Act of 1991 deepened that commitment. These laws established solid waste management policies and designated jurisdictions responsible for the recovery. The Acts also recognized that some waste management practices conserve more energy and natural resources than others and so we must have systems and a mindset that sets priorities for what we do with our discards. A hierarchy was established to guide solid waste management decisions. The State uses the solid waste hierarchy as a communication tool to encourage residents and businesses to reduce, reuse and recycle, in that order. The hierarchy is also used to focus planning efforts and to prioritize program activities.

THE RECOVERY HIERARCHY





Workplace clothing swap



Recycling at a multifamily complex

A CLOSER LOOK AT THE HIERARCHY

Reuse



To use an item again after it has been used. The goal is to displace the need for a new product with an existing product.

Reuse can be practiced in the following ways:

- A consumer can reuse durable products multiple times instead of using one-time-use disposable products (examples: bring your bag to the store or print documents double-sided).
- A consumer can make a discarded item available for another consumer to use in the same way in which the product was originally intended (examples: donation, resale, salvage or swapping).
- Reuse can also include repurposing an item for a new use without changing the fundamental structure of the item (example: using an old door as a desk top).

In the recovery hierarchy, reuse usually uses the least amount of energy and resources, because this strategy replaces the need to extract, manufacture and process natural resources for a new item.

Items do often still need to be collected, separated, cleaned, fixed and transported to the new owner or user. Once it is in the hands of the new consumer, the material may have environmental costs associated with the use phase. When the reused product is older and energy inefficient, these energy costs may be higher than purchasing a new product. Most of the time, these costs to reuse are still lower than the costs to recycle.

Recycle



To break discarded products down to more fundamental materials so they can be manufactured into new products (examples: pulping paper, melting glass or metal, chipping or melting plastic).

This strategy replaces the need to extract natural resources needed for new products and usually requires less energy and natural resources to process, manufacture, transport and sell back to consumers than raw materials.

Activities such as collection, separation, cleaning, transportation, processing, manufacturing and marketing have emissions, energy and wastes associated with them.

Compost



To break organic discards down through controlled biological decomposition. This can be done with some materials on a small scale in the backyard or on a large scale in a commercial compost facility. The resulting product is utilized as fertilizer, soil amendment, pest and weed control, and mulch. Compost is useful when it displaces the use of synthetic fertilizers, pesticides and herbicides. Compost also makes the production of food more energy and resource efficient. In some conditions, organic matter can also be utilized to generate energy before composting.

Composting can also play an important role in mitigating impacts of materials that decompose in a landfill. When organic matter breaks down in a closed environment (deprived of oxygen), it produces methane which is a potent greenhouse gas pollutant.

Recover for energy



To combust or process discards to create energy. When products cannot be reused, recycled or composted, it may still be useful to try to extract the material in order to generate energy. This approach reduces the need to extract raw materials (often times fossil fuels) for our energy needs. However, all of the natural resources and energy used to make the original product are lost once the material is burned. This alternative is only useful if the other levels of recovery are not an option.

Incineration and thermal depolymerization are the two most common ways that energy is recovered from materials in Oregon.

- **Incineration:** Incineration systems burn mixed solid waste to reduce its volume and extract energy as heat and/or electricity. Another name for these systems is waste to energy plants. They are the most contested and expensive methods of waste disposal. While such systems have improved, pollution still remains a problem. Incineration facilities also require a large amount of material to keep them viable economically. This need to provide a high level of feedstock often results in recovery programs having conflicting goals. One is to support the economic viability of the facility (which improves as volume increases), while the other is to prioritize recycling or reusing materials.

A small portion of our solid waste from the metro area goes to Marion County's Brooks facility. Marion County sends all of their solid waste to this facility after recovering material and removing toxic materials.

Much of the wood waste in our region is also chipped and used as an energy source for some local manufacturers. Due to the decrease in paper mills which predominantly utilize this energy source, there is a decreased market for wood waste in our region.



Backyard composting bin



Energy from waste facility in Marion County

DEEP DIVE

See video “Breath this Air” from the Peak Plastic Foundation to learn more about inequities in human health costs of depolymerization.

- **Thermal depolymerization:** Some plastics are not easily recycled because of additives or the nature of the resin. Plastics that have been used in agricultural or construction industries are particularly dirty and therefore costly or impossible to recycle. In these conditions, some of these plastics may go through a process called thermal depolymerization. Pellets are processed to supplement or replace other fuels, particularly coal. High levels of energy use and pollution are associated with this processing. It is significantly less desirable than recycling, because once it is burned as a fuel, the energy and resources cannot be recovered again.

Landfilling



To bury and manage solid wastes (or ashes that result from incineration) underground. Landfills play an important role in the solid waste system. Without landfills, materials would be discarded in the environment in the form of pollution and litter.

However, capturing materials through recovery is a priority so that there is less need to extract the natural resources. Landfills are also a major source of methane emissions which contribute to climate change. Some of the methane is collected for energy, but composting significantly reduces the impact of organic discards even when methane fuel capture is considered.

Columbia Ridge Landfill near Arlington, Oregon

WHERE DOES IT GO?

Garbage

Contrary to popular belief our garbage cans and subsequently our landfills play an essential role in protecting the environment. Garbage, when it is not contained, is risky to our health and environment. Historians describe a time when there was no understanding that objects that were no longer needed should be placed somewhere special. People often set their discards wherever they were last used. This still happens today in places where people live further apart or their governments are not developed enough to have a plan for discards. Rotting organic waste, human waste, and even heaps of solid waste can spread disease and cause injury to people and wildlife and pollute the environment. In a city setting, these problems are compounded by the volume of material.

Around 500 B.C., Athens issued the first-known law against just throwing garbage into the streets. Instead, they required residents to dump waste no less than one mile outside the city walls. Over the 2,500 years that followed that decree, dumpsites became more concentrated and isolated from people. The result was that places like wetlands and river deltas

became ideal locations for garbage since they were deemed uninhabitable by people. These practices, that were problematic for the environment, became even more dangerous as the volume of waste increased and as this waste came to contain more and more toxic materials.

By the late 1980's, the public began to look around and realize that these practices were resulting in toxics in the water supply and air and land pollution from uncontained garbage. Municipalities were required to close and manage old landfills and utilize modern practices in managing waste.

At this time, landfills acquired a particularly bad reputation. Certainly it makes sense to try and use the building blocks of our products again, but some essential materials simply have no use after we are done with them. These items need a safe and near permanent place to go. Today these places are called sanitary landfills.

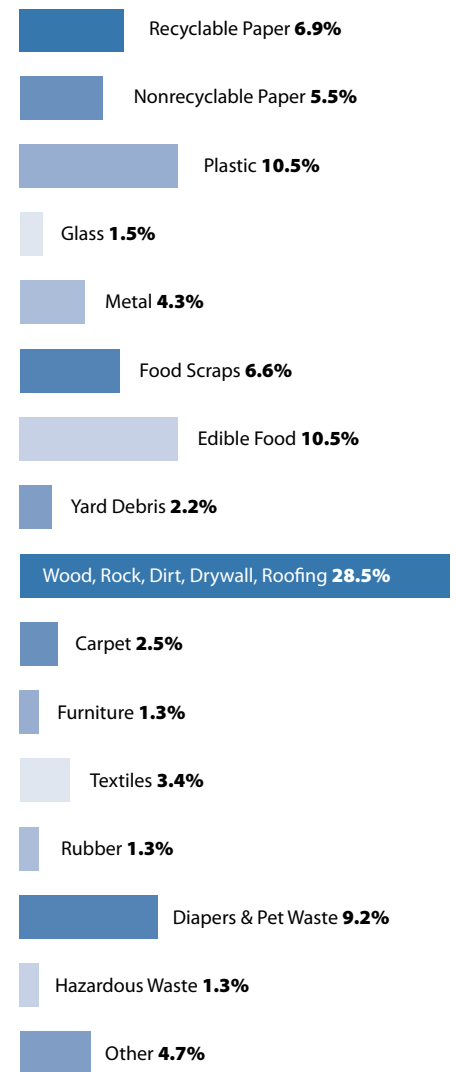
What is in Oregon's garbage?

The Oregon Department of Environmental Quality (DEQ) works with Metro and local jurisdictions to conduct a Waste Characterization and Composition Study every 2-5 years. It is a statewide study of the composition of municipal solid waste generated in Oregon and disposed at landfills, transfer stations, and incinerators in Oregon or transported out-of-state for disposal.

The study is conducted by obtaining samples of waste at the point of disposal, sorting the waste into different material categories, weighing each component, and then combining these results with disposal quantity information to determine the total amount of different materials being disposed in Oregon.

These studies are useful in assessing whether recycling education programs are effective in getting Oregonians to recover the materials on the list of accepted materials. The studies also help the state and region make decisions about policies and infrastructure that could recover new materials. As you can see from the Metro Garbage Graph, the last garbage composition study was conducted in 2016.

METRO GARBAGE



Source: Oregon DEQ (2016)

TERM

Franchise: Contracts between private garbage and recycling companies and local governments that allot specific territories and require standardized services and fees.



Columbia Ridge Landfill near Arlington, Oregon

What happens to our garbage after we set it out on the curb?

The EPA and Oregon DEQ set regulatory standards, but solid waste systems are managed at a local level. Local government and private companies work together to collect, transfer and dispose of waste. In our tri-county region, governmental responsibility is split; cities and counties are accountable for collection, while Metro oversees transfer and disposal.

A. Collection

Most metro area businesses and residents pay a fee to private garbage and recycling companies, known in the trade as “haulers,” for garbage collection. However, some businesses and individual residents decide to opt out of the collection process and haul waste directly themselves.

Most local governments have **franchises** that make collection for garbage and recycling happen for homes and small-plexes of 2-4 units throughout the region. Franchised haulers have contracts with the local government to serve allotted territories, and offer standardized services and fees. In Washington County, hauling certificates replace franchise contracts.

Multifamily and business garbage and recycling haulers are franchised or certified as well. The one exception is that haulers in Portland are not franchised. Haulers compete in a free market for commercial and multifamily customers and each hauler sets its own rates. In order to get a permit to haul commercial waste in Portland, haulers still need to meet certain levels of service, but they are allowed to offer a larger range of services and choose their rates.

B. Transfer

Most haulers in our region take collected garbage to Metro transfer stations, which prepare the garbage for transportation to a landfill. Metro owns the transfer stations, but a contract is placed out for bid by Metro every five years for companies to operate the stations. As part of the contract, facilities attempt to pull out more valuable and larger pieces of recyclable materials from the refuse. The remaining garbage is compacted into large trailers bound for a landfill disposal facility.

Transfer stations free haulers to spend their time collecting waste in our communities, rather than traveling great distances to dump their loads in distant landfills. Ninety percent of waste collected in the Metro region is deposited at the transfer stations, loaded into privately-owned trailer trucks and transported to the Columbia Ridge Landfill in Arlington, Oregon. Each landfill-bound semi-trailer — some 65 a day — carries six or seven garbage truckloads, saving energy, time and money while reducing truck traffic through the Columbia River Gorge.

MAP OF METRO CENTRAL AND METRO SOUTH



Two Metro-owned transfer stations presently accept most of the region’s waste:

Metro Central	Metro South
6161 NW 61st Avenue, Portland (between Front Ave. and St. Helens Rd.) Open 8 a.m. – 5 p.m. seven days a week.	2001 Washington Street, Oregon City Open 7 a.m. – 7 p.m. daily

Call 503-224-3000 for more information.

C. Disposal

In the early 1990's, the metropolitan area had a landfill problem that has been predominantly solved today. Diminishing local space and the identification of groundwater pollution at landfills led to growing concern. Eventually, Metro led the way to find new disposal sites for the garbage generated in our region.

Before 1991, waste was disposed of at several local area landfills. Landfills in northeast Portland and Oregon City closed in the 1970's and 80's. Metro's St. Johns Landfill in North Portland stopped accepting waste in 1991.

Today, Columbia Ridge Landfill is the final destination for most of the area's waste. It is located 30 miles south of Arlington, in northeastern Oregon. The Riverbend Landfill in McMinnville and the Hillsboro Landfill are smaller local landfills permitted to receive only construction and demolition materials.

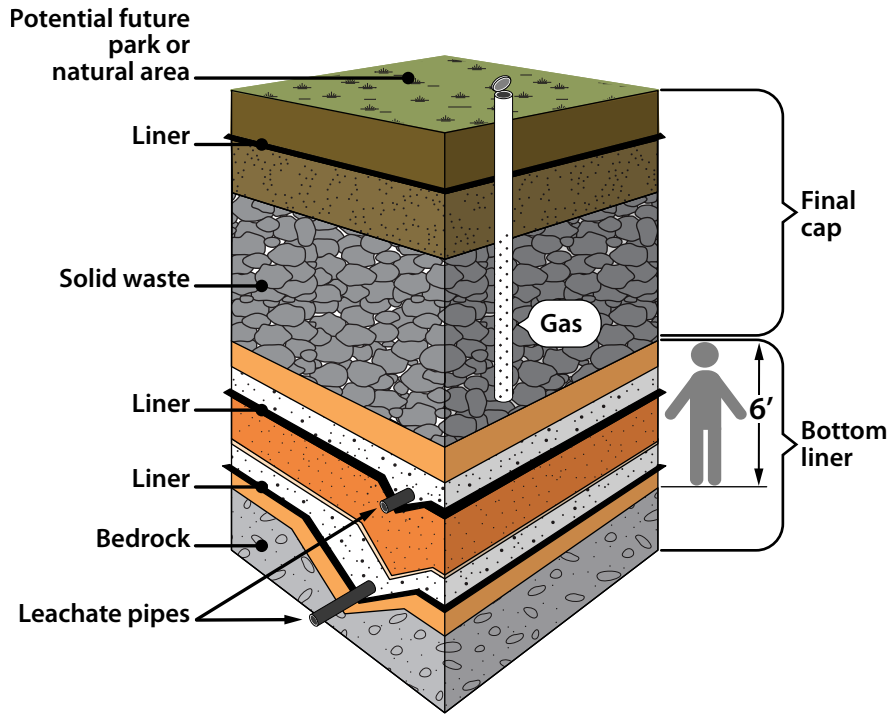


Landfilling is not ideal by any means. Since our primary landfill is 140 miles from Portland, the resource and monetary costs of hauling waste there are significant. In some landfills, high levels of yard debris, food scraps and paper waste are also a concern, as they produce the greenhouse gas methane.

But today, the two major regulators, the national Environmental Protection Agency (EPA) and Oregon Department of Environmental Quality (DEQ), agree that new landfills are less problematic than older facilities, due to today's stringent regulations for facility design, siting and operation.

The Columbia Ridge Landfill (CRL), our region's primary waste destination, is located in the desert, where it's less likely to contaminate groundwater than landfills in rainy locations. In contrast to the old Portland area landfills, CRL is geologically stable as it is on top of no faults, has a water table at least 200 feet deep, and receives only 9 inches of rain a year. This modern landfill uses liners, covers, and leachate collection systems to protect groundwater. A system of collection pipes reduces methane infiltration into surrounding soils and reduces (though it does not eliminate) emission to the atmosphere of this potent greenhouse gas. With 750 acres available, Columbia Ridge is expected to efficiently accommodate our waste until at least 2066.

LANDFILL PROFILE



DEEP DIVE

You can find a video tour of the Columbia Ridge Landfill created by Sustainable Today on YouTube.

Recycling

In the Metro area, responsibility for managing garbage is split; cities and counties handle collection, and Metro oversees transfer and disposal. Recycling management mirrors this system. However, there are several important components and players unique to recycling.

Successful recycling depends on the careful alignment of five key steps:

1. Source separation
2. Collection
3. Mixed recycling separation and marketing
4. Processing and manufacturing
5. Purchase of recycled products

In order to end up with quality recycled products, each player in the process must do their part with care. Those who receive materials depend on those before them to do their part by properly handling materials. Proper sorting ensures that the end material is pure enough to recycle into new products. The end goal of creating quality materials requires teamwork at all stages of the process: from homes and businesses, to companies that process materials, and local governments. The amount of work and level of quality are at a constant tension that is driven by economic pressures all along the system. Most of the pressure comes from the end where materials are returned as a commodity. The next chapter will go into detail about how these markets play a role. This section will follow the materials up to the point of those end markets.

TERM

Source separation: *the segregation of recyclables and garbage at the point of generation before collection.*

TERM

Curbside collection program: *an on-site garbage, recycling and compost collection system for residents and businesses.*

1. Source separation

The first step in any recycling system is picking out materials that can be recycled from those that will be disposed. This stage is called **source separation** in the waste management field.

There are two major players in this stage: the local jurisdictions and people. Local jurisdictions (Cities and Counties) are responsible for determining which containers should be included in a **curbside collection program** and what materials belong in each of these containers. They determine that a material is allowed in recycling by identifying and analyzing long-term markets that will use the material to make new products. They then examine the processes to ensure that there is a way to get the materials from the consumer to the markets. These Cities and Counties are also responsible for informing the public about how to use this system.

It is then the responsibility of the public to learn which materials go where and then to prepare materials properly so that they can be successfully recycled. Materials must be free of food and dirt. Some items must be removed such as plastic lids and caps. It is useful to keep materials in their original shape rather than flattening them. All of these actions help reduce contamination.

The word **contamination** is used frequently in the recycling field. Contamination can refer to soiled recyclables. But contamination also refers to mixing materials that are not compatible for collection, processing of discards or manufacturing of new materials. Improper source separation and preparation at home and at work not only results in the loss of quality material, but also it may actually contaminate other materials, thus losing valuable recyclable materials during the processing. Having to process materials that do not belong in the curbside programs is also costly for processors.

In 2008, regional jurisdictions and Metro determined a uniform list of accepted materials for recycling so that, no matter where you lived and worked in the region, the list would be the same. The list of accepted materials for recycling and how you sort those materials remains the same today.

For the most part, people in the region are doing a good job with source separation. Metro conducted a comprehensive study in 2014 to understand what levels of contamination exist in the curbside collection program. Overall, the study found that 14 percent of the material in residential garbage could have been placed in curbside recycling.

On the other side of that, nine percent of peoples' recycling loads were non-recyclable materials that should have been sent to the landfill or wasn't accepted in the curbside collection. Those are contaminants.

"There are still some recyclables in garbage," said Marta McGuire, a planner in Metro's Resource Conservation and Recycling division. "The study also found unacceptable items in the recycling cart. The question on the table is, can we do better? Do we want to do more?"

Ms. McGuire asked this question in 2014. As global markets became more conservative about contamination, the region and local governments are finding that the answer to this question is, "Yes."

The importance of avoiding contamination and ensuring proper preparation and separation at the source will become clearer as we continue to follow the journey of recyclable materials.

TERM

Contamination:

1) Unintended materials mixing with desired materials for recycling or compost (for example, glass is a contaminant in a paper stream); 2) Materials that are too soiled, such as with food, grease or dirt, to be recyclable.



2. Collection

Source separated recyclables are typically collected one of four ways: a deposit system, curbside collection, recycling depots or Metro Transfer Stations.

The Oregon Bottle Bill

Consumers in Oregon pay a dime deposit for most beverage containers larger than 4 ounces and smaller than 1.5 liters. When they return containers to local retailers that sell that beverage, their deposits are returned. Consumers can also return their bottles at redemption centers called Bottle Drop. Bottle Drop is a new system that gives consumers more options on how to return their containers and how to accumulate their returned money.

The Bottle Bill is great for recycling. Initially, the Bottle Bill yielded a return rate of more than 90 percent and reduced litter by 77 percent. Over time the recovery rate dropped with the drop of the value of the nickel. By 2015, numbers from the Oregon Liquor Control Commission (OLCC) showed Oregonians redeemed 68 percent of covered metal, glass and plastic containers.

Even with a dropping redemption rate, the 5 cent incentive got more materials recycled. The 2015 rate of recycling for containers that were made of the same types of materials – but were not accepted by the Bottle Bill – was only 37 percent. This is much lower than the 68 percent recovery rate for those containers covered by the Bottle Bill.

Under state law, consecutive years with redemption rates below 80 percent allow OLCC to raise the deposit from a nickel to a dime. As a result, the agency switched to a dime deposit in Spring 2017. In 2018, the redemption rate returned to 90 percent. Meanwhile, the program also expanded the accepted materials. In 2018, the program also saw a 50 percent increase in sign-ups for the BottleDrop service that allows consumers to drop off their bottles to be counted and credited to their accounts. More than 300,000 Oregonians now have BottleDrop accounts.

The deposit system is also good for recycling because it provides a steady supply of clean, sorted recyclables that boost local recycling markets.

 **DEEP DIVE** 

Visit Bottledropcenters.com for more information

Oregon's 2018 Bottle Bill Expansion
Additional beverage containers to be included

NEWLY INCLUDED

- Energy and Sports Drinks
- Coffee and Tea Drinks
- Ready-to-Drink Cocktail Mixers
- Kombucha
- Hard Cider (up to 1.5 liters volume)
- AKB (not yet included)
- Protein and Wellness Drinks

These products must be made with 100% recycled plastic or glass and 100% recycled metal. They must also have a returnable container or label. Not all products included on list include.

Oregon's 2018 Bottle Bill Expansion
Additional beverage containers to be included

NOT INCLUDED

- Wine, Mead, and Distilled Spirits
- Milk (dairy and plant based)
- Infant Formula
- Meal Replacement Drinks
- Concentrated Cocktail Mixers

All quart, carton, and straw boxes, along with other containers, including unrecycled, are exempt. Call us for updates on list changes.

The Oregon Liquor Control Commission is responsible for enforcing Oregon's bottle deposit and redemption system. For more information about these containers call us at 800-452-4522 or visit www.oregon.gov/OLCC.

Curbside collection

Oregon cities with a population of 4,000 or more must provide recycling along with their curbside garbage collection. Privately owned recycling trucks collect materials at the curbside of both residences and businesses. In the Metro area, jurisdictions franchise private garbage haulers to pickup residential recyclables in recycling trucks. Haulers provide containers to each household. For commercial collection, all haulers are required to include with their garbage service the same list of basic materials that they collect for residents. However, in Portland because it is not franchised, haulers can customize specialized pickup for materials for recycling for special rates.

Oregon recycling laws require that separate vehicles are used for garbage, mixed recycling and compost. Glass is always kept separate because it is breakable. Most companies send a separate truck to pickup glass.

Recycling and reuse depots

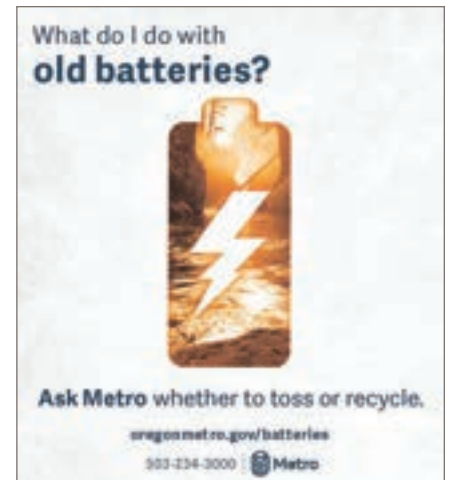
In addition to curbside collection, recycling and reuse depots often accept additional materials, such as Styrofoam, computers and plastic bags. Some materials are taken for no charge. Fees may be charged for materials that are costly to recycle. Recycling depots are used by business owners and operators, and rural residents who don't have curbside service. In addition, some of these businesses provide drop boxes for residents who want to recycle non-curbside materials.

There are also many depots and organizations that take discards so that they can be reused by someone else. From building materials to furniture, food to art supplies, it is worthwhile to seek locations that will take gently used materials before considering recyclers.

Metro's Recycling Information Center is a great resource for locating a depot for recycling and reuse for the materials you wish to discard. The RIC phone number is 503-234-3000. Metro also provides an online *find-a-recycler/reuse* page, which allows you to search for places that recycle many materials.

Metro's transfer stations

These transfer stations are not just for your trash. They are one-stop locations for waste deposit. Residents and businesses can take their garbage and recyclables to the transfer stations, which are also the drop-off points for garbage haulers. Transfer stations are particularly popular for bulky items. But they also have a hazardous waste collection program and receive many types of recycling and reuse materials.



TERM

Commingled recycling: a system in which paper, plastics, and metals are mixed in one container by the consumer, instead of being sorted by the consumer into separate commodities (newspaper, paperboard, corrugated fiberboard, plastic, etc.) and handled separately throughout the collection process.

TERM

Two-sort system: a recycling system in which paper, plastics, and metals are mixed in one container and glass is placed in a separate container.

TERM

Materials Recovery Facility (MRF): pronounced “murf.” A specialized plant that receives, separates, and prepares recyclable materials for end-user materials markets.

3. Mixed recycling separation and marketing

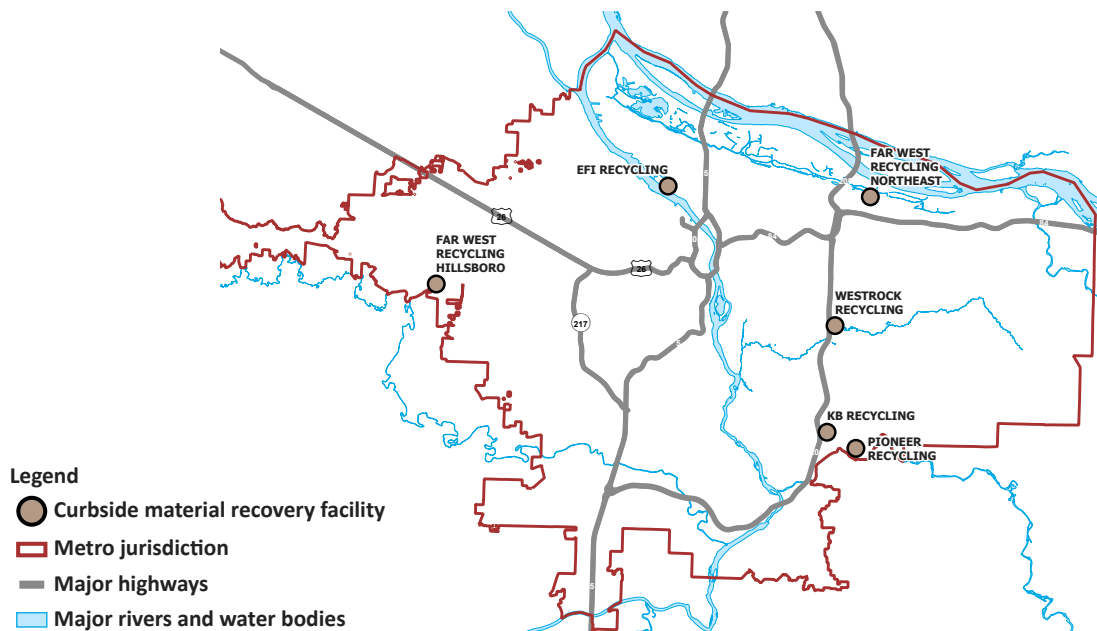
In the old days, source separation was rather involved. Newspapers were bundled by string, cans had to have labels removed and smashed. Paper went in one bag, metal and plastic bottles in another. Glass in another bag. Collection trucks needed multiple compartments to manage all of the categories. The result was that consumers were not recycling enough material to supply the demand of end markets.

For these reasons, by 2008, most Metro area communities were allowed to mix their paper, plastic and metal together in the same curbside containers with glass in a separate container. **Commingled recycling** means less source separation for the public and ultimately has resulted in an increase in recycling. However a **two-sort system** meant that materials would eventually have to be sorted by someone else.

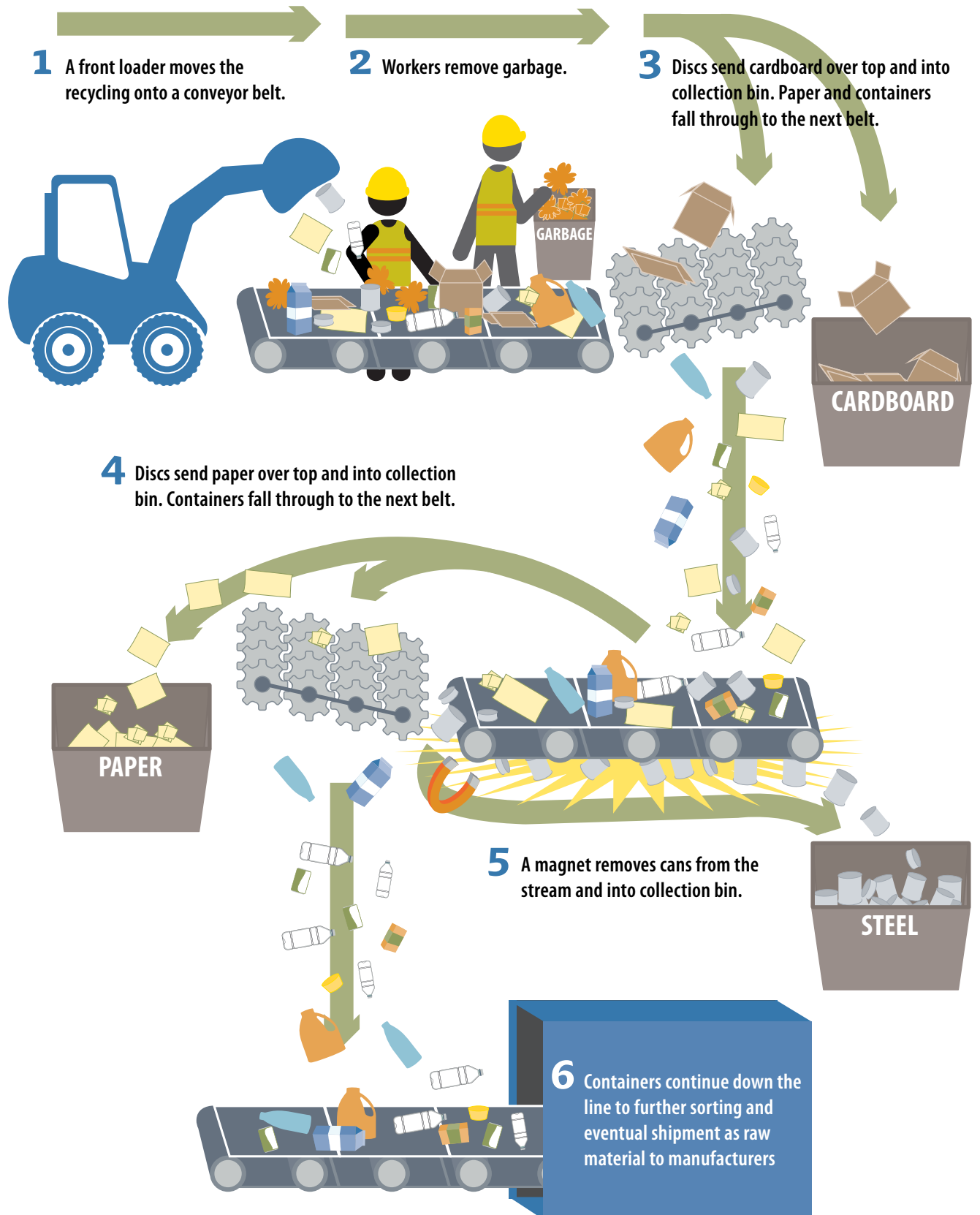
That need for a second stage of separation gave birth to the increasing role of facilities called **Material Recovery Facilities or MRF’s**. MRF’s are privately owned facilities who accept the materials collected by haulers, separate them with a combination of manual and mechanical means, and bale them up to truck and sell to the market that will yield the best price.

MRF’s are the linchpin of our recycling programs in the metro region. For this reason, the next chapter will take a deeper look at the relationship between MRF’s and the markets that will purchase the materials they prepare.

CURBSIDE COLLECTION MRF MAP



MATERIAL RECOVERY FACILITY (MRF) PROCESS



DEEP DIVE

Learn more through the Oregon DEQ The Truth About Packaging with Recycled Content fact sheet.

4. Processing and manufacturing

Material Recovery Facilities bale up the materials after they have sorted them and sell these materials as is to processors who will chip, melt, mix, sort or pelletize the materials. These companies understand what types of raw materials manufacturers use and how to prepare recyclables so that they will function just as well as virgin materials. All these materials compete against virgin materials, often in worldwide markets. As a result, the economics of utilizing recycled materials can change based on virgin commodity prices. For example, if wood chips are readily and cheaply available, prices for virgin paper pulp might be low.

The next step in recycling is the actual manufacturing of a new product and its purchase by individuals, businesses, and governments.

The volume of material available also affects prices manufacturers are willing to pay. When many communities began newspaper and cardboard recycling simultaneously, prices fell because the supply of recyclable material became so large. Alternatively, if too little material is available, no business will be interested in investing in the plant capacity to use it.



TERM

Post-consumer: content that comes from waste materials generated by households or businesses in their role as end users of the product.

TERM

Pre-consumer: content that comes from manufacturing waste, for example paper scraps recycled at a paper mill.

5. Purchase of recycled products

Just as the recycling cycle starts with the consumer, the last link is also the consumer. The cycle is not complete until goods made with recycled materials (or even better used goods) are purchased and used again.

Buying recycled sends a message to industry that recycled products are in demand. When recyclable materials become the raw materials of industry, they reduce the need for mineral and petroleum extraction and timber harvesting. Less water and energy are typically required to make products from existing (recovered) materials than from virgin materials. When you buy recycled products, you save vital natural resources and help stimulate economic growth through environmentally preferable technologies.

Look for products that say that they have recycled content. **Pre-consumer** and **post-consumer** products are both better than using virgin material, but it is better to give preference to those products with the highest level of post-consumer content. Post-consumer means the material has come from a product collected for recycling as compared to industrial scrap. Most products will also tell you how much of the material has come from a product collected for recycling as compared to industrial scrap. The intent behind choosing post-consumer products is to increase demand for them thereby reducing impacts resulting from extraction and processing of virgin materials.

Organic Discards

The Curbside and Beyond Chapter will provide information about backyard composting and wormbins. Backyard composting is the best way to go! Processing yard debris is most environmentally effective when it takes place close to the properties that generate the organic discards and will in turn utilize the fertilizer.

However, onsite composting is not an option for the volumes of material generated in commercial settings like schools, restaurants, hospitals and grocery stores. Furthermore, there are some organic discards such as meat, dairy and grains that should not be managed in backyard compost piles, because these piles do not get hot enough to break these types of discards down and they can attract rodents.

For these reasons, the region has been working to develop a large scale collection and processing infrastructure so that food scraps can be captured to be turned into soil amendment for agriculture, parks, roadsides and homes.

Successful composting depends on the careful alignment of steps that are similar to those for recycling:

1. Source separation
2. Collection
3. Processing at compost facilities
4. Purchase of compost and other by-products

Unlike recycling which is well-established and standardized throughout the region, the steps for composting look quite different depending on whether the organic material is coming from a residential or commercial source. Organic material that is collected in a residential setting is made up almost entirely of yard debris which is woody, fairly dry and high in carbon material which is fairly stable. Organic discards in a commercial setting are almost entirely made up of wet, heavy food scraps that are high in nitrogen and therefore more odorous and quick to break down. These differences require different collection processes and different types of compost facilities.

This organics infrastructure is still very much developing in our region, and the development is happening at different rates around the region. For that reason, these steps can also look quite different in Hillsboro than they do in Gresham or Portland.



1. Source separation

As the region works to develop a comprehensive food scrap collection system, businesses are the top priority source of food scraps for composting, because there is so much more to collect there. Grocery stores, restaurants and large institutions like hospitals, schools and colleges generate a lot of food waste. About 40 percent of the metro area garbage comes from the commercial sector, and 28 percent of that waste is food scraps. So, separating out those food scraps for composting would have a major impact.

Residents can help out by separating their yard debris from garbage by using it in their backyard compost or placing it in their yard debris container (where provided). Beaverton, Cornelius, Durham, Forest Grove, Gaston, Hillsboro, King City, Lake Oswego, Milwaukie, North Plains, Portland, Sherwood, Tigard, Wilsonville, and unincorporated urban Washington County are currently the only places in the region where residents can also include food scraps with their yard debris.

Contamination is an even more important consideration when separating organic materials than it is for recycling. When you think about it, recycling will be sorted and separated by mechanical methods. Compost must be processed by biological creatures (bacteria). These creatures are amazing, but they only eat what they consider food. Some bacteria can only breakdown materials found in yard debris, while others like nitrogen-rich food scraps. None of these critters like to eat plastic.

For these reasons, the way in which the public separates out materials for composting is more important than ever. Places where source separation in recycling are most problematic, such as community events or multi-family housing, are often the least desirable places to collect food scraps. Programs in these areas will likely someday exist in a more rigorous manner, but first the places that can separate the food scraps in more pure loads will be prioritized.





2. Collection

Food scrap collection is available for businesses in Beaverton, Clackamas County, Gresham, Portland, Hillsboro, Sherwood, and Tualatin as well as unincorporated Washington County. Businesses in these areas can set up collection with their garbage and recycling company so that they can separate food scraps for composting. Accepted food scraps includes grains, dairy, seashells, meat and bones. Non-food items such as waxed cardboard, napkins, paper towels, service ware and plastics must all be separated and placed in the garbage.

Landscaping materials can be composted at many local yard debris sites throughout the region, but food scraps cannot be included in these loads.

Organic collection for residents varies greatly in the region. Some rural areas do not have yard debris pickup; some services provide roll carts; some use customer-provided carts; and some accept paper craft bag containers of extra yard debris. Standard container size is 60 gallons, but some cities allow for smaller containers for tight spaces. Frequency is usually every week in service programs throughout the region, although some cities in Washington County pickup only every other week. In Beaverton, Cornelius, Durham, Forest Grove, Gaston, Hillsboro, King City, Lake Oswego, Milwaukie, North Plains, Portland, Sherwood, Tigard, Wilsonville, and unincorporated urban Washington County, you can include food scraps with your yard debris.

TERM

Anaerobic digestion: *the processing of organic waste with microorganisms in an oxygen-free environment, which generates methane and carbon dioxide for the purposes of fertilizer and burning for fuel.*

RESOURCE

For more information on anaerobic digestion you can watch the “How is food waste recycled?” video (available on YouTube).

TERM

Aerobic digestion: *the processing of organic waste with microorganisms and oxygen, carbon and water. This process generates fertilizer, mulch and soil amendments.*

3. Processing at compost facilities

Most compost facilities in the region are permitted for landscape material only. Their method for composting is to utilize large enough piles of material, air and water to turn materials into bark, mulch and soil amendment in about 45-60 days. These facilities do not use methods that get hot enough or cultivate bacteria that can process food scraps and therefore are not permitted to accept this material. Food scraps, other than the occasional unharvested veggies from the garden, are a contaminant for these facilities.

Most yard debris and landscaping from residents and businesses are collected and sold to these local facilities and in turn their products are sold mostly right in our region.

Most food scraps collected by businesses in the region were going to an anaerobic digestion facility in Junction City called JC Bio. This facility converted the food scraps into fertilizer and generated enough electricity to power 2,200 Oregon homes annually. Unfortunately, Shell Oil bought the company and discontinued the organics program. Business food scraps are temporarily going to some of the same facilities as residential scraps. However, as soon as summer of 2020, commercial food scraps received at the Metro Central Transfer Station could be put into a slurry-making machine and sent to Portland’s wastewater treatment plant for energy recovery in the anaerobic digesters.

Food scraps are rich in digestible sugars that break down easily in anaerobic digesters and provide the highest yield of energy. Fibrous material that is low in nitrogen such as woody debris, leaves, grass clippings and biodegradable plastics can take much longer to break down or may not break down at all. Yard debris and plastic also keep beneficial bacteria from getting to the food scraps. This is why commercial compost programs only accept food scraps.

A number of new facilities on the outskirts of the region or in other parts of Oregon can also accept food scraps along with yard debris. They utilize **aerobic digestion** process which generates a nutrient-rich compost product that is applied to local farms and gardens. This approach to composting utilizes aeration equipment to pull or push air through piles along with a rigorous turning schedule. This combination brings the rows of material to a high enough temperature to manage food scraps.

At this time, these windrow compost facilities are not large enough to accept all of the region’s residential organic material. Beaverton, Cornelius, Durham, Forest Grove, Gaston, Hillsboro, King City, Lake Oswego, Milwaukie, North Plains, Portland, Sherwood, Tigard, Wilsonville, and unincorporated urban Washington County are the current areas collecting food scraps and are now utilizing all of the capacity of these facilities. More facilities are in the works, but in the meantime, most of the rest of the region is focusing on developing collection and education programs for commercial collection.



4. Purchase of compost and other by-products

The benefits of using compost are numerous. It builds good soil structure; enables soil to retain nutrients, water, and air; protects against drought; helps maintain a neutral pH, and protects plants from many diseases commonly found in the garden. It also feeds earthworms and other microbial life in the soil. In general, regardless of the kind of soil you have, it can be improved with the addition of compost.

All types of compost facilities in our region sell their finished products for fertilizer in agriculture and parks and for erosion control along public roads. Households can also buy these products directly from the source. Most of the facilities will deliver the compost right to your door for a fee, or you can drive up and purchase smaller loads from a hauler.



CONCLUSION

Discards and materials management

You will notice that even though this chapter was devoted to the part of the materials life cycle that comes after consumers are done with products, most of the discussion is not about landfills. This is not because landfills are to be avoided at all costs, but because the primary goal of recovering material is to turn those materials back into something new. As we learned in the materials management chapter, the most important environmental impacts of recovering materials come from displacing the need for raw materials in the manufacturing process. To ensure that recovery meets this important goal, materials must actually reach the intended manufacturers.

Discards processes and markets

As mentioned, recycling and composting is all about getting the natural resources embedded in our discards back into commerce in order to replace the need for raw materials. This means that many of the decisions that our local jurisdictions make about what is accepted curbside are related to the global economy. A material may technically be recyclable or compostable but not appropriate for curbside collection. For a material to be eligible for curbside pickup:

- The material must have a stable market so that it can remain on the list indefinitely.
- The hauling and sorting machinery necessary to collect and separate the mixed material must be economically feasible and safe for workers.

The next chapter will describe the dynamics of material recovery facilities and the global materials market and how they affect our ability to recycle in our region.