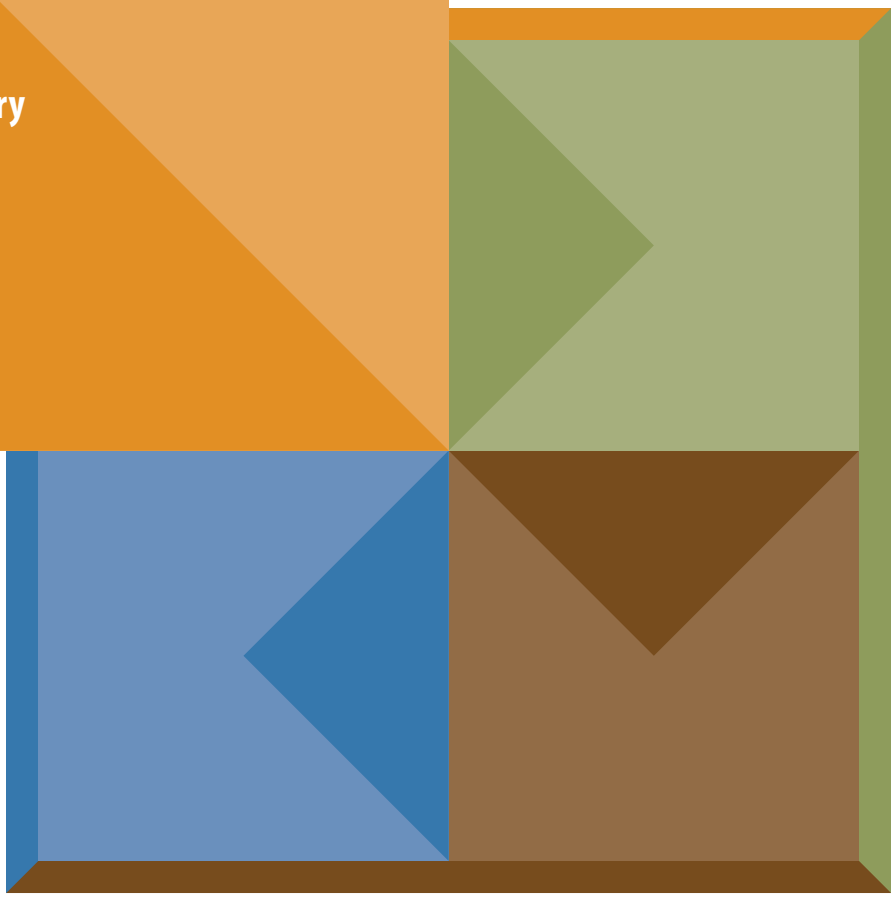
SECTION 1: SYSTEMS

1. Materials Management
2. Climate and Materials
3. Sustainable Consumption
4. Equity and Materials
5. Discards: Solid Waste and Recovery Systems
6. Recovery Markets
7. Behavior Change Theory



Understand the decisions we make about materials in our daily lives in the context of the global economy, social structures and human psychology.

CHAPTER 1 MATERIALS MANAGEMENT

- Oregon's new vision for materials management
- From discards management to materials management
- The life cycle of materials

CHAPTER 2 CLIMATE AND MATERIALS

- The scope and potential impacts of climate change
- Materials contribute significantly to climate change
- The benefits of climate action
- The costs of climate inaction

CHAPTER 3 SUSTAINABLE CONSUMPTION

- Definitions of sustainability
- Gross Domestic Product (GDP) as an inadequate measurement of a successful economy
- Alternative metrics of economic and social wellbeing
- Towards sustainable consumption

CHAPTER 4 EQUITY AND MATERIALS

- Defining equity and equality as it relates to consumption and production of materials
- Doughnut economics
- Just Transition
- Metro 2030 Solid Waste Plan puts race first

CHAPTER 5 DISCARDS: SOLID WASTE AND RECOVERY SYSTEMS

- The scope of waste generation
- The recovery hierarchy: reuse, recycle, compost, recover energy, landfill
- Where does waste go and how

CHAPTER 6 RECOVERY MARKETS

- Local and global markets for recycled resources
- Types of contamination and their impacts
- Sorting technologies, infrastructure, and their impacts
- Modernizing Oregon's recycling system

CHAPTER 7 BEHAVIOR CHANGE THEORY

- Change is a process
- Understanding barriers, benefits and social norms
- Making your message positive and other best practices

CHAPTER 1 MATERIALS MANAGEMENT

INTRODUCTION

Oregon's Vision

Imagine a day when Oregonians live well and prosperously, producing and using materials responsibly, conserving resources, and protecting the environment. Imagine a day when we recognize that the earth's resources are finite, and we begin living within those limits, ensuring that future generations have the same opportunities as we do.

Is such a future impossible or possible only with tremendous sacrifices? The short answer is no. We are in the midst of an important transformation with respect to how we think about and manage materials. This transformation will have its challenges, to be sure, but it is possible and economical given current technology and systems. Proper **materials management** will enable a future in which we all live sustainably and well, responsibly using and managing all the materials we depend on.

The Department of Environmental Quality (DEQ), Oregon's regulatory agency responsible for protecting our environment, convened a diverse group of stakeholders that resulted in the adoption in 2012 of a vision and framework for rethinking waste and discards. Their report, ***Materials Management in Oregon: 2050 Vision and Framework for Action***, lays out four key transformations:

1. Recognizing that Earth's resources are finite, Oregonians live within the limits of our sustainable share of the world's natural resources.

2. We take into account the full impacts of materials throughout their life cycle.

3. We use renewable resources at levels that can be sustained in perpetuity while maintaining the resiliency of natural systems.

4. All Oregonians have access to the knowledge, capabilities, resources and services required to use materials responsibly.

We have done the impossible before!

Carbon emissions in Multnomah County are

25% lower

than they were in 1990.

TERM

Materials management: *the use of materials based on the environmental and social impacts associated with the materials across their entire life cycle. (EPA)*

DEEP DIVE

Learn more about materials management at DEQ's website.

TERM

Paradigm shift: *an important change that happens when the usual way of thinking about or doing something is replaced by a new and different way.*

These aspirational statements were collaboratively generated by businesses, non-profits and local governments from all over the state. The stakeholders worked together to identify current challenges and create a compelling vision for the future. Many of the environmental challenges facing Oregon and the world, such as pollution and greenhouse gas emissions, are related to how materials are produced, used and managed. In DEQ's long-term vision:

- Producers make products sustainably, so every option is a sustainable option.
- People live well and consume sustainably.
- Materials have the most useful life possible before and after discard.

In June 2015, the Oregon Legislature passed SB 263 and SB 245, which will turn our state and cities towards a robust implementation of the 2050 Vision. They provide goals, requirements and a revenue stream to help make the vision a reality. In June 2021, they furthered this commitment with SB 582 which required that producers of certain products help with the financing of some of these goals.

In the rest of this chapter we'll more fully explore this **paradigm shift** from discards management to materials management, outlining key stages in the life cycle of materials and their environmental and social impacts. We will explore how Oregon law will alter how we measure and prioritize practices to meet this Vision. We'll also begin to lay out how you as a Master Recycler might play an important role in this shift.

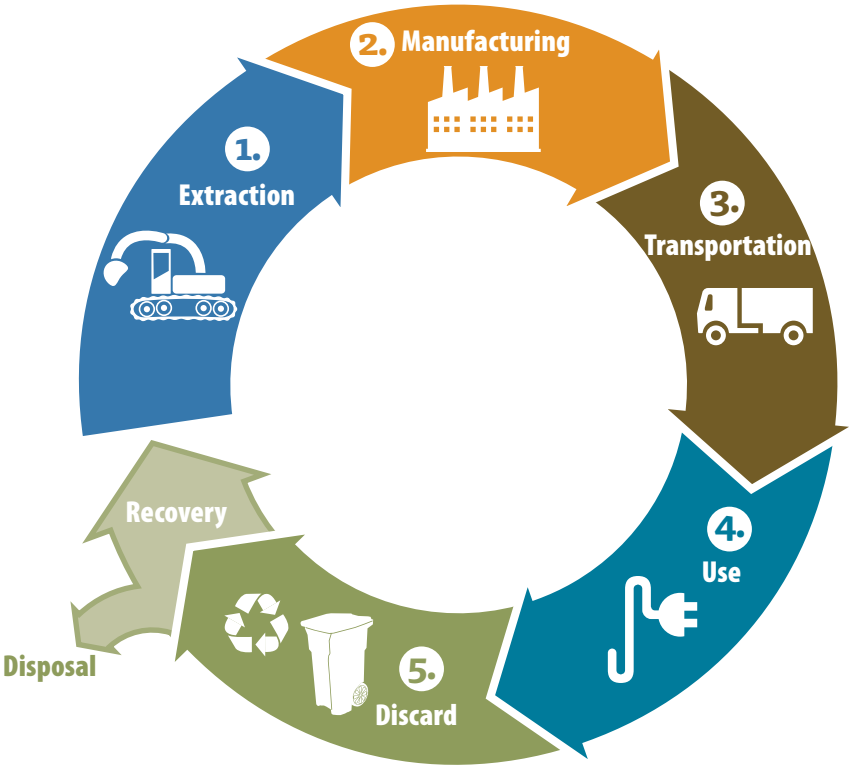
WHAT IS MATERIALS MANAGEMENT?

Materials management takes a holistic view of environmental and social impacts across the full life cycle of materials as they move through the economy and around the world. We can use materials management to identify actions needed to reduce negative impacts. Materials management includes the analysis and management of all of the steps it takes to make products.

The steps in the life cycle of materials typically include:

- Extraction
- Manufacturing
- Transportation
- Use
- Discard (reuse, compost, recycle and energy extraction)

MATERIALS MANAGEMENT LIFE CYCLE



This Materials Management image shows the cycle of materials from extraction to disposal (or recovery).

Materials management recognizes that there are environmental, economic, and social impacts in each and every stage of the life cycle of the material. Trees, minerals, water and food are gathered to make products. Oil, natural gas, water, wind, the sun and wood are used for energy for transportation, manufacturing and during the use phase. Waste is generated during just about every stage in the form of water and air pollution, carbon emissions and solid waste.

Each stage along the life cycle also has economic impacts (negative and positive). Workers extract, transport, design, manufacture, recycle, and reuse materials sometimes at a living wage, sometimes as slaves. Corporations produce the products made from raw materials. The recycling and reuse industry mines discarded materials for reuse.

Materials also affect our social wellbeing and health. People who work in and live near mines, factories and landfills can face health risks. Americans often report feeling overwhelmed by having to gather, store and maintain all our stuff. But materials make up the products that meet basic human needs such as food, medicine, clothes and shelter. Materials also enable human creativity from music and art to the sharing of ideas on the Internet and in books.

CREDIT

Much of the language and ideas in the next three sections come from a presentation by David Allaway, Senior Policy Analyst in the Materials Management Program of Oregon's Department of Environmental Quality (DEQ). David coordinates DEQ's Waste Prevention Strategy and has contributed to several projects involving life-cycle analyses, including e-commerce packaging, water delivery systems, residential construction, end-of-life management of paint, community-scale recycling, and an economy-wide carbon footprint for all consumption in Oregon. David co-leads the Inventory Workgroup of the West Coast Forum on Climate and Materials Management and was an invited member of the Steering Committee of Walmart's Packaging Sustainable Value Network. David is also on the Master Recycler Advisory Committee.

MATERIALS MATTER

Materials matter, and our current use of materials is deeply unsustainable. The extraction, transportation, use and discarding of materials produce significant negative environmental impacts and have social and economic costs.

By looking at the full life cycle of materials, we can begin to understand the magnitude of their impacts.

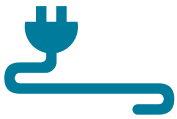
Extraction: The products that we use every day are made from natural materials (such as wood and metal) that are found in the environment and then extracted. This stage has substantial environmental impacts that are most often not directly seen by consumers.

To obtain metal for new products and coal for manufacturing them, large mines permanently scar landscapes and leave behind acid drainage that pollutes the water and kills wildlife. Many of our nation's Superfund sites are abandoned mines. In the southeastern U.S., coal is mined by dynamiting mountain tops and pushing the rubble into nearby streams. Mining devastates large tracts of tropical rainforest. Mining often requires smelting onsite, poisoning the nearby rivers and villages.

Eight thousand years ago our planet had 1.5 billion acres of forest; today close to half of this is gone, and the rate of destruction is increasing. In Oregon and Washington over 90 percent of old-growth forests have been cut. Loss of forests leads to loss of wildlife and erosion of soils that disturb rivers.

Manufacturing: Most of the materials that we use must be transformed through manufacturing processes into final products. Metal and paper manufacturing are major contributors to air pollution, including acid rain. Plastic manufacturing is one of the largest contributors to hazardous waste. Manufacturing requires large volumes of water that are then returned to the environment polluted and at temperatures incompatible with the native habitats. Construction of a new home creates about 2.5 tons of wood waste.

Transportation: After raw materials are extracted they almost always need to be transported somewhere, usually to sites of manufacture or consumption. Evidence is mounting that the noise produced by ships at sea negatively impacts the sea life dependent on sound for communication and navigation. Roads used to transport materials between each step of the life cycle of materials damage the land. The normal use of cars and trucks release significant heavy metals that drain into our waterways. Brakes release copper, while tire wear releases zinc. Smaller amounts of many other metals, such as nickel and cadmium, come in contact with motor oil that then drips onto roads. These metals are also emitted in exhaust.



Use: Many everyday products and devices continue to require natural resources for their use and maintenance. Small appliances, computers, phones, automobiles and homes are all powered by energy, usually made from coal and oil. Even our clothes require significant energy to keep them clean.

Discard: Eventually most of our materials and products reach the end of their useful lives, at which point they typically end up in landfills. While landfills monitor and contain toxins and pollution better than they did in the past, their maintenance still requires resources and land. Recycling and energy recovery also require resources. Even reusing a product in the same form often requires transportation, cleaning and possibly fixing, all of which require resources.

Now that we've painted a somewhat bleak picture by outlining the negative environmental impacts that accumulate at each and every stage of the materials life cycle, we'd like to explain how the shift to materials management can offer a solution.

FROM MANAGING DISCARDS TO MATERIALS MANAGEMENT

TERM

Solid waste: *Any discarded or abandoned materials. Solid wastes can be solid, liquid or containerized gas.*

Discards management: *The policies, decisions and processes regarding materials that prioritize environmental and social impacts associated with products after the consumer has used them.*

RESOURCE

For more on landfill and recycling capacity see the Solid Waste and Recovery Infrastructure chapter.

Until 2012, when the Materials Management vision for Oregon was approved, DEQ's Materials Management program was called the **Solid Waste** program, because it traditionally focused on managing products and materials at the end of their useful life, when they were considered solid waste. This resulted in programs, priorities and measurements of success based almost entirely on how we manage materials when we discard them, and so, is often called a **discards management** approach.

DEQ's historic focus on planning for materials based on their end-of-life is largely a consequence of problems identified — and legislation passed — in the 1990's. At that time, many landfills were poorly located, operated and regulated, and new federal standards made the closure of many landfills imminent. These factors added to a perception of a *garbage crisis* — that we were running out of places to dispose of our waste.

Oregon's current solid waste system is quite different. We now have ample disposal capacity, in landfills that are better operated and less polluting than their predecessors. Recycling programs are firmly established, conserving resources, reducing pollution and providing green jobs. Some producers are even sharing responsibility for managing their products at end-of-life and for reducing the presence of toxic chemicals in products that enter consumers' homes and eventually become solid waste. Recycling is now second nature for Oregonians, and interest in *reduce and reuse* is growing.

Discards management and materials management are concerned with different stages of the life cycle of materials. In contrast to discards management, materials management focuses on the entire life cycle of materials, attending to the social and environmental costs at all stages from extraction, manufacturing, and use to disposal or reuse.

To understand the difference, it is helpful to look back at the steps of the life cycle of materials from the perspective of the consumer. The extraction, transportation, design and manufacturing of materials all take place before the consumer uses that material. If we were to use a river as an analogy, they could be thought of as *upstream* from the consumer. Collection, processing, landfilling, recycling and reuse are all activities that take place *downstream* from the consumer. The time that the consumer is actually using the product is the *use phase*.

Discards management focuses on actions downstream of the consumer to reduce emissions from waste facilities and also to conserve resources through recovery. Materials management addresses all stages of the life cycle and all associated pollutants and resources. The old model of discards management is not wrong. In fact it is very much a part of materials management. Materials management, however, offers a much broader view

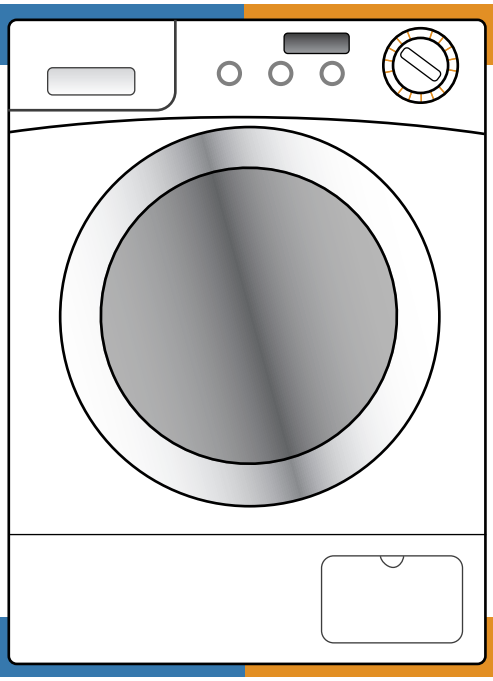
and, with the bigger picture in mind, helps individuals and policy makers make better choices, because often the biggest impacts can be in the upstream and use phases rather than the discards phase.

Along with shifting the focus and analysis of the problem, shifting to material management will drive innovation to solve the problem. For instance, these two approaches to materials engage different sets of partners. Discards management primarily involves waste generators and the waste collectors, landfill managers, and the recycling and reuse industries. Materials management involves those partners along with everyone else involved in the life cycle of materials — which is everybody!

TYPES OF QUESTIONS WE MIGHT ASK IN DISCARDS MANAGEMENT VS. MATERIALS MANAGEMENT

Discards Management

- Can I recycle the material from this washer when I am done with it?
- Will it be safe to take it apart for recycling?
- Will it add toxins to our landfills?
- How long will it last?
- Can someone else use it when I am done with it?



Materials Management:

- Where did the materials they used to make the washer come from?
- Is it designed with minimal materials and toxins? Who made it?
- How much energy will it need to run?
- How long will it last?
- Can I recycle it when I am done with it?
- Will it be safe to take back apart for recycling?
- Is it better to recycle the washer when I am done with it because it is now an energy hog?
- Will it add toxins to our landfills?

CASE STUDY: DRINKING WATER

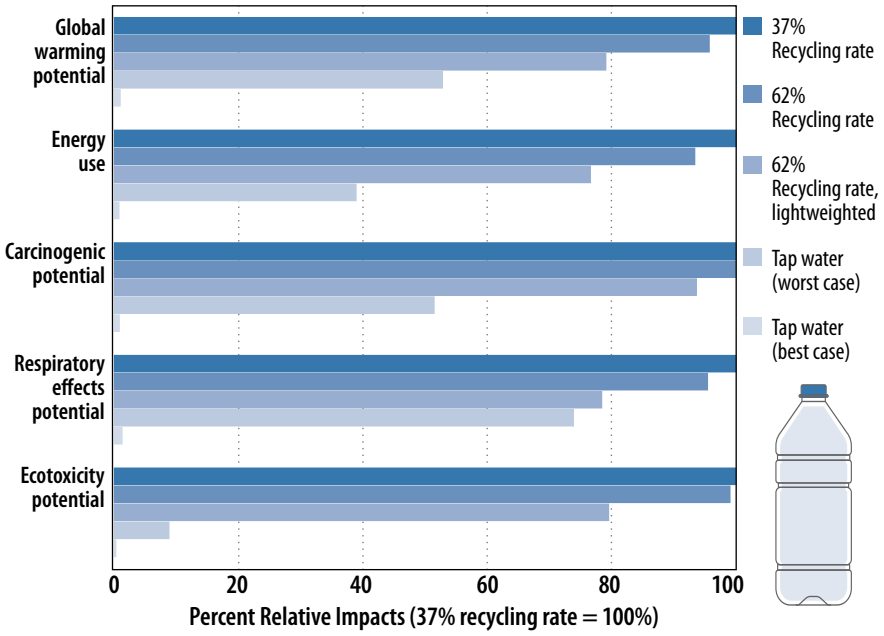
To more fully understand the powerful, holistic approach of materials management, let's consider how we drink water, whether in single-use bottles, bottles that we reuse, or directly from the tap. In 2008, the Oregon Department of Environmental Quality (DEQ) commissioned life cycle analysis that compared various ways to reduce the environmental impacts associated with the delivery of drinking water.

This Water Delivery graphic shows five different types of impacts: global warming potential, energy use, carcinogenic potential, respiratory effects and ecotoxicity. The darkest bar shows the baseline which is the impacts of delivering drinking water in a single-use PET bottle, where the bottle is recycled at a rate of 37 percent (which was the current recycling rate of water bottles). All of the impacts are set to a common index of 100 for easy comparison.

The next lighter bars show the impacts of the same water in the same bottle, recycled at a higher rate, about 62 percent. You can see that increasing the recycling of PET bottles is one way to reduce environmental impacts, although not by nearly enough.

Fortunately, there are actions that producers and consumers can take that go beyond just changing how we manage our discards. Producers, for example, can make their bottles thinner. Many already have, and we see those impacts in the middle bar. That's a form of **product stewardship** where manufactures take action to reduce impacts of their products; it's also waste prevention. And you can see that this reduces impacts more significantly than just recycling.

WATER DELIVERY



Baseline = PET, half-liter, 13.3 grams, 0% post-consumer recycled content (PCR), on-site molding, purified municipal water (reverse osmosis, ozone and uv), 50 miles to retail, 5 miles home-to-retail, co-purchase w/24 other products, no chilling.

Source: Oregon DEQ (2013)

TERM

Product stewardship:
The principle in which everyone involved in the lifespan of a product is called upon to take responsibility to reduce its environmental, health and safety impacts.

Consumers can also take action. They can drink from the tap, in a reusable bottle. DEQ explored this scenario in contrast to water delivered in a bottle. The fourth bar in the chart is a worst case scenario of reuse, where the consumer drinks from a reusable bottle and washes it every day in a home dishwasher which, by the greatest margin, failed EPA's Energy Star Program.

Use an Energy Star dishwasher and wash your bottle once a week, and the impacts are there in the fifth bar. Can't see them? That's because they're about 98 percent less than using and recycling a single-use bottle.

If we look beyond recycling, we can identify more strategies, and sometimes more effective strategies, for reducing impacts. That's the power of materials management.

As a side note, the drinking water delivery graph also illustrates the hazards of promoting recycling as a method of landfill avoidance. The hierarchy — reduce first, then recycle — is an imperfect but powerful tool. It says that we should reduce first, then recycle, because reducing our consumption is the most effective way of lessening our environmental impacts. Recycling is better than disposal, but waste prevention is best of all. In this example, recycling PET water bottles at 100 percent results in no new landfill material, and yet it still produces very significant and unsustainable environmental impacts.

MATERIALS MANAGEMENT ON A NATIONAL LEVEL

Oregon is not the only place shifting from discards to materials management. In 2009, U.S. Environmental Protection Agency (EPA) created a materials management vision. It is described in *Sustainable Materials Management: The Road Ahead*.

The EPA states that a materials management strategy would be an important shift of emphasis where policy and practice would be focused on:

- Knowing and reducing the life cycle impacts across the supply chain.
- Using less material inputs (reduce, reuse, recycle).
- Using less toxic and more renewable materials.
- Considering whether services can be substituted for products.

Upcoming chapters explore each of these topics in greater depth.

Shifting to a materials management approach refocuses the way our economy uses and manages materials and products.

It is certain that a thoughtful materials management strategy is essential to realizing a future of less waste, fewer toxics and greater prosperity.

DEEP DIVE

Materials Management
Find EPA's vision in the Sustainable Materials Management: The Road Ahead (available online).

The EPA asks:

"What kind of world will we actually inhabit in 20 years? Some predict that it will be better than the present — where products and materials will be less toxic and reusable, and where resources will be used more efficiently so that far less waste is produced. Others predict we will experience a bleaker future — where harmful chemicals will be more prevalent throughout our environment and may seriously affect groundwater, drinking water, and food supplies. While we can't know which of these scenarios—or others—will exist in 20 years, considering the future now makes sense if we want a chance to shape it positively."

CONCLUSION

A future in which we use and manage materials sustainably is possible and very much within our reach. *Materials Management in Oregon: 2050 Vision and Framework for Action* aims for a future in which people live well and sustainably. Key to realizing such a future is shifting from a paradigm of discards management to materials management.

We have learned that materials management takes a holistic view of environmental and social impacts across the full life cycle of materials as they trace their course through the economy and through natural and built environments. This broader view empowers us to make better decisions, individually and collectively, and helps us move beyond simply focusing on waste reduction or recycling. So, what's next?

Chapters 2 through 4 use a systems perspective to explore how the materials we use every day relate to global issues such as sustainable consumption, climate change and equity.

Then, Chapters 5 and 6 will explore the economies and processes of recovery (reuse, recycling, compost, incineration) and disposal from a holistic materials management perspective.

This larger systems approach introduced in the early chapters of this handbook will empower you as a Master Recycler with a conceptual foundation so that you can answer questions that relate to the everyday choices people make about materials at work and home. Master Recyclers are important agents in the transformation from discards management to materials management. You can help promote positive activities such as recycling, reuse, sharing, fixing, and maintaining materials and toxics reduction (all of which are powerful strategies for sustainable consumption).

CHAPTER 2 CLIMATE AND MATERIALS

INTRODUCTION

Climate change is a serious threat, but we know what we need to do

Climate change is the greatest environmental challenge of the 21st century and so deserves some special focus in this handbook. Climate change poses a serious threat not just to Oregon's natural treasures — forests, mountain snows and rivers — but also to our jobs and our health.

The good news is that working to address climate change also presents huge opportunities. Money can actually be saved and made during the transition to a low-carbon community. The Portland metro area is a global leader in that transition, and we have an unparalleled opportunity to make the switch in ways that create jobs and benefit all residents.

Scientists expect that, should we fail to curb climate change, Oregonians in the future may see more intense heat waves, droughts, rainstorms, floods, wildfires and landslides. These impacts could drag down Oregon's economy, stress our natural resources and worsen inequities.

DEEP DIVE

For more on potential local area ramifications to climate change visit the City of Portland Climate Preparation Strategy (available online).

When we protect the climate, we win

When we work to protect our climate, good things happen. Local businesses innovate and create jobs. Residents and businesses save money that they can then spend locally. Our community gets healthier and our neighborhoods become more vibrant.

When people in our region reduce the energy we need to power our homes and businesses, invest in renewable energy, make smart decisions about urban development and transportation, and consider climate change risks in decision-making, we see:

- Better air quality and improved human health.
- New jobs and greater reinvestment in the local economy.
- Lower energy bills.
- Shorter commute times between home, work and school and more opportunities for people to walk, bike or take public transit.
- Less damage to social and environmental systems due to drought, floods and fire, and fewer disruptions in services.

We're adding too much carbon to our atmosphere

The world's scientists have concluded that carbon emissions from human activities have begun to destabilize the Earth's climate. Carbon emissions from fossil fuels and land use changes, including deforestation, are primary drivers of climate change today and in the future. Emissions of methane from cattle and landfills also make significant contributions. Simply put, we're adding too much carbon to the atmosphere by burning fossil fuels like coal, natural gas and gasoline. The magnitude of future climate impacts depends largely on the trajectory of future global carbon emissions.

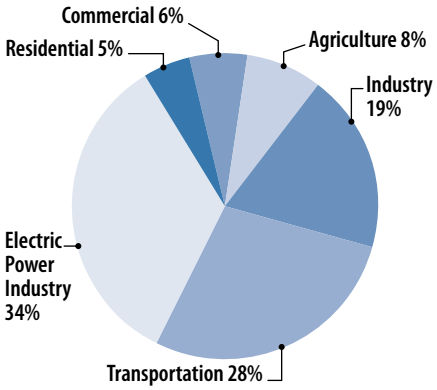
MATERIALS AND CLIMATE

Materials management is important

While most of the public knows that the transportation and energy choices we make are important to curbing climate change, studies show that the average consumer does not associate consumer goods and food choices with climate change. When addressing climate, programs, plans and climate action outreach tend to focus on transportation and energy used in buildings. This chapter will explore why materials management matters for climate protection.

While public perception research shows that it may not be effective to begin a conversation about reducing, reusing or recycling by talking about climate change, this topic will come up, and it is helpful to be prepared to speak about it. Meanwhile a growing portion of the public is becoming alarmed about this global problem and will sometimes mistakenly decide that materials management is a distraction from the action that they urgently believe must be taken to save the planet. Master Recyclers can help respond to concerns about climate change and help give people hope that we can still mitigate the impacts of climate change, in part by changing how we extract, produce, consume and dispose of materials.

TRADITIONAL ECONOMIC SECTOR-BASED VIEW OF U.S. GREENHOUSE GAS EMISSIONS



Source: U.S. EPA (2009)

National, state and local governments inventory where emissions come from in order to identify priority areas to change our practices.

To identify where we burn fossil fuels, climate experts have traditionally divided carbon emissions into economic sectors: You can see by the graph to the left that they are divided into residences, businesses, agriculture, industry, transportation and electrical power. This inventory process has led governments to believe that the best strategies to reduce carbon emissions pertain to how we heat and power our homes, businesses and factories and how we get around. The connection between materials and climate was not intuitively obvious because emissions associated with materials were spread throughout all of the sectors.

In 2009, however, the EPA shifted the emissions inventory to better identify the actual activities that cause emissions. They called this new inventory a systems-based view of U.S. greenhouse gas emissions (GHG), where each system represents and comprises all the parts of the economy working to fulfill a particular need. For example, the provision of food system includes all emissions from the electric power, transportation, industrial, and agricultural sectors associated with growing, processing, transporting, and disposing of food. The systems view is helpful for framing opportunities to reduce GHG emissions through prevention-oriented mitigation strategies that act across an entire system.

The resulting report confirmed that lighting, heating and cooling buildings contribute 25 percent of our domestic emissions, and therefore green building is important. It also confirmed that moving people around contributes 24 percent, so transit and types of fuels are priorities.

What was new and surprising to some was that the EPA report showed that about 42 percent of U.S. greenhouse gas emissions are associated with the energy used to produce, process, transport, and dispose of the food we eat and the goods we use. This includes the extraction or harvest of materials and food, the production and transport of goods, the provision of services, reuse of materials, recycling, composting, and disposal. The report also indicated the following:

- 29 percent of U.S. GHG result from the provision of goods produced within the United States.
- The provision of food contributes another 13 percent of U.S. GHG emissions.
- Landfilling and incineration represents 1 to 5 percent of U.S. GHG emissions.

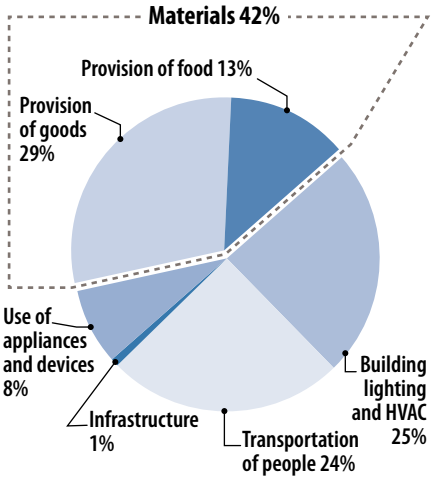
Note that the U.S. GHG emissions presented in these two graphs represent emissions that are released domestically. Emissions associated with extraction of raw materials, processing, and production of goods and services outside the United States, but consumed in the United States, are not captured in the EPA Inventory, and therefore are not reflected here. Correspondingly, the emissions associated with goods and services produced in the United States that are exported for consumption in other countries are not included. If U.S. emissions were calculated using a total life cycle perspective, based on goods and services consumed rather than produced in the United States, the emissions associated with materials management would be greater than is shown due to the large quantity of imported goods consumed in the U.S.

Oregon engaged in a related effort, estimating the global emissions associated with consumption by Oregonians no matter where the product was made. And we've come to similar conclusions: When viewed through the lens of consumption, Oregonians contribute more to climate change as a result of purchasing stuff, than we do by driving our cars, or heating and powering our homes.

DEEP DIVE

For more information you can consult the EPA's report Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices (available online).

MATERIALS MATTER: SYSTEMS-BASED GEOGRAPHIC EMISSIONS INVENTORY



Source: U.S. EPA (2009)

These new approaches to calculating carbon emissions led local governments to shift priorities to include materials management as part of the suite of solutions that will be necessary.

OREGON'S CLIMATE IS CHANGING

Climate change presents an unparalleled challenge.

Human influences on climate, already apparent at the global and continental scales, are altering the social, environmental and economic systems we rely upon. In the Pacific Northwest, these changes threaten agriculture and water sources, power supplies, public safety and health, forests and local economies, all of which have substantial impacts on quality of life. Observed regional temperature, snowpack, snowmelt timing and river flow changes are consistent with projected trends.

Over the past 30 years, average temperatures in the Pacific Northwest have generally exceeded the 20th-century average, and the region has seen a temperature increase of about 1.3 degrees Fahrenheit.

Over the past 50 years, increases in winter temperature have contributed to the decline in snowpacks in the Pacific Northwest, including in the Clackamas River basin. Glaciers have diminished, a trend expected to continue through the next 100 years. In particular, Mount Hood's glaciers have decreased in length as much as 61 percent over the past century.

DEEP DIVE

For more on the changes expected in our region visit the City of Portland's Climate Preparedness Plan (available online).

These changes are costly

Warmer temperatures and more extreme heat events are expected to increase the incidence of heat-related illnesses (for example, heat rash, heat stroke) and deaths. A recent study projected up to 266 additional deaths in the greater Seattle area among persons 65 and older in 2085 compared to the annual average for 1980–2006. In Oregon, the hottest days in the 2000s resulted in about three times the rate of heat-related illness compared with days 10 degrees Fahrenheit cooler.

The physical impacts of a changing climate are accompanied by social challenges. In particular, low-income households face disproportionate impacts of climate change. Exposure to heat stress in homes without air conditioning, for example, while having fewer resources to respond to these changes. Rising energy prices compound the situation and have the potential to further exacerbate existing social disparities.

Climate change will affect natural systems and watersheds across the Portland region. Changes in precipitation patterns affect streamflow, groundwater recharge and flooding, and may increase risks of wildfire, drought, and invasive plant and animal species. Increasing surface water temperatures affect resident and migratory fish and wildlife species and their habitats, threatening their long-term survival.

Native American leaders in the Portland metropolitan region have also been vocal in stating that climate change will have complex and profound impacts on their communities, many of which have deep historic and current ties to the land's resources. For example, treaty-protected fish species may become threatened or less accessible to tribes due to impacts on water quantity and quality that affect salmon and other fisheries.

CONCLUSION

The good news is that there has been important progress and many new voices have joined the call to action.

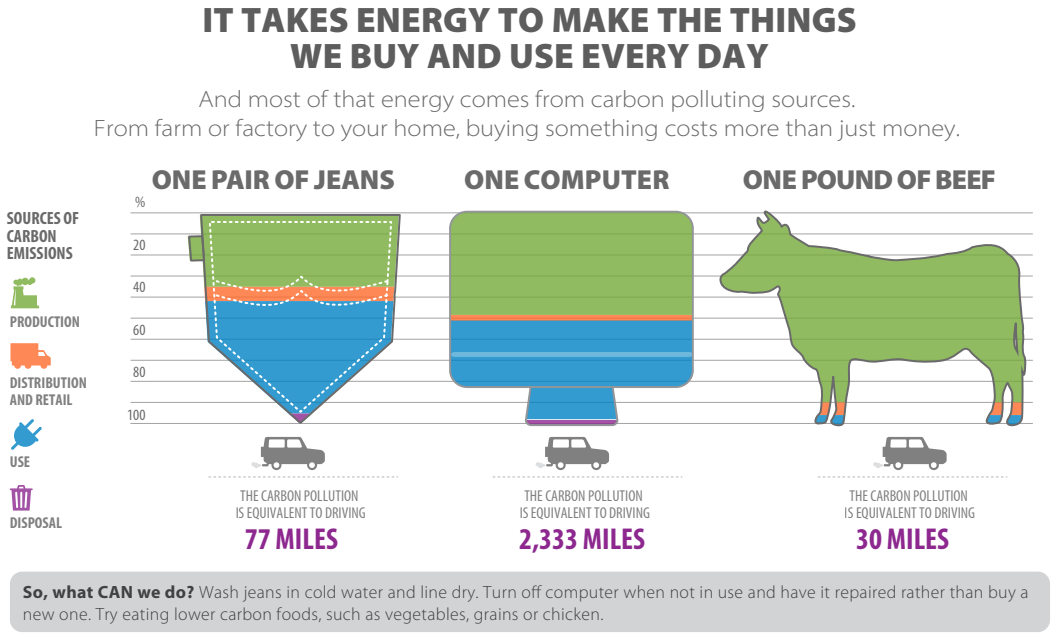
International religious leaders are beginning to characterize climate protection as a moral imperative. In particular, Pope Francis has been remarking how the environmental degradation caused by climate change disproportionately affects the world's poorest people. Pope Francis has also been linking climate change to the massive movements of people and increased human trafficking.

Islamic leaders have also prompted faith communities to take action to halt the desecration of nature that leads to destruction of creation, human and otherwise. In summer 2015, they launched the *Islamic Declaration on Climate Change*.

On a more local level, the State of Oregon passed its Material Management plan in part to address climate. Metro also worked on regional planning for transportation, land use and landfill management in order to address climate change.

It can be discouraging to hear about the devastating effects of climate change. Many people doubt that it's still possible to turn climate change around. But the City of Portland and Multnomah County have proven that it is possible to change the momentum of emissions. In 1993, Portland was the first city in the country to adopt a climate action plan with a roadmap of action items. They've already reduced carbon emissions by 25 percent since 1990, while the population has increased by 42 percent and they have 27 percent more jobs. Furthermore they have a plan for continuing to reduce emissions that will also improve our economic, social and cultural lives.

Action is required at all levels to build low-carbon communities. Each person, each business, each government agency has a part to play. Whatever you decide to focus on in your volunteer efforts as a Master Recycler will ultimately be related to this larger global effort.



So, what CAN we do? Wash jeans in cold water and line dry. Turn off computer when not in use and have it repaired rather than buy a new one. Try eating lower carbon foods, such as vegetables, grains or chicken.

CHAPTER 3 SUSTAINABLE CONSUMPTION

INTRODUCTION

Last Sunday morning, Aurelia Sanchez made breakfast for her kids with eggs from their chickens, and berries and vegetables grown in their garden. They walked down the street and Aurelia caught up with her best friend on the front porch as they watched their children play together. Then Aurelia walked the kids to the Hillsboro library for children's reading hour while she sat on the library sofa and read the newspaper. There was an article about a drunk driver who had plowed onto the sidewalk and killed two pedestrians.

TERM

Gross Domestic Product (GDP): *the monetary value of all the finished goods and services produced within a country's borders in a specific time period. GDP includes all private and public consumption, government outlays, investments and exports minus imports that occur within a defined territory.*

To an economist focused on the **Gross Domestic Product (GDP)**, Aurelia's day had zero economic value. No money was exchanged. No purchased products were consumed.

The drunk driver in the story in the newspaper, on the other hand, had consumed alcohol and gasoline. That counted for something. His accident necessitated paramedics who arrived in an expensive vehicle and used costly medical equipment. Repairs and glass will be needed for the storefront he smashed into. The two funerals will also cost money. Ironically, by standard metrics, the drunk driver was contributing significantly to GDP, while Aurelia Sanchez was not. Although these are extreme examples, they point to some significant flaws with using GDP as a measure of progress.

"Gross National Product counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage. [...] It counts the destruction of the redwood and the loss of our natural wonder in chaotic sprawl. [...] Yet the gross national product does not allow for the health of our children, the quality of their education or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages."

– Robert F. Kennedy, 1968

Gross Domestic Product (GDP) is one of the primary indicators used to gauge the success of a country's economy. It represents the total monetary value of all goods and services produced over a specific time period. Steady growth of production and sales of goods indicates the economy is going the right direction. Too much or too little indicates problems.

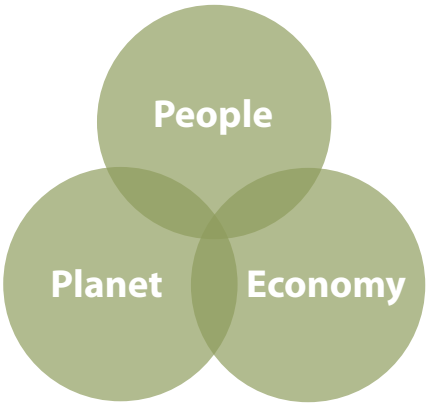
But is the monetary value of materials produced and consumed really the best indicator for the health of a community or a country? And is steady GDP growth sustainable?

In 1968 Robert F. Kennedy spoke out about shortcomings to the ways we measure economic and social wellbeing. He roundly criticized Gross National Product (GNP). (GNP was used before they started adjusting for exports and imports and changed to GDP.)

This chapter will explain how neither the current patterns and trends of consumption nor perpetual growth are sustainable. It will then look at new ways of measuring consumption and community well-being that proponents hope will move us towards more sustainable communities, businesses and governments.

WHAT IS SUSTAINABLE CONSUMPTION?

There are many definitions of sustainability (see below for a sampling) and they differ significantly. Despite this there are some important common themes that connect most of the prevalent definitions. Sustainability is the capacity to endure. A sustainable society, system or process is one that mimics a healthy ecosystem. It is rich in diversity. It is resilient to disturbance and can retain its basic structure and viability even during times of change. And there is a balance or equilibrium of inputs and outputs.



There are numerous models of sustainability, but most of them include three pillars that are considered essential for a sustainable society. These three pillars are often called the *three P's: People, Planet and Profit, or the three E's: Economy, Equity and the Environment*. The idea is that a society that wants to endure must meet basic human needs without destroying or degrading the natural environment, which is essential to current and future wellbeing. Sustainable consumption must therefore provide goods and services that contribute to human wellness without depleting our natural resources.

Sustainability Defined

The World Conservation Union, United Nations Environment Programme, and World Wildlife Fund:

Sustainability: improving the quality of human life while living within the carrying capacity of natural ecosystems.

Environmental Protection Agency

Sustainability: the conditions under which humans and nature can exist in productive harmony to support present and future generations.

Part of the Great Law of the Iroquois Confederacy

Sustainability: In every deliberation, we must consider the impact of our decisions on the next seven generations.

Sustainable Consumption

"The use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations."

– United Nations Commission on Sustainable Development (UNCSD), Symposium on Sustainable Consumption, Oslo, 1994.2

ARE CURRENT TRENDS OF CONSUMPTION SUSTAINABLE?

In the economic model that values growth, based on the GDP, the future is looking rosy. Rapid global population growth will mean a population of 9 billion by 2050. In this time, the International Finance Corporation (IFC) predicts there will be a rise in global affluence and that there will be an associated increase in consumption among low-income populations, resulting in increased *purchasing power*. Where there is already a high level of wealth and consumption, there is heavy societal pressure to maintain and even increase consumption patterns and competitive spending and displays of wealth are valued. All of this means that more and more consumers will be ready and interested in spending money and consuming products.

Even multinational corporations are beginning to see that these trends are not sustainable. The World Business Council for Sustainable Development (WBCSD) concedes "there are now clear signs that consumption issues are increasingly of central concern to business. The global challenges related to shortage of resources, water scarcity, climate change and loss of biodiversity. Overlooking this trend would be shortsighted and a risk for any company."

DEEP DIVE

For more information you can consult the World Business Council for Sustainable Development's Report: Sustainable Consumption facts & trends: from a business perspective (available online).

TERM

Ecosystem services: *the benefits provided by ecosystems that contribute to making human life both possible and worth living.*

The World Wildlife Fund (WWF), the United Nations, Amnesty International and the Global Footprint Network are some of several international environmental and human rights organizations that concur with WBCSD's conclusion that a shortage of resources is coming. In fact, they have been saying this for some time. Assessments emerged in the 1990's that attempted to describe the potential risks. One such model showed that nature provides humans with essential resources that are sometimes called **ecosystem services**. Ecosystem services include provisioning services or products, such as timber and fish, and regulation services, such as climate control, pollination, irrigation and flood regulation.

These international organizations warn that ecosystem services are not infinite. Groups like the WWF and Global Footprint Network offer metrics that compare existing global resources (especially energy, forests, freshwater and seafood) with the current rate at which they are being consumed. These metrics show that the planet cannot sustain its level of ecosystem services given current levels of consumption. We are using or withdrawing renewable resources faster than the earth is able to replenish those resources.

WWF explains that, "It takes a year and a half to generate resources that the human population uses in only a year." Another way of imagining this is that we need one and a half earths to sustainably produce the renewable resources that we are currently using. This means that we are now in a state of "global ecological overshoot, depleting the very resources on which human life and biodiversity depend" (Global Footprint Network).

If these trends continue, this overshoot will become more severe. The WWF predicts that if the trajectories of growth for population and middle class are correct, and the wealthy continue to consume at current levels, we will be using renewable resources three and a half times faster than they can be regenerated. This would mean severe shortages and other dramatic adverse impacts.

ALTERNATIVE METRICS

Given the flaws in GDP, economists and policy makers are developing alternative metrics. Some of these new metrics continue to focus on economic growth, while other metrics choose to include the health of the ecosystem and the well-being of people as part of the bottom line.

Genuine Progress Indicator

Some economists propose an alternative way of measuring economic growth called the Genuine Progress Indicator (GPI). This metric continues to use goods and services as the primary measurement, but where GDP measures the economy based on the price of finished products, GPI loads into their measurements a number of costs related to the production and consumption of the goods and services. Among the indicators factored into GPI are resource depletion, pollution, human health and long-term environmental damage.

These economists point out that GDP does not recognize social and environmental costs associated with products. Some of these costs that are left out of GDP may have profound economic effects. You will recall that GDP measures the monetary costs of a finished product. GPI, in contrast, recognizes that the manufacture of a consumer good results in other costs like pollution. The costs of this pollution (such as health impacts or property damage) may not be paid for by the producer, but rather are borne by other members of society. The impacts and costs are nonetheless real and GPI accounts for them.

When the full costs are not reflected in our models and decision-making, society as a whole is less well off. Production and consumption are over-valued and we over spend scarce resources because we are not considering all the costs.

When there is a full accounting, it is easier to set policies and make economic decisions that mitigate specific costs. An example is creating zoning laws that do not allow manufacturing to take place within a certain distance of where people live.

Understanding the full cost of the making of a product can also help ensure that manufacturers are invested in mitigating the cost of production and consumers understand the full implications of their purchases.

The EPA's Acid Rain Cap and Trade program is an example of a program that considers human illness and environmental degradation as part of the cost of production. The *cap* sets a limit on emissions, which are lowered over time to reduce the amount of pollutants released into the atmosphere. The *trade* creates a market for pollution allowances, helping companies innovate in order to meet, or come in under, their allocated limit. The less they emit, the less they pay, so it is in their economic interest to pollute less.

Well-being and the environment as the bottom line

Without a doubt, there are certain materials that are required to meet basic human needs. We need food, shelter, vaccines and medications to stay healthy. We even need materials to be creative and productive. But models that aim for growth assume that there is no such thing as enough or too much. Is growth sustainable?

While continuous growth challenges the basic concept of environmental balance, studies also indicate that the continuous accumulation of money and materials is not a very good predictor of human well-being.

A Princeton University study demonstrated that the life expectancy and sense of satisfaction for people in the United States that lived below the poverty level were definitely negatively affected by the lack of basic materials to meet their needs. But the study also found that after meeting a certain annual income threshold of about $75,000, life expectancy and the level of well-being did not increase with additional income.

The New Economics Foundation decided to create a metric that did not use growth as its implicit goal. Their Happy Planet Index ranks a nation's progress based on the amount of the Earth's resources its inhabitants use and how happy they are. They defined happiness by the length of life and how satisfied people report feeling on a scale from 1 to 10. Although this is a contentious area of research, it yields some interesting insights. According to the Princeton study, a high consumption level does not guarantee happiness. This study suggests that people can live long, happy lives without using more than their *fair share* of the Earth's resources.

While no country combines high GDP with low life satisfaction, many poorer countries achieve levels of life satisfaction just as high as their wealthier neighbors. Above a minimum level, there is no apparent correlation between per capita GDP and life satisfaction.

The New Economy Working Group (NEWGroup) is seeking an alternative bottom line, as well. NEWGroup members are academics, community developers, economists, and labor and environmental justice leaders. They are working together to identify measurements that show the economy is meeting quality of life standards for people rather than simply measuring the movement or cost of materials that might or might not be enhancing our quality of life.

New Economists want to shift the defining value from money to quality of life, decision making from global to local, the favored dynamic from competition to cooperation, the defining ethic from externalizing costs to embracing responsibility, and the primary purpose from growing individual financial fortunes for a few to building living community wealth that enhances the health and well-being of everyone.

A primary contributor of NEWGroup is author Juliet Schor who calls for an Economy of Plenitude. She posits that how we spend our time is key to reducing negative environmental impacts, creating more jobs and improving our way of life.

Image from the video, Visualizing a Plenitude Economy

DEEP DIVE

For more detail see Juliet Schor and the New Dream's animated video explanation of the Economy of Plenitude, Visualizing a Plenitude Economy (available online).

Juliet Schor writes, "Economists today focus solely on growth as a mechanism for job creation. But for much of the industrial age, falling hours have been roughly as important a contributor to employment as market growth." And she argues that fewer hours worked allows for more time for community, family and what she calls *the basic rhythm of daily life*. She explains:

Imagining a world in which jobs take up much less of our time may seem naïve or utopian, especially now, when a scarcity mentality dominates the economic conversation. People who are employed often find it difficult to scale back their jobs. Costs of medical care, education, and child care are rising.

But fewer work hours for people with jobs may be a key step toward solving the unemployment crisis—while giving Americans healthier lives. Fewer hours worked per week could mean more jobs available to people who need them. Living on less pay usually means consuming less, making more of the things one needs at home, and living lighter.

EUGENE MEMO

For the most part, the models described above have been theoretical. Little has been applied to real sustainable consumption policy and practices in U.S. cities. Babe O'Sullivan, from the Urban Sustainability Director's Network wants to change that. She found there to be a profound gap between academia and practice and so led a nationwide series of workshops aimed to bridge that gap.

DEEP DIVE

For more information you can consult the Local Governments and Sharing Economy Report (available online) and the USDN's Sustainable Consumption Toolkit (available online).

In October 2014, members of the Urban Sustainability Directors Network (USDN), the Sustainable Consumption Research and Action Initiative (SCORAI) and other policy experts met in Eugene, Oregon to review relevant research and explore the actions that cities could take to promote sustainable consumption and wellbeing at the municipal scale. The workshop concluded with the development of several working committees.

Participants felt that they were missing a list of principles to guide municipal goals and policies. A committee was formed to develop a memo that set forth guiding principles. The resulting *Eugene Memo* is excerpted below. In summer 2015, O'Sullivan convened another committee to develop a *Sustainable Consumption Toolkit* that aims to help Cities successfully design policies and practices to carry out the systemic changes described in the Eugene memo. The resulting toolkit is available online for members of the Sustainable Directors Network. Other committees formed to provide focused research on specific topics such as developing a roadmap for Cities to navigate the *sharing economy*.

EXCERPT OF THE EUGENE MEMO: THE ROLE OF CITIES IN ADVANCING SUSTAINABLE CONSUMPTION NOVEMBER 2014

Cities in North America have an important role to play in building prosperity and wellbeing while promoting lifestyles that are compatible with the limits of natural systems. The consumption of materials and energy in high-income cities is a significant factor in driving climate change and resource depletion. Increasingly, government agencies, industry organizations and experts in the research community are calling attention to the need both to consume less and consume differently. Cities can and should take action to make this possible.

A clear consensus emerged from this dialogue: to facilitate human and ecological wellbeing, we must transform the economy so that it serves what we value. This objective is ultimately less about increasing material wealth and more about enhancing the hallmarks of the good life to which everyone aspires: time with family and friends; strong community ties; a sense of belonging; personal growth through new skills and knowledge; meaningful livelihoods, good health and other life-qualities that transcend mere income and material consumption.

Such a transformation requires a shift in cultural values and a re-design of urban economies and communities to reduce material and energy throughput while simultaneously improving the quality of life for all people. Advancing sustainable consumption in cities also entails supportive systemic change at the nation-

al and global levels: these multi-level changes enable the fundamental and necessary shifts in culture and markets that make the transition possible.

We need such powerful ideas to open a new way of advancing urban sustainability.

GUIDING PRINCIPLES FOR LOCAL ACTIONS:

1. **Envision prosperity as a holistic, integrated concept:** Real prosperity supports individual, social and ecological dimensions of wellbeing. Aggregate wellbeing should be the goal of progress in the pursuit of social and economic development. That means satisfying basic needs, food, shelter, mobility, security, education, and health, while also ensuring true personal and community development (development implies getting better and not just getting bigger).

2. **Commit to equity and social inclusion:** Highly unequal societies are not sustainable. By committing to sustainability with social justice we also commit to equity in designing projects and policies, and in evaluating progress.

3. **Enhance social capital and resilience:** As cities build toward more compact, cohesive and livable communities, urban form must align with more collaborative, reciprocal and interdependent patterns of human interaction, including consumption. People living in close proximity have more opportunities to share idle resources, to launch small-scale commercial ventures and to build community engagement and cohesion. Sustainable urban form fosters both informal and commercial exchange, augments social capital and builds stronger neighborhood networks and resilience in the process.

4. **Advance sustainable local economies:** A strong and diverse local economy promotes human wellbeing by: providing a cushion against global financial shocks; responding to new business opportunities and emerging needs; strengthening local communities; and creating novel livelihoods. Consumers are becoming more interested in access to goods and services than in personal ownership.

5. **Keep the big picture in mind and work toward the long-term:** Taking a systems approach enables us to target our efforts at the appropriate level. Cities can focus on integrated programs and actions that lead strategically toward more sustainable consumption patterns in the short- and long-run.

6. **Collaborate with diverse partners to take action and leadership:** Advancing sustainable consumption requires interaction and engagement across sectors (public, private, civil society, academia, media, communities) to co-create and take action together. Cities can facilitate connections among people, sectors and activities to catalyze change.

7. **Experiment and learn:** Advancing sustainable consumption in cities requires a commitment to sharing lessons on effective initiatives, monitoring and evaluating approaches, learning from mistakes, and embracing emergence and the unexpected. Cities benefit from engaging and consulting with the research community to gain from their insights.

8. **Set goals and measure:** Learning and progress over time is supported by clear goals and measures that indicate whether our actions are moving us forward. GDP per capita is an inadequate measure of human wellbeing. New indices must be developed and deployed to evaluate progress and in choosing among alternative policies and projects.

9. **Combine structural and systemic change with education:** Awareness programs on their own are limited in advancing systemic change but are effective when cities combine structural and institutional changes with educational programs.

10. **Take action and leadership:** Cities must be opportunistic as well as strategic. They should mobilize their assets, engage local allies and partners, and embrace the need to learn-by-doing; cities should be thoughtful risk-takers and openly self-reflective in assessing the results. As cities, we can lead through convening, demonstrating, leveraging, and activating others, and by creating incentives and disincentives to move sustainable consumption, economies, and communities forward.

CONCLUSION

In this chapter we've seen that current patterns and trends in consumption are unsustainable. The global consumption of renewable resources is outpacing the planet's capacity to renew itself. Research studies have demonstrated that our high consumption lifestyle is not even particularly good at satisfying our needs. In fact, beyond a certain annual income threshold there is no correlation between increased income and increased happiness and people trying to reach beyond that threshold increasingly feel trapped in a work and spend treadmill. Meanwhile, far too many people globally and right here in Oregon struggle to meet basic material and life needs.

Given the global scope of the consumption problem, it can feel confusing and overwhelming to know how to make good choices about a sustainable lifestyle. It is hard to measure the impacts of our choices and set priorities. The current systems even build road blocks that make living those lifestyles unobtainable for people with less time and resources.

Happily, advocates, scientists and local governments are breaking new ground in understanding how humans can satisfy basic needs without consuming beyond the capacity of the planet. Alternative economic metrics such as the Genuine Progress Indicator and the Happy Planet Index offer ways to more fully account for costs such as pollution that were previously left out of economic models. These new metrics also begin to enable planners to maximize non-economic values such as happiness and satisfaction.

The transition to different and more sustainable patterns of consumption will likely have its challenges. For example, it might be challenging to accept a future with lower levels of consumption. But, on the other hand, new visions, such as the Economy of Plenitude, see a future with fewer hours worked per week and more time for friends, family, community, volunteerism and personal projects. This chapter has presented a rather theoretical overview of sustainable consumption. Systemic change will take businesses, government, diverse communities and people working together. We hope that the concepts introduced here will be helpful in putting your very practical work as a Master Recycler into a larger context. Chapter 12 Resourceful Living focuses on tools and strategies for achieving a life with less consumption and greater happiness and satisfaction.

CHAPTER 4 EQUITY AND MATERIALS

INTRODUCTION

In the materials management and sustainable consumption chapters we learned that humans both carry the burdens and enjoy the benefits from the production and consumption of materials.

We learned that all the stuff we consume has negative impacts for humans all along the materials life cycle. These negative impacts include: poisoned drinking water near extraction sites, risks to workers in manufacturing facilities, toxins in consumer products, and conflict and displacement caused by climate change.

We also learned that life expectancy and sense of life satisfaction are dependent on having a certain level of material necessities such as food, shelter, medicine and art and literature.

What has not been discussed to this point is that the benefits and burdens of consumption are distributed inequitably between differing populations and that this inequity is a great threat to sustainability.

This chapter will define equity and explore how institutional racism and poverty result in the inequitable distribution of the benefits and burdens of materials production and consumption. Materials production and consumption have the largest negative impacts on low-income communities and people of color. Meanwhile, those same people have less access to products that provide health and wellbeing.

This chapter will demonstrate the importance of addressing these inequities as we work to build new systems. Oregon's materials management vision takes a holistic view of environmental and social well-being and health across the full life cycle of materials. As we change how we produce and consume, we have the opportunity to ensure that this is done collaboratively so that communities of color and low-income communities are co-creators. We can also ensure that we create equitable avenues for wealth building. As we reduce the pollution caused by extraction, we can create safe, living wage jobs in recycling and reuse. As we reduce deforestation, we can increase access for recreation in our natural areas. As we redefine what it means to live a good and rich life, we can ensure that people who have traditionally had the least access to the American Dream will get to enjoy health and happiness. This inclusive process will result in more complex systems that better meet the needs of a diverse population.

> *"It is not our differences that divide us. It is our inability to recognize, accept, and celebrate those differences."*
>
> Audre Lorde

WHAT IS EQUITY?

The Portland Plan uses the following definition for equity:

"Equity is the right of every person to have access to opportunities necessary for satisfying essential needs and advancing their well-being."

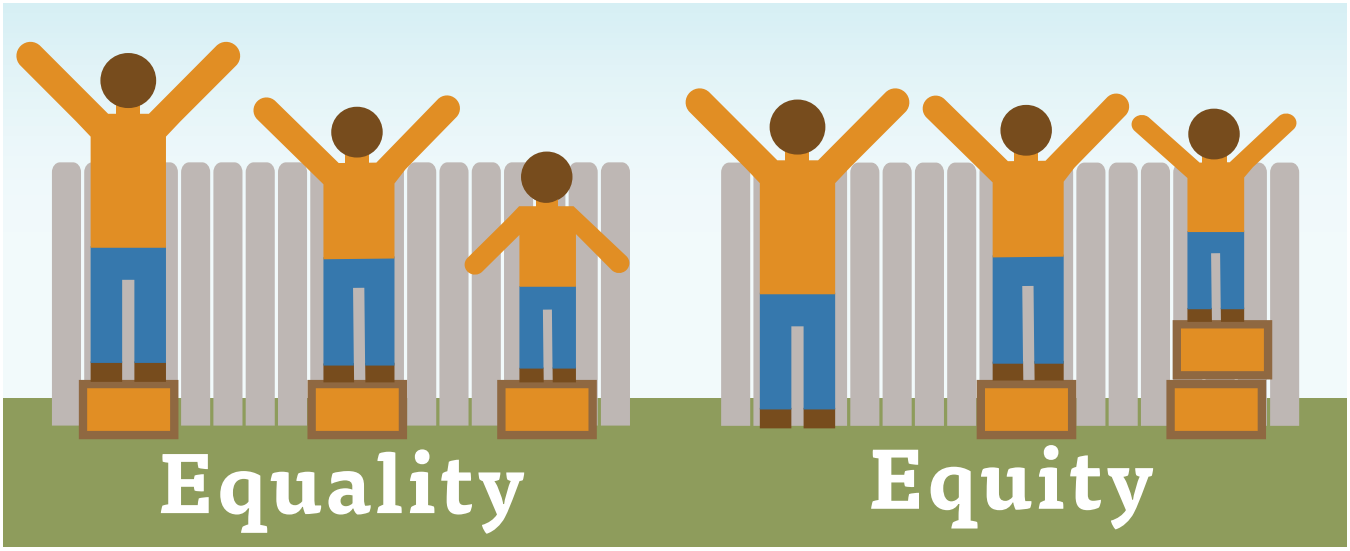
What does equity look like?

- All residents have access to opportunities, such as good jobs, education, healthy food, housing and self-expression.
- The benefits and burdens of growth and change are equitably distributed across our communities.
- All residents and communities are involved as full and equal partners in public decision-making, problem-solving and implementation; and these processes consider the history of impacted communities.

Equity is not the same as equality

There are important distinctions between equality and equity. Equality aims to distribute exactly the same resources to everyone equally. The idea is that if we all get the same things, we will all enjoy life and health equally. Equality aims to promote fairness and justice, but equality can only work if everyone starts from the same place and has the same needs and wants. Equity, in contrast, involves ensuring that people have access to opportunities to enjoy full, healthy lives. Aspects of our identities, such as race, class, and gender, can determine the difference in what is made available to us as individuals to enjoy full, healthy lives. Equity requires looking at the historic, social, and institutional barriers that impact people's access to opportunity and correcting for any negative outcomes.

A focus on equity recognizes that people do not start at the same place and consequently people have different needs. A focus on equality strives for a perfectly even distribution of resources. Whereas an equity approach takes into account the actual desires and needs of each population and their ability to satisfy those desires and needs.



*This image illustrates some of the differences between equity and equality. All three people want to see over the fence so they can watch a game. On the **equality** side of the graphic, each person is given an equal number of boxes. If the three people were the same height, this might be fair, but they are not, so the boxes only help the person in the middle. The tall person already had access to see the game and the shorter person still can't see it. On the **equity** side of the graphic, the boxes are distributed to ensure that all three can enjoy the game.*

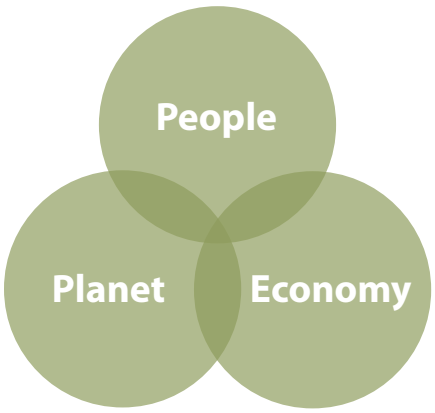
EQUITY AND OREGON'S MATERIALS MANAGEMENT VISION

The equality vs equity graphic (shown above) can guide our thinking about how we meet Oregon's materials management vision. For "all Oregonians to enjoy life and attain well-being," it is important to understand the variety of people who live here and their communities.

Each community experiences different levels of access to consumer choices, healthy food and toxic-free households. This ease of access (or lack of) has everything to do with where people were born, economic background, and race.

Inequity is built into our institutions. So, addressing the material environment and economy without defining, addressing, and monitoring existing disparities will perpetuate those inequities. If we don't, those inequities will be perpetuated in our new environmental and economic policies.

TRIPLE BOTTOM LINE OF SUSTAINABILITY



Many models of sustainability are based on the concept of a "triple bottom line," that says we must plan for and measure economic, environmental and social outcomes. Unfortunately, economic and environmental factors typically receive most of the attention and precise accounting in the sustainability field. All too often, measures of social impact are simply tagged on at the end and rarely measure how differing populations may or may not be experiencing those impacts.

Julian Agyeman, an expert on environmental justice and sustainability and a professor at Tufts University, notes that "you cannot retrofit for equity." To come up with solutions to sustainability problems, he argues, it is paramount that existing disparities are named at the outset and that the people who might carry the biggest burdens help shape and build the new system.

To be successful in creating a triple-bottom-lined sustainable Oregon, we must recognize our differences, particularly where there have been historical disparities. If we use the equity vs equality diagram, we can redirect our focus from moving around the boxes to ensuring that everyone gets to see the game. In other words, solutions must shift from measuring the movement of materials we produce and consume to satisfying the core needs of all people. This shift may allow us to meet the triple bottom line. Doughnut Economics and Just Transition are two models that directly put equity in the center of sustainable systems. Both global models are being applied to identify new solutions to our local consumption in the Portland metropolitan area.

A SAFE AND JUST LEVEL OF CONSUMPTION

Kate Raworth, Senior Researcher at Oxfam Great Britain, believes that we can make this shift to an equity focus through a concept she calls Doughnut Economics. She says, "The Doughnut of social and planetary boundaries is a playfully serious approach" to framing the challenge.

Raworth argues that humanity's 21st-century challenge is to meet the needs of all people within the means of the planet – that no one falls short on life's essentials (from food and housing to healthcare and self-expression). And while doing this we don't overshoot our pressure on Earth's life-supporting systems, such as a stable climate, fertile soils, and a protective ozone layer.

Traditional sustainable consumption messages and programs focus on encouraging people to "consume less," "live simply" and "make do." These messages fall flat for communities who are experiencing a lack of basic needs. They also only focus on consumer choice, without addressing the systemic problems that cause over consumption and inequities.

Doughnut Economics acknowledges the billions of people on the planet who fall short of meeting their basic needs. But it also describes a world where humanity is collectively overshooting our consumption at a level that is heading for collapse.

Doughnut Economics changes the goal from reducing all consumers' consumption to identifying an economic system with a "safe and just zone" of consumption. In that system, ecological ceilings of consumption levels that are unsustainable are measured, with the goal to avoid an overshoot. But also measured is a foundation of basic well-being for all people.

The goal is to stay in equilibrium within that safe and just zone. Instead of a model of an ever-growing economy, a safe and just economy is regenerative and distributive. An economy that is regenerative is one where we take nature as our model, measure and mentor. With nature as model, we can study and mimic life's cyclical processes of take and give, death and renewal, in which one creature's waste becomes another's food. Economies that are distributive by design are ones where all people who contribute to its value receive its benefit.

DEEP DIVE

Visit Kate Raworth's website to see her Ted Talk, explore resources and more.

Join the debate at www.oxfamblogs.org/doughnut

C40 operates a network of the world's megacities committed to addressing climate change and supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change.

Portland and Doughnut Economics

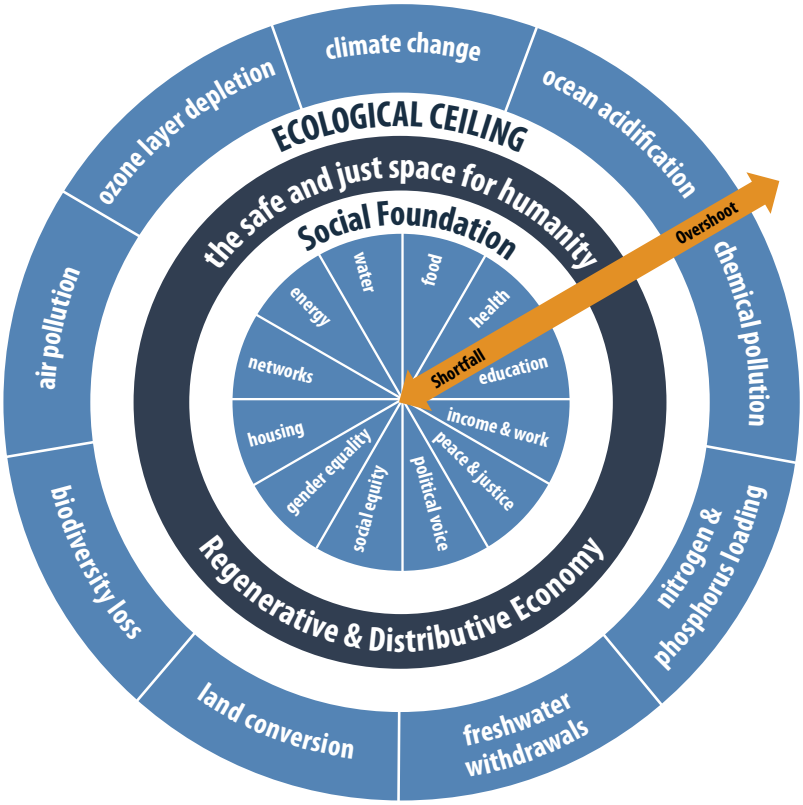
While the City of Portland is not tackling its fundamental economic structure, staff in the Bureau of Planning and Sustainability (BPS) are actively using concepts from Doughnut Economics to create strategies to address consumption.

Portland's Climate Action Plan calls for BPS to develop a sustainable consumption and production strategy to prioritize local government activities that will support a shift to lower carbon consumption patterns. A Sustainable Consumption work project started in 2019. It uses the safe and just concept to ensure that whatever strategies are considered, each has a ceiling and foundation approach.

The City's first phase took place in the spring and summer of 2019. Workgroups of stakeholders examined where carbon emissions were specifically associated with consumption and production in Portland. They used this data to brainstorm interventions in the areas of construction, electronics, food, goods, and services. Then they charted ways these interventions could reduce consumption for consumers who are overshooting in our community and lift up shortfall consumers.

The current phase is a partnership with C40, a network of the world's megacities committed to addressing climate change. The City of Portland was selected to participate in their Thriving Cities Initiative, a C40 pilot

DOUGHNUT ECONOMICS MODEL



project focused on helping cities reduce carbon emissions and enhance quality of life for all residents through shifting to more sustainable patterns of consumption.

The initiative kicked off with a workshop for City staff with Kate Raworth, who shared her Doughnut Economics research and led City staff through activities using a city scale snapshot of Portland's doughnut.

In the Spring of 2020, City leaders will partner with community-based organizations and business actors to determine how they can address unsustainable patterns of consumption and production and create a thriving city.

With the Sustainable Production and Consumption Strategy and the Thriving Cities Initiative, Portland is embarking on a journey to understand what it means to be a 21st-century thriving city.

The Thriving Cities Initiative (TCI) is a journey for cities to explore and embrace a vision for a thriving city that appreciates what makes cities unique while understanding its global influence and responsibility. Together with diverse city representatives, participating cities embark on a journey to understand how to create thriving people in this thriving place, while respecting the wellbeing of all people and the whole planet. This is a collaboration between C40, Doughnut Economics Action Lab and Circle Economy.

JUST TRANSITION: LETTING COMMUNITY LEAD

Like Doughnut Economics, Just Transition is an international concept with local activities. But where the origins of Doughnut Economics were academic, Just Transitions is born out of decades of grassroots environmental justice organizing to find common ground and shared benefit in the transition away from polluting industries. Just Transition highlights that economies based on growth are extracting resources from both the environment and workers – without benefit to them. Just Transition addresses pollution and toxics that are critical issues in the environmental justice movement, but it also addresses the urgency that climate change presents.

The movement works to advance ecological resilience, reduce resource consumption, restore biodiversity and traditional ways of life, and topple extractive economies. They celebrate a concept called "Buen Vivir," which means that we can live well without living better at the expense of others or the planet.

A critical aspect of the Just Transition concept is that "Frontline Communities" must lead in the co-creation and co-delivery of strategies, programs and systems that come out of the transition from an extractive economy. Frontline Communities are those that experience "first and worst" the consequences of climate change. These are communities of color and low-income populations. Their neighborhoods often lack basic infrastructure to support them, and they are increasingly vulnerable as our climate deteriorates. These are Native communities, whose resources have been exploited, and laborers whose daily work or living environments are polluted and/or toxic.

TERM

Frontline Communities: *those that experience "first and worst" the consequences of climate change. These are communities of color and low-income, whose neighborhoods often lack basic infrastructure to support them and who will be increasingly vulnerable as our climate deteriorates. These are Native communities, whose resources have been exploited, and laborers whose daily work or living environments are polluted or toxic.*

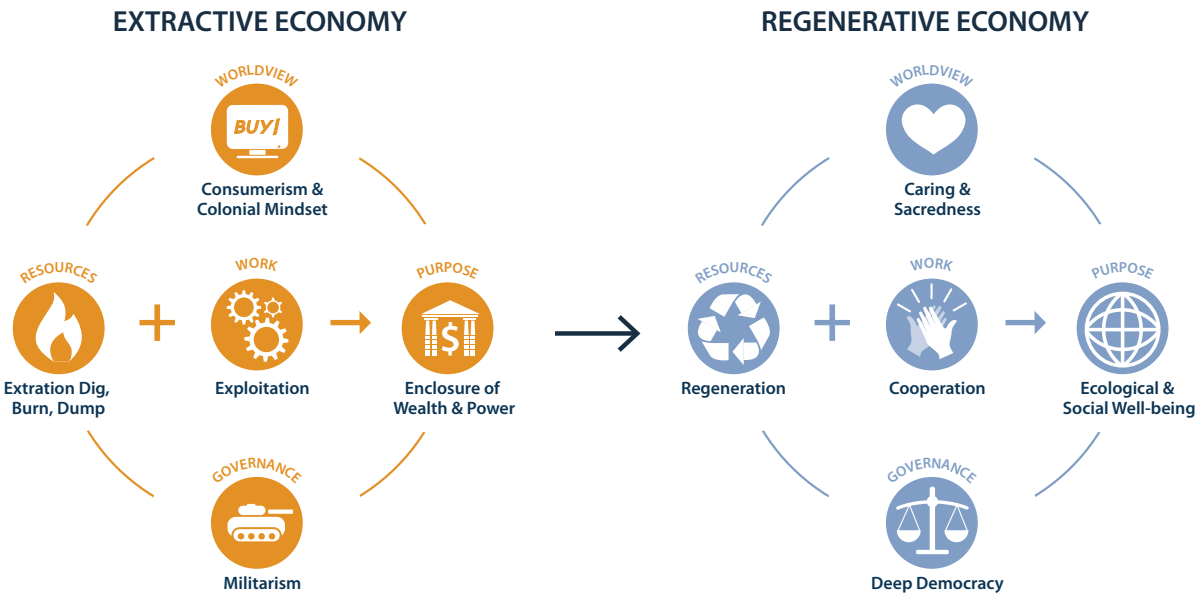
Local Just Transition

Communities in the Portland metropolitan area and Oregon are embracing the just transition concept and making substantive change using its tenants. The Oregon Just Transition Alliance (OJTA) is a project of OPAL, Asian Pacific American Network of Oregon, Beyond Toxics, Pineros y Campesinos el Noroeste (PCUN), Rural Organizing Project, and Unite Oregon. They see just transition as the framework where frontline communities in Oregon can build existing and new relationships and nurture leadership to ensure the new economy works for them.

In Spring 2017, more than 50 community organizations organized the People's Climate March. It was an opportunity for frontline communities to connect and find common ground. From that gathering, energy spread into projects large and small. Day laborers began to identify ways that they can play a role in the City of Portland's emergency plans and that any job can be a green job through a project with Voz Workers' Rights Oregon and the City of Portland. The Coalition of Communities of Color developed a program called Redefine to advocate for climate solutions that are led with racial and economic equity. Their principals demand policies that prevent further harm to communities of color, reinvest revenues to reduce disparities, create opportunities directly in underserved communities, and ensure inclusive design and implementation.

Allies developed, advocated, and passed a ballot measure in 2018 called the Portland Clean Energy Community Benefits Fund (PCEF) – the first climate-fund measure created and led by communities of color. PCEF invests over $150 million annually in projects that maximize carbon emissions reductions, provide direct benefits to those who have been historically under-resourced, and create climate initiatives that benefit all Portlanders, while also supporting the City's 2050 climate goals. The program is guided by a deep commitment to community engagement, accountability, and prioritization of those hit first and worst by a changing climate. This unique combination of climate expertise and public engagement makes PCEF a world leader in climate action that is rooted in economic opportunity and climate justice.

JUST TRANSISTION MODEL



METRO'S 2030 PLAN: LEADING WITH EQUITY

Leading with equity

Our region is stronger when everyone has access to financial prosperity, a healthy environment and the range of opportunities that allow us to thrive.

But unfortunately, a long history of exclusionary and discriminatory policies has harmed communities of color in the Portland metropolitan region. As a result, communities of color currently experience the worst economic and social outcomes of any demographic group.

Within the garbage and recycling system, inequities appear in a variety of ways, including:

- The garbage and recycling industry tends to lack diversity in the workforce—except in the job categories that pay the lowest wages.
- Procurement processes for solid waste operations contracts often include barriers to participation for minority-owned and woman-owned small businesses.
- Communities of color experience barriers to accessing Metro's recycling information, education services and household hazardous waste services.
- People of color own few of the businesses that run our region's system.

Metro, cities and counties are committed to creating the conditions that allow everyone to enjoy the benefits of our growing region. With our programs, policies and services, we are working to make this a great place for everyone—today and for generations to come.

To ensure an inclusive process from the start, Metro convened an Equity Work Group to ensure that racial equity was incorporated into the plan. The work group participated in each phase of the process, working alongside staff in drafting elements of the plan. Metro and eight community-based organizations also organized discussions to learn how residents envision the future of the garbage and recycling system. These discussions informed many of the actions in this plan.

CONCLUSION

As we have recognized the ecological importance of biodiversity, we are increasingly also recognizing the importance of human diversity. Researchers have estimated that there are between three to 30 million species on Earth, with a few studies predicting that there may be over 100 million species on Earth! This great variety of life and its processes is called biodiversity. Ecosystems have evolved over thousands, hundreds of thousands, or even millions of years, and are therefore in delicate balance, with each species playing a vital role. This interrelatedness of species means that safeguarding biodiversity is essential to safeguarding our natural systems. Coming to understand this has been an important paradigm shift for conservationists, and it has led to the understanding that each species, no matter how small, plays an important role in the ecosystem.

Much as biodiversity is important to environmental sustainability, human diversity is essential to economic and social equity. In this chapter we learned that equitable solutions arise only out of a careful consideration of our diversity and our differences. Because people do not start out from the same place and because they have different wants and needs, equity cannot be achieved by distributing resources to everyone exactly equally. Rather, an equitable distribution of resources must take into account current inequities and barriers to access. And equitable solutions to materials management must consider all people, including the workers who sort recycling, people who live near manufacturing, or households that do not have the materials to meet basic needs. Utilizing an equity lens while working on making shifts in our consumption and production of materials will improve our chances of creating rich complex systems that build benefits and serve a variety of cultures and communities.

Workers at a local Material Recovery Facility (MRF)

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.

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 damanged 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.

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

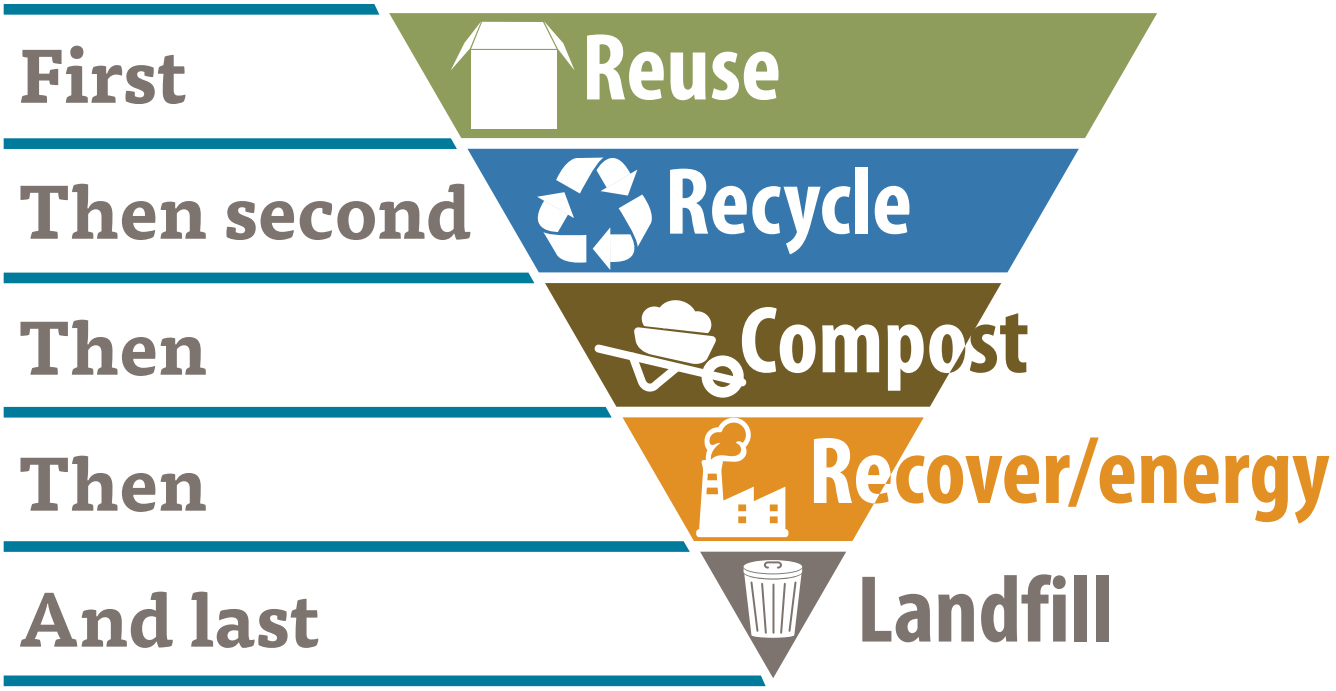
For more details you can consult the Oregon DEQ 2021 Waste Recovery Report (available online). DEQ releases a new waste recovery report each fall for the previous year.

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.

Backyard composting bin

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.

Energy from waste facility in Marion County

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.

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

Columbia Ridge Landfill near Arlington, Oregon

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.

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.

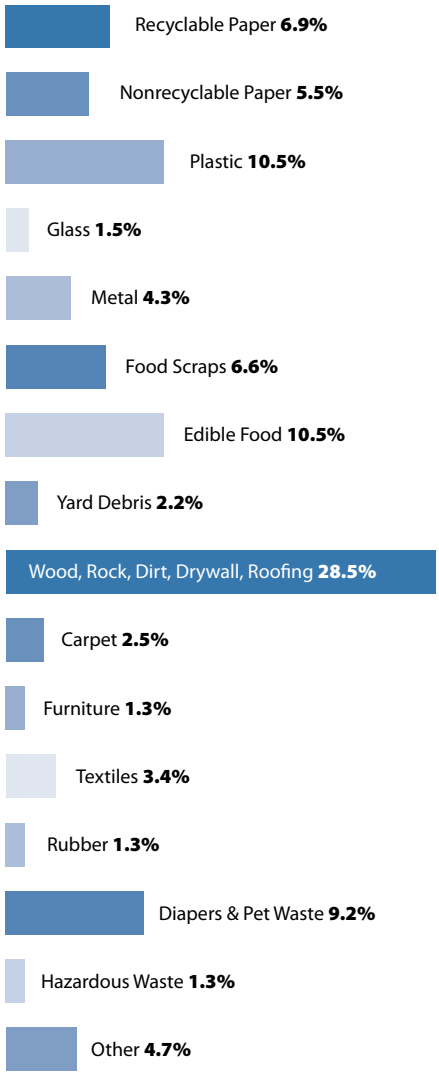
What is in Oregon's garbage?

The Oregon Department of Environmental Quality (DEQ) works with Metro and location 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.*

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

Columbia Ridge Landfill near Arlington, Oregon

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.

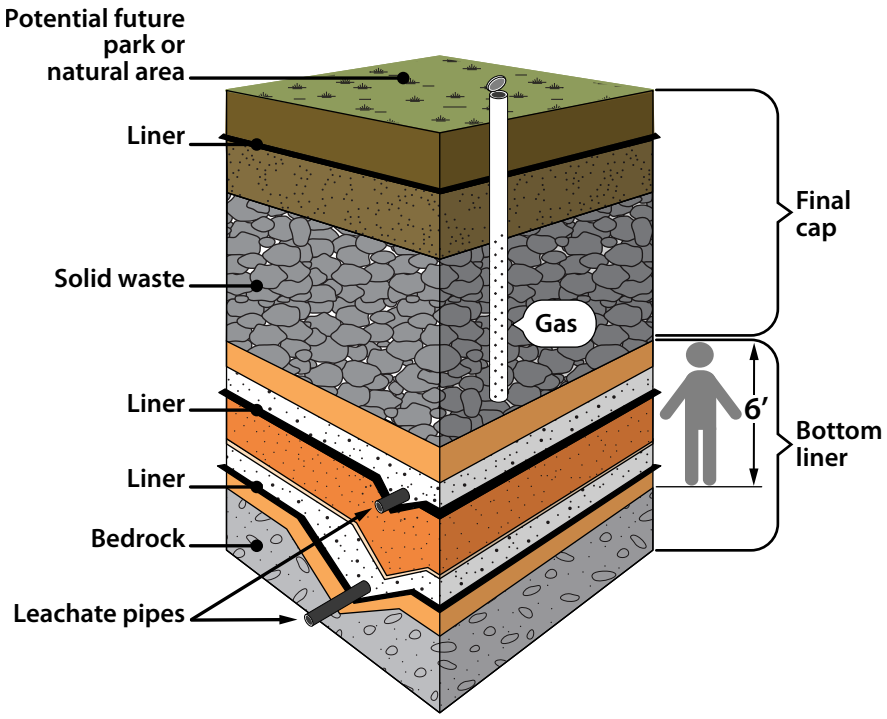
Today, Columbia Ridge Landfill is the final destination for most of the area's waste. It is located 30 miles south of Arlington, in northeastern Oregon. The Riverbend Landfill in McMinnville and the Hillsboro Landfill are smaller local landfills permitted to receive only construction and demolition materials.

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.

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.

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.

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.

DEEP DIVE

Visit Bottledropcenters.com for more information

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.

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

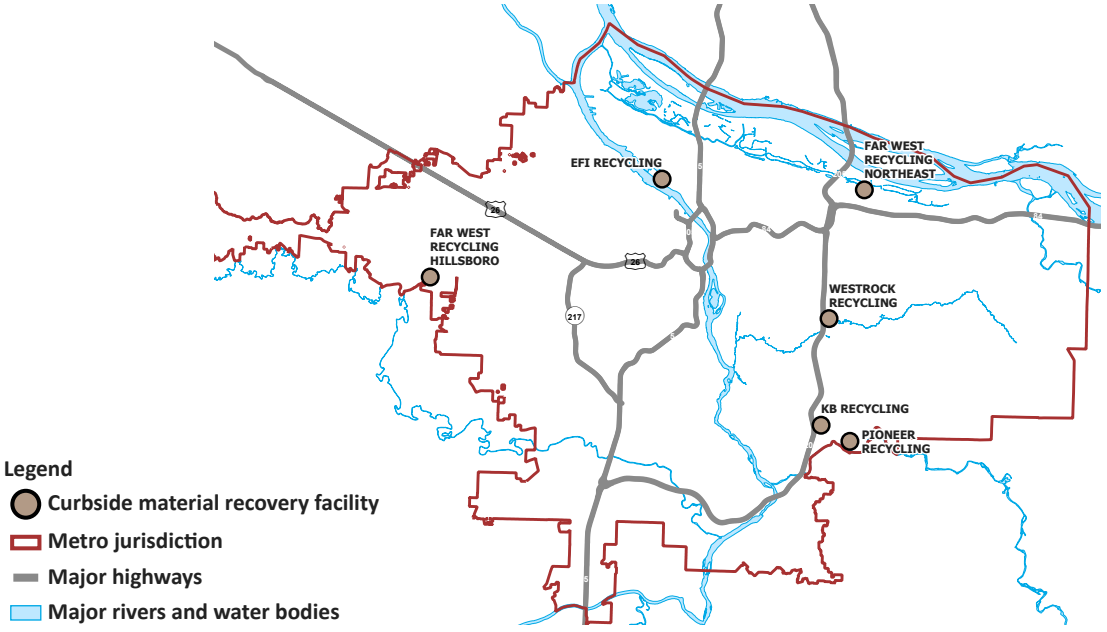
In the old days, source separation was rather involved. Newspapers were bundled by string, cans had to have labels removed and smashed. Paper went in one bag, metal and plastic bottles in another. Glass in another bag. Collection trucks needed multiple compartments to manage all of the categories. The 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.

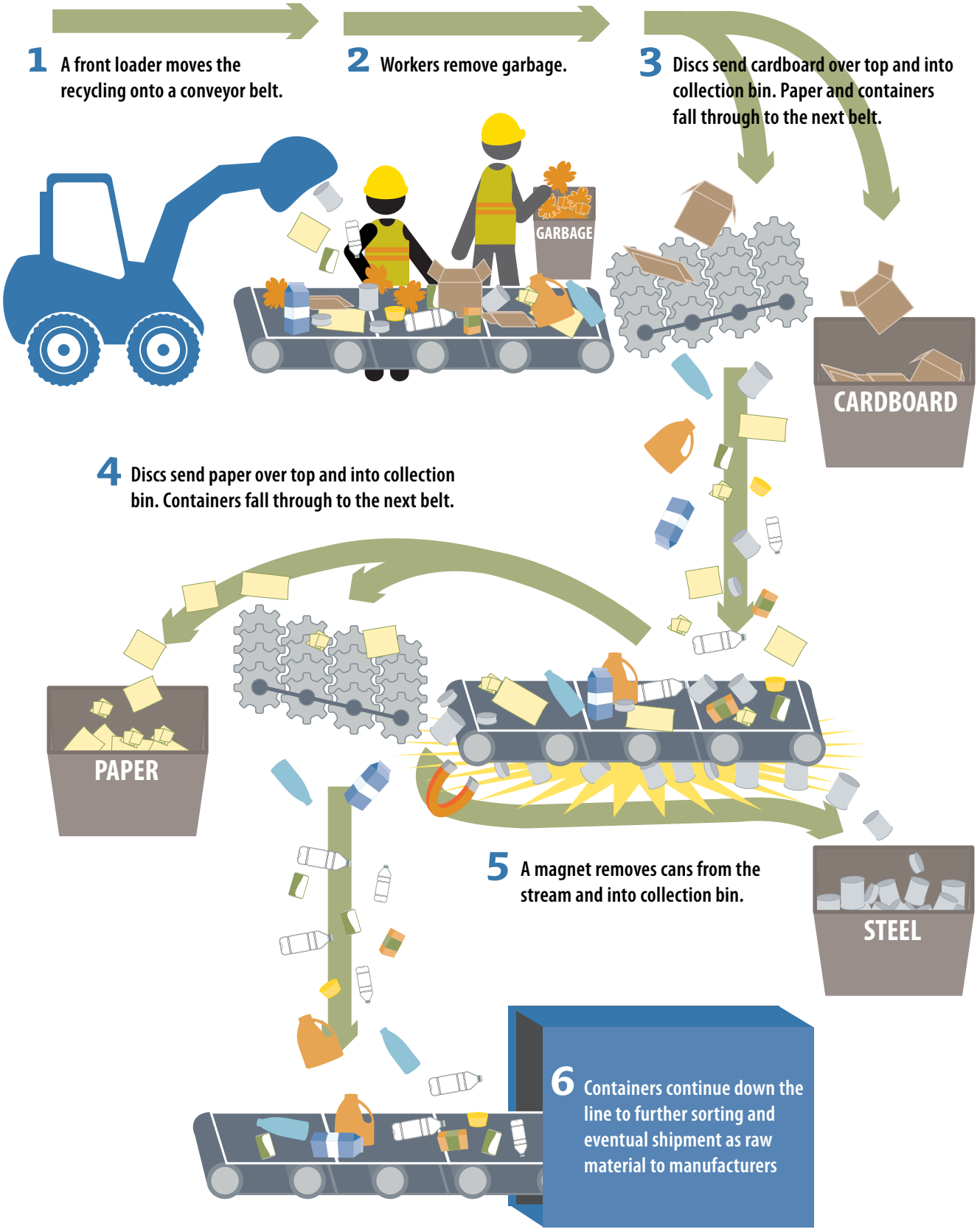
That need for a second stage of separation gave birth to the increasing role of facilities called **Material Recovery Facilities or MRF's.** MRF's are privately owned facilities who accept the materials collected by haulers, separate them with a combination of manual and mechanical means, and bale them 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



4. Processing and manufacturing

DEEP DIVE

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

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.

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.

TERM

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

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.

TERM

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

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 anerobic 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 regions' 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.

CHAPTER 6 RECOVERY MARKETS

INTRODUCTION

Why we recycle and why we recycle right

Recycling isn't just good for our environment; it's also about economics. If there isn't a market for the material collected at curbside, then recycling won't occur for that material; it's as simple as that.

While the central idea behind recycling — taking something old and turning it into something new — is simple, the devil is in the details. Some materials are turned into commodities used here in the metro region. Other materials are consumed out of state. Still more recyclables are sent overseas to be turned into products that we then, in turn, purchase here at home.

What follows is a basic description of the markets for recyclable materials (both domestic and international) as well as a look at most of the individual materials collected in our curbside rollcarts.

CREDIT

Much of this chapter was contributed by Resource Recycling's Executive Editor, Jerry Powell and Recycling Partnership's Dylan de Thomas. Resource Recycling, Inc. publishes business journals on the latest recycling trends, market analysis, research, equipment, and business news for the recycling and waste management industry. Recycling Partnership is a national nonprofit that invests in recycling systems through resources and technical assistance.

THE CHALLENGE: SENDING MATERIALS TO THE RIGHT PLACE

Islands in the two-stream

As discussed in the last chapter, in the metro region, we have a two-stream or two-sort collection system for recyclable materials. Mixed paper, plastic and metal go together and glass is separated. Many places around the country have an even simpler system, with glass mixed in with the other recyclables. Our two-stream collection is a trade-off. With everything in one cart except glass, and thus picked up by one collection vehicle, there are massive savings on the collection side of the equation, since fewer trucks and drivers are needed. Also, it is much easier for consumers to put out recyclables. This provides more material for the recycling industry. But this system has led to rising costs for materials sorting which must occur after the materials are collected at curbside. Some have noted that this is akin to attempting to get eggs out of an omelet.

Why not one-stream?

Many communities in the U.S. allow residents to place glass in the container with mixed recycling.

Our region explored this option but discovered that domestic markets find glass to be problematic.

Broken glass ruins paper and metal and causes costly damage to equipment.

In an attempt to keep recycling local, the metro area decided to keep glass separate.

These challenges are met by both increased outreach and signage; through newsletters, flyers, and the large stickers on the lids of roll carts. The challenges are also met by the Master Recycler program, where educated residents are deputized to offer advice and guidance to their friends, families and neighbors.

Revisiting the concept of contamination

Anything that is collected for recycling in a curbside cart must be sorted before it is sold. With that in mind, let's ask the question: What is contamination? Well, there are two types of contamination:

1. Materials that consumers put in the curbside cart that do not belong (for example, plastic bags).
2. Recyclable materials that Material Recovery Facilities (MRF's) send to the wrong place (for example, plastic in a paper bale, or vice-versa).

Improper source separation and preparation at home and at work not only results in the loss of that material, it may actually contaminate other materials, thus wasting valuable recyclable materials. When Material Recovery Facilities send the wrong materials to a recycling company, this costs the recycler money and usually results in the material being thrown away.

Sorting it out

While outreach and education is an important way to minimize the first type of contamination, unwanted material will always be a problem. And education will not solve contamination from facilities. New, modern materials recovery facilities (MRFs) are able to lower both of these types of contamination.

With different types of screening processes that do a remarkable job in separating out two-dimensional material (such as paper) from three-dimensional material (such as containers), and optical sorting technology that can separate out different types of plastics by color and/or resin type, modern MRFs have the ability to sort both effectively and efficiently, reducing both types of contamination.

Unfortunately, the majority in our metropolitan region are not this type of facility. Our system is primarily the same sorting process that was originally designed when as much as 95 percent of the recycling was paper and sorting was primarily aimed at cleaning contaminants from the paper. A new infrastructure will require major investment in planning as well as expensive equipment. Both government and business are presently engaged in trying to address this aspect of the recycling industry here.

But, in the meantime, the level of contamination has both local and global implications to the economic sustainability of the recycling industry.

LOCAL AND INTERNATIONAL MARKETS

Local recycling markets are dependent on global manufacturing and trade.

While international markets have been key to the recycling industry almost since its inception, beginning in the late 1990s, the market for these materials, especially in China, grew rapidly. This rapid growth in the Chinese market had everything to do with their emergence as the largest manufacturing nation. This was coupled with a vast improvement of the export infrastructure (ports, piers, the size of westbound shipping lines, etc.). For the metro region, this had important impacts on the local market for recyclable materials.

One advantage this expanded international market had over local markets was its ability to accept material with contamination.

There were a number of reasons China was able to accept dirtier loads of material than local markets could. The first is that low-cost Chinese labor could be utilized to sort imported recyclable materials. China's recycling industry also formed later than it did in the United States and when it was built, there was a good deal of investment. So their sorting technology is sometimes superior to local sorting technology. Finally, China was dependent on the steady stream of recycling materials to lower the costs of manufacturing products.

In other words, until recently we have been able to pass the problem of contamination onto overseas markets which had the wherewithal to sort out the problem.

The Great Green Fence of China

Even with these two important advantages that the Chinese market enjoyed, the levels of contamination in much of the curbside-collected recyclable materials coming out of MRFs around the region, the country and Europe proved to be too high. Meanwhile, Chinese wages have increased and consumers there are beginning to create an increased level of their own discards, making them less and less dependent on the U.S. and Europe for material.

In 2013 and again in 2017, the Chinese government implemented customs enforcement actions called Green Fence and Green Sword to reduce contamination in imported plastics and paper recycling. Simply put, the Chinese did not want our trash anymore. It was not long after that other countries that received scrap paper and plastic, like India, Thailand, Vietnam and Malaysia, created policies refusing unwanted materials

The increased pickiness of overseas buyers meant that MRFs had to more effectively sort the incoming recyclable materials in order to sell them. Cleaner loads and a need for an alternative did result in increased opportunity for North American companies to complete with China. But it also left a gap in recycling for many materials.

Unfortunately, neither the MRFs nor the US paper and plastics facilities have invested enough in equipment to make US recycling sustainable. Recycling markets consultant Patty Moore stated in May 2017, "I'm really, really concerned about the impact this is going to have on recycling in [the U.S.], because we've gotten so used to being able to move that material to export. The U.S. sorting facilities are unequipped to provide the high grade of paper and plastic that China is now demanding."

By 2019, local communities felt the impact of these international policy changes. In order to meet higher standards, Material Recovery Facilities slowed down their sorting lines, increased the number of people sorting materials; one even invested in optic and mechanical sorting. These changes made the cost of recycling go up. Some rural communities in Oregon deemed it more cost efficient to discontinue recycling collection as it became more expensive to recycle materials than to throw them away. The Metro area cities opted instead to raise the rates for collection in order to pay for the higher cost of recycling. The list of accepted materials for all parts of the Portland metro area that was created in 2008 remains the same list.

In June 2021, Oregon passed the Plastic Pollution and Recycling Modernization Act (Senate Bill 582). The Act will overhaul Oregon's outdated recycling system by building on local community programs and leveraging the resources of packaging producers in order to create an innovative system that works for everyone in Oregon.

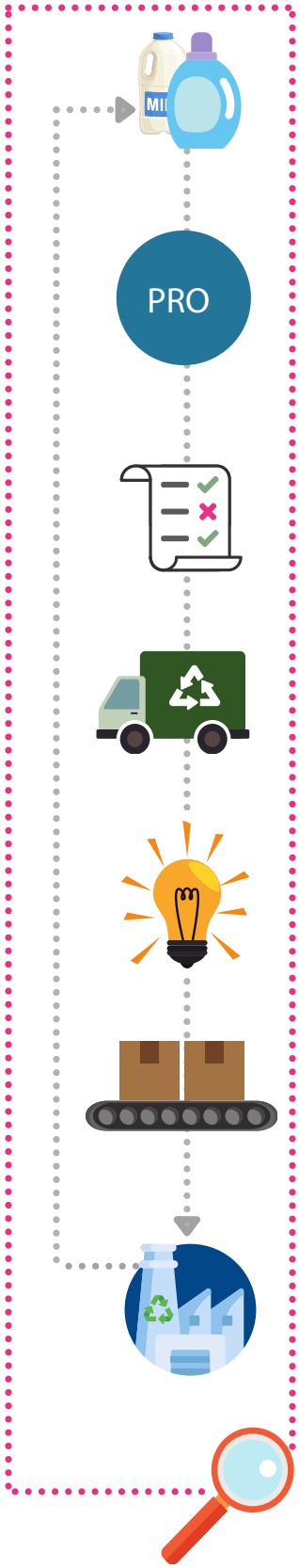
PLASTIC POLLUTION AND RECYCLING MODERNIZATION ACT

The Plastic Pollution and Recycling Modernization Act updates Oregon's recycling system by building on local community programs and leveraging the resources of producers to create an innovative system that works for everyone. The new law requires packaging producers to share responsibility for effective management of their products after use. The law went into effect January 1, 2022 and program changes will start in July 2025.

Key benefits

	Shares and scales responsibility across the recycling system. Producers will be brought into the recycling system to fund improvements and expand recycling services. Cost to producers will be based on what materials they use and how much they sell into Oregon.		**Creates one statewide list of what can be recycled.** The uniform collection list will provide clarity to households and businesses about what can be recycled, and create efficencies in recycling operations across the state.
	Increases access to recycling. The new law will provide recycling services to people who didn't previously have it, such as those who live in apartments and rural areas.		**Incentivizes sustainable products.** Producer fees will be higher for non-recyclable products and those creating more environmental pollution.
	Prevents plastic pollution. Ensures collected materials are recycled responsibly and keeps plastic and other trash out of our waterways and communities--both domestically and oversees.		**Creates accountability to outcomes.** DEQ will permit and audit recycling processors, and a Governor-appointed advisory council will review producer program plans, the statewide collection list and educational resources.

How the Recycling Modernization Act Works



PRODUCERS will join and pay a membership fee to a nonprofit Producer Responsibility Organization (PRO) that will fund improvements and ensure that collected recyclables go to responsible end markets. Producers will also be required to meet new recycling goals for plastic packaging and food serviceware.

PRODUCER RESPONSIBILITY ORGANIZATIONS will collect producer membership fees and use them to ensure improved and expanded recycling services. Most collection will continue to be overseen by local governments, but PROs will provide services for certain hard-to-recycle materials. PROs will also fund waste prevention grants, and several studies to assess challenges and recommend improvements to improve multifamily recycling conditions, equity in the recycling system, and litter and marine debris.

ONE COLLECTION LIST will allow individuals and businesses to recycle the same items across the state, at home and at work. PRO funding will enable collection of the same items regardless of location or distance from recycling markets.

RECYCLING SERVICES will be expanded under the direction of local governments, with support from the PROs, especially for rural communities and people living in apartments. The same private collection companies will continue to provide recycling services.

EDUCATION about how to recycle will continue to be offered by local governments, along with new programs to reduce recycling contamination. PROs will create accessible educational resources that local governments can use and that meet the needs of diverse communities.

PROCESSING of recyclables will be done in facilities that meet new performance standards, including for material quality, reporting, and paying living wages to workers.

END MARKETS that can handle the material appropriately — without creating plastic pollution or other harms — can purchase it after sorting and recycle it into something new. Producers and processors will be obligated to make sure materials collected in Oregon reach responsible end markets.

OVERSIGHT AND INTEGRATION will be provided by DEQ, with accountability from all participants. DEQ will plan and implement changes required by the new law, and oversee the recycling system and provide enforcement where necessary. PROs, recycling processors and local governments will track and report more information about where our recyclables go and ensure that they are managed responsibly and used to make new products.

MARKETS FOR INDIVIDUAL COMMODITIES

Fiber (otherwise known as paper)

Even with the increased digitization of our media consumption and business communications, recovered fiber is still the single largest segment of the curbside bin, making up an average of around 60 percent by weight of the material stream inbound to MRFs.

MRFs previously marketed a number of different grades of paper and paperboard, but now most sell just two: highly valuable corrugated cardboard (OCC) and mixed paper, which combines much of the remaining fiber collected, and includes newspapers, office paper, and other paper products. Some MRFs simply produce one bale, which would include all fiber.

While some material does go overseas, much of the recovered office and newspaper collected curbside in the Metro region is turned right back into paper by Pacific Northwest mills. A key reason for this is the close relationships between many local MRFs and U.S. paper companies, either by ownership or by long-term contractual arrangements. The mills in this region are typically combination mills in that they use a mix of virgin and recovered fiber to make products.

Paper products that are made of mixed materials like cereal boxes, six pack carriers and milk cartons are often recycled into products like toilet tissue.

Contamination Concerns:

With fiber, much of the deleterious contamination is either broken glass that can stick to paper (especially if wet) or other two-dimensional material (plastic film or other flat packaging, such as pouches or plastic lids) which is largely why these forms of packaging aren't allowed in the curbside roll carts.

Beverage containers

With beverage containers, Oregon has a unique position because of the state beverage container redemption program, or bottle bill. Under the redemption system, a far greater percentage of beverage containers are recovered in Oregon than in parts of the country without such a system.

Not only does this system help recover more beverage containers of all types (PET, aluminum and glass), it helps keep those containers incredibly clean, which makes them more valuable on the open market. With PET containers, it even led to a unique partnership to help recycle this material locally.

In 2013, a group of local investors signed a long-term agreement with the Oregon Beverage Recycling Cooperative, the industry-owned corporation that runs the state's redemption system, to purchase all of the PET containers collected under the bottle bill. The resulting facility, ORPET, is located in St. Helens, Oregon. and it also purchases some materials from local and regional MRFs, as well as redeemed containers from western Canada.

Previous to the building of the facility, a strong export market existed. This is a good example of local infrastructure responding to local markets within our state's recycling system.

Recycled PET is primarily used to make products that would have otherwise been made of polyester such as clothing, pillow stuffing and carpets.

Contamination Concerns:

With the bottle bill-collected material, contamination is negligible. The curbside-collected material can be contaminated by dirt, broken glass or even smaller bits of various materials. Also, a PET bale from a MRF may contain other recyclables, such as HDPE (No. 2) bottles. This can reduce the price garnered for the material from downstream consumers.

Aluminum beverage cans

Aluminum beverage containers, known in the recycling industry as UBCs (used beverage containers) are the single-most valuable commodity, by weight, recovered at a MRF.

Generally, this baled material sells for 50¢ to $1 per pound (or from 1¢ to 3¢ per can), so the markets for UBCs are robust. Because the material collected via the bottle bill is of such high quality it is typically sold domestically.

Due to the special processing needed to handle UBCs – the top of cans is made of a different alloy than the body – as well as the specific processing needed to delacquer the scrap metal (think of it as paint removal), the local manufacturers able to handle UBCs are few and far between. Our UBCs mostly go to mills in Georgia, Indiana or New York.

There are also markets for other types of aluminum, such as foil or the tabs from cans (both different alloys) but these, too, are specialized.

Contamination Concerns:

Same as with the PET containers.

Glass bottles

Blessed by the bottle bill and robust recycling industry in the Pacific Northwest (Owens-Illinois off of I-205 and others), **cullet** — as commodity-grade recovered glass is known — has healthy markets here in the metro area. Owens-Illinois sells recycled glass bottles to our local brewers and wineries.

Markets for the glass collected curbside were at one time less robust due to high contamination. Today glass recycling trucks often bring glass directly to a facility called Glass to Glass who uses optical sorting that provides Owens the clean glass needed to make their products.

If not purchased by a glass container manufacturer, other markets include fiberglass manufacturers (for which cullet must be very clean) and for use in concrete. Alternative uses include landfill road base and alternative daily cover for landfills.

TERM

Cullet: *recycled or waste glass used in glassmaking.*

Contamination Concerns:

Glass container manufactures can only use food-grade bottles and jars. Other types of glass such as window panes, Pyrex or candle holders can cause imperfections and ruin glass containers. Glass collected through the bottle bill is more valuable because the scanners only accept food-grade bottles. People frequently contaminate the curbside collected glass with non-food-grade items.

Other plastics

There are robust domestic and foreign markets for No. 2 high-density polyethylene (HDPE) plastic containers. It is particularly important that HDPE is not mixed with contaminants for it to be useful to make new products. Unfortunately, few to no containers accepted in the bottle bill utilize HDPE. So the steady stream of uncontaminated material that other plastics recyclers enjoy is not available with HDPE. If noncarbonated beverage packaging were added to the bottle bill program, it would greatly increase the chances of a growing local HDPE industry.

There are emerging markets for other containers, particularly for polypropylene (PP, No. 5). For example, the nation's largest HDPE reclaimer in Alabama is expanding into handling PP.

Because of growing markets for these types of containers, there has been an attendant growth of secondary processing facilities, which either sort out the materials that MRFs would have otherwise landfilled or sort a mixed plastic bale.

These facilities, sometimes called PRFs (plastics recovery facilities), have come about due to growth and advances in sorting technology, particularly as that technology has become more readily available and competitively priced on the global market.

All of the efforts surrounding non-sorted plastics previously were overseas where inexpensive labor was employed and where sorting operations were able to supply local markets for resins in applications where quality has fewer issues, such as making drainage pipe, garden pots, parts for toys, etc.

Contamination Concerns:

Because mixed plastic bales typically consist of the plastic materials that are left over after sorting, they also can be considerably contaminated by unwanted materials. This is why they have typically gone overseas (before Operation Green Fence) or on to secondary processing.

Ferrous metals

Households are not large generators of ferrous metal scrap. A single household will likely never produce as much ferrous scrap as when junking a single unwanted car. Despite this small flow of material and few regional mills, much of this material is recycled back into ferrous metal locally.

Contamination Concerns:

Ferrous metals do not present much concern in the way of contamination. Magnets in MRFs efficiently and effectively sort ferrous metal. These metals also withstand more contamination than other materials, because they will be melted in extreme heat, burning off most unwanted materials.

Plastic bags

While this material is not, and should not be, collected curbside, clean bags are a desirable material. Bags are recycled into many products such as composite lumber that is used to make park benches, backyard decks and fences – even playground equipment. They also can be recycled into new plastic bags.

While thin single-use plastic grocery and shopping bags are banned in the State of Oregon, enforcement will be inconsistent, and other plastic bags still make it into the recycling (for example, vegetable bags from grocery stores or bags for newspapers). They should be kept clean and dry and then taken to depots or retailers, where a large number have take-back bins. Plastic bags from these locations are highly desired by plastics recyclers as they tend to be clean from contamination.

Contamination Concerns:

Plastic bags don't belong in the curbside, but many make it in there anyway. Markets for these plastic bags that end up in the curbside containers are extremely limited because of the level of contamination typically found in baled, recovered film from MRFs. Also, plastic bags are often cited by MRF operators as the most-common non-desired material because of how they can clog and damage sortation equipment of all types.

For bags returned to retail outlets, a common contaminant is the paper sales receipt left in the bag.

TERM

Ferrous metal: *Metal that contains iron. Ferrous metals include mild steel, carbon steel, stainless steel, cast iron, and wrought iron. Aluminum is the most common non-ferrous metal.*

CONCLUSION

After reading this chapter and touring a MRF, Master Recyclers might be concerned about the future of recycling. Hopefully the opinion of long-time recycling industry consultant, Patty Moore, will help ease concerns as well as provide some hope for how we can shape the future:

Recycling will thrive again

Recently, we've seen reports of the ruination of recycling. This is nothing new: A quick Internet search shows recycling's death has been predicted whenever scrap prices fall.

Prices are now slowly recovering, yet the doom-and-gloom has not abated. Why? Quite simply, the material mix has changed and MRF design has not kept up with the change. I believe the most pressing issue in recycling today is the lack of MRF separation technology. It's clear we need significant research and development and capital investment into post-consumer material separation infrastructure that reflects the product and packaging mix of today and tomorrow. MRFs are still predominantly built to separate two-dimensional paper items from three-dimensional bottle and container products.

Oregonians are hopeful the Recycling Modernization Act will bring new resources to a much needed comprehensive update that will put Oregon at the forefront of Recycling innovation once again.

CHAPTER 7 BEHAVIOR CHANGE THEORY

INTRODUCTION

Change is hard

We surprise even ourselves when we act in ways that are contrary to our core beliefs. For example, on New Year's Day we vow to take the bus to work, but on January 4th when the alarm goes off, the car seems a whole lot easier. People like to behave with integrity, but struggle to make changes to their regular habits in order to match their actions with their beliefs. Psychologists refer to this as the **intention-behavior gap**. The intention-behavior gap is the disconnect between knowing what you would like to do and actually doing it.

The environmental community often thinks that all that we need to do is give people information, and that will make them care enough to take action. Give everyone in the neighborhood a recycling brochure, and they will put all the materials in the right container after that.

Unfortunately, research doesn't show a strong correlation between having environmental values and acting on them. Harvard Professor Douglas Holt goes so far as to offer the cynical assessment that, "After 40 years of research that industriously sought out linkages between environmental concern and environmental behaviors, the answer is clear, the relationship barely exists."

TERM

Intention-behavior gap: *A psychological term for the gap between the possession of knowledge, values and awareness, and behavior.*

DEEP DIVE

Holt, Douglas. 2012. ***Constructing Sustainable Consumption: From Ethical Values to the Cultural Transformation of Unsustainable Markets,*** *The ANNALS of the American Academy of Political and Social Science 2012 644: 236.*

TERM

Social marketing: *Theory and practice that seeks to develop and integrate marketing concepts with behavior science to benefit individuals and communities and further the greater social good.*

DEEP DIVE

To more fully explore the fascinating field of social marketing you can search online for: community-based social marketing (CBSM), ecopsychology, behavioral economics, and tools of engagement.

What works?

Whether it is getting folks to change the container in which they put waste, clean their home with non-toxic products, properly store food so it won't go bad, or fix something instead of buying something new, you as a Master Recycler will be challenging the very basic human tendency to resist change.

Let's be clear that Master Recyclers are not in the business of changing people's minds about the environment. We don't need to research shows that most people in our region are already open to recycling, composting, reducing toxics and consuming sustainably. This is fortunate because it is pretty tough to change a person's basic values.

The Master Recycler mission is to bridge the gap between intention and action by motivating people at home and at work to reduce waste. So we are in the business of helping people take the actions they already want to take.

You don't have to have a psychology degree to effectively change behavior. But it doesn't hurt to understand how people make decisions about taking new actions and changing behaviors. This chapter explores the relationship between the science of behavior and sustainable living. It will describe techniques that use this science to encourage behavior change. The techniques come from a number of **social marketing** theories and practices. The goal is to use science to help you motivate people to take action.

In a nutshell, research indicates that if you have had success in making pro-environmental changes in your own life, then you are well positioned to inspire those around you to make similar changes. You can do this by: 1) sharing your story about how you struggled and succeeded, 2) sharing your favorite places to go for resources and 3) helping build community support and systems for others to take action.

THE PROCESS OF CHANGE

Change is a process

Before exploring some reasons that people act or don't act, it is helpful to understand the process that people go through in order to make a lasting change in their habits. The environmental movement tends to operate as if behavior has an on - off switch. The theory goes that one day we throw a tin can in the garbage; we learn that we should recycle; the next day we decide to throw a tin can in the recycling and we never look back. Environmentalists who assume that information is the key to change get frustrated when people don't act in a way that is known to be good for the environment.

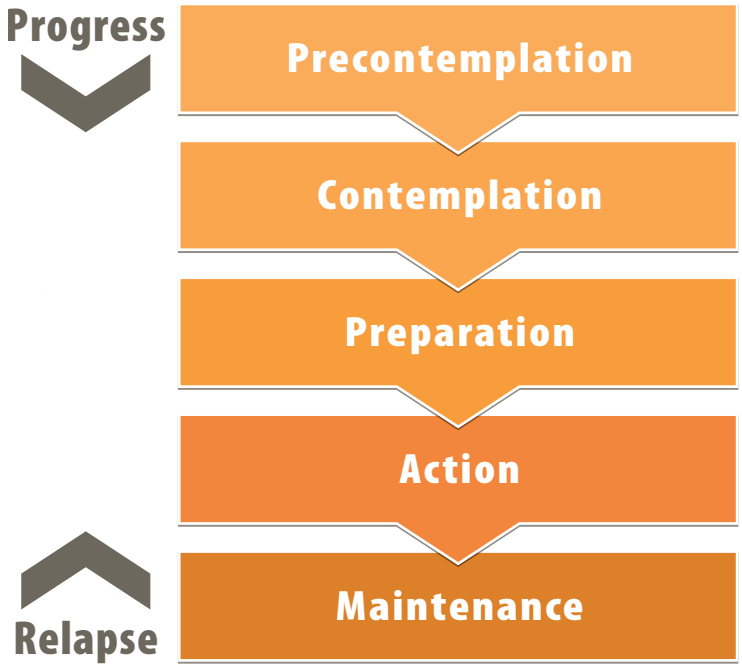
Health psychologists, however, have known since the 1970's that most people don't go from inaction to action just because they receive a piece of information. Rather there are stages to behavior change.

According to the Transtheoretical Model of Behavior Change there are five stages on a spectrum of readiness to act. These stages are: precontemplation, contemplation, preparation, action and maintenance. This model proposes that people must build up the motivation and know-how to change and that this motivation is dependent on a number of personal and social factors. (Note: This model was developed in the field of public health, so it refers to healthy and unhealthy behaviors. You can substitute sustainable and unsustainable.)

DEEP DIVE

More information about the Transtheoretical Model of Behavior Change is available online in ***Stages of Changing Unhealthy Behaviors****. Boundless Psychology.*

STAGES OF CHANGING UNHEALTHY BEHAVIORS



At the **precontemplation stage**, an individual may or may not be aware of a problematic behavior, and generally has no desire to change their behavior.

At the **contemplation stage**, participants intend to start the healthy behavior but are still ambivalent. They have not yet committed to take action.

People at the **preparation stage** have decided that they are committed to make a change, and take small steps that they believe can prepare them to make the healthy behavior a part of their lives.

In the **action stage**, people are trying out the new behavior, experimenting, and working through challenges to keep moving ahead.

This model recognizes that even after a person takes the action for the first time, they must then commit to a **maintenance** process, which is the final stage.

Importantly, the progression through these stages is not strictly linear. People may move back and forth between the stages as their motivation changes or as they run up against various barriers. Often people relapse in their behavior multiple times or may get stuck in one of the stages.

Environmental behaviorists believe that the best strategy for change is to identify some of the moments in this continuum when an intervention, such as a tool or piece of information, might help move a person through a barrier and motivate them to move to the next stage.

So, how might these stages actually play out? Let's take a closer look at the five stages in the context of a desired behavior change. We'll observe the visible behaviors and also speculate about the thinking that might produce these behaviors. Because we can't know what other people are thinking just by observing their behavior, we have included multiple possible explanations, even though these might be overwhelming.

Desired behavior: Keep plastic bags out of the recycling.

Precontemplative stage:

What it looks like: Plastic bags are in the mixed recycling.

Possible beliefs and thoughts: Not aware that bags cause problems for recycling and are a safety hazard to workers. Believes that sorting recycling is difficult, takes time, or doesn't make a difference. Believes that plastic bags belong in the recycling. Puts plastic bags in the recycling because they see bags there already. Uses plastic bags to collect and carry their recycling from the kitchen to outside containers.

Contemplative stage

What it looks like: Plastic bags are in the mixed recycling.

Possible beliefs and thoughts: Learned that plastic bags don't go in the recycling, but not sure if they are concerned enough to change their behavior. Believes that sorting recycling is difficult, takes time, or doesn't make a difference. Wonders how bad it really is to put plastic bags in the recycling. Doubts the source where they learned you shouldn't put plastic bags in the recycling. Sees plastic bags in other peoples' recycling containers. Detests the idea of putting plastic bags in the garbage. Believes that the City or hauler or recycler should figure out a way to recycle plastic bags.

Weighing alternative options. Not sure how else to get recycling from the kitchen to the outside containers. Not aware of waste prevention and alternative recycling options. Wondering if waste prevention and bringing plastic bags to alternative recycling locations is time consuming, takes up space or is unsanitary. Wondering if they bring plastic bags to a store will they really recycle them or just throw them away. Questioning if the production of durable bags and washing and reusing bags is better or worse for the environment.

Preparation stage

What it looks like: Plastic bags are in the recycling, or plastic bags are piling up in the kitchen, or plastic bags are in the garbage.

Possible beliefs and thoughts: Committed to not putting bags in the recycling. Talking to everyone in the household, apartment complex or office about making the switch. Asking people they know about alternatives. Looking online or making phone calls to learn about alternatives. Shopping around for an environmentally friendly or affordable reusable bag. Looking for a free durable bag. Creating a space in the kitchen to store and dry plastic bags. Looking into alternative options for carrying recycling to the recycling containers.

Action stage

What it looks like: Plastic bags are never or only sometimes in the recycling.

Possible beliefs and thoughts: Trying out the various options. Some people in the household, apartment complex or office have made the switch and some have not. Forgetting sometimes to put plastic bags in their new place. Feeling good about making the change. Feeling frustrated with the mess or fuss. Starting to notice that they use a lot of plastic bags because they are focused on them right now (this can lead to a decision to reduce the use of bags rather than just recycling them).

Maintenance Stage

What it looks like: Plastic bags are never or seldom in the recycling.

Possible beliefs and thoughts: This is something we do. Setting up a plan to inform new roommates, tenants or co-workers. Regularly taking plastic bags to recycling depot or cleaning reusable bags.

BARRIERS, BENEFITS AND SOCIAL NORMS

Environmental psychologists find that people will move from one stage to the next at different rates. Some people are early adopters, innovators and tinkerers and readily try new things. Most of us however, tend to move slower. Environmental behaviorists explore the sometimes unconscious reasons why people get stuck in a stage and what might motivate them to move forward. Only after understanding the benefits, barriers and pertinent social norms do they design programs, systems and strategies to address those specific issues.

Barriers and benefits

To take a new action or even move to a deeper level of commitment to take the action, people weigh the benefits and motivations against the barriers and costs of changing what they habitually do. They usually make this comparison in a completely unconscious state. It is as though they are mentally and emotionally collecting pebbles to place on a scale. Each pebble is placed on either the change side of the scale or the inertia side. If there are enough pebbles to tilt the scale from inertia to change, then they can move onto the next stage. One task for those of us wanting to help people to make change is to identify barriers that block people from taking the desired action and see if we can avoid, minimize or remove that barrier. There are several types of barriers.

Structural barriers

Some barriers to action are physical or structural. In some parts of our country recycling markets are not easily accessible. It becomes economically infeasible for the local government to build a collection system for recycling if there is a lack of local recyclers who will process the material, no local industry, and no port to easily get the materials to another area of production. Some local governments have also set up the collection system so that it costs the same, or even more, to place materials in the recycling container rather than the garbage. The lack of recycling infrastructure and charging to recycle are true barriers for many in the US.

In our state, recycling markets for the core materials accepted at curbside are strong, and the state offers a pay as you throw system, meaning you pay for the collection system based on the amount of garbage you throw out. So those two barriers are removed for many in our region. However, some communities still experience structural barriers. Consider the large apartment complex where the property manager and the local hauler have not communicated well and have not set up adequate recycling containers with clear signage. For people living in that complex, the recycling containers, overflowing with both garbage and recycling, is a structural barrier to getting their materials to a recycler.

Fear of risk and sacrifice as a barrier

Through researching benefits and barriers accounting, scientists have concluded that humans tend to resist change and avoid risk. We typically underestimate the benefits of changing and overestimate the costs. Short term gains are also typically given much more weight than long term solutions. So if we hear about, or even guess at, potential risks or costs associated with a change we are likely to avoid it, even when we believe it is the right thing to do. We will sometimes stay in intensely uncomfortable situations for a long time before we are willing to take the risks associated with a change.

Conservation movements have a long tradition of working counter to human psychology by calling on the public to sacrifice individual wants for the greater good of the planet. But even when President Jimmy Carter laid out the extreme costs of our level of energy consumption during the energy crisis of the 1970's, his message that we must sacrifice for the future fell flat for many Americans. Americans were generally unwilling to sacrifice present comforts for future benefits, even though President Carter had the weight of the Presidency on his side and many people were fed up with gas lines and international power struggles over oil. Even in these extreme circumstances the message of sacrifice was ineffective.

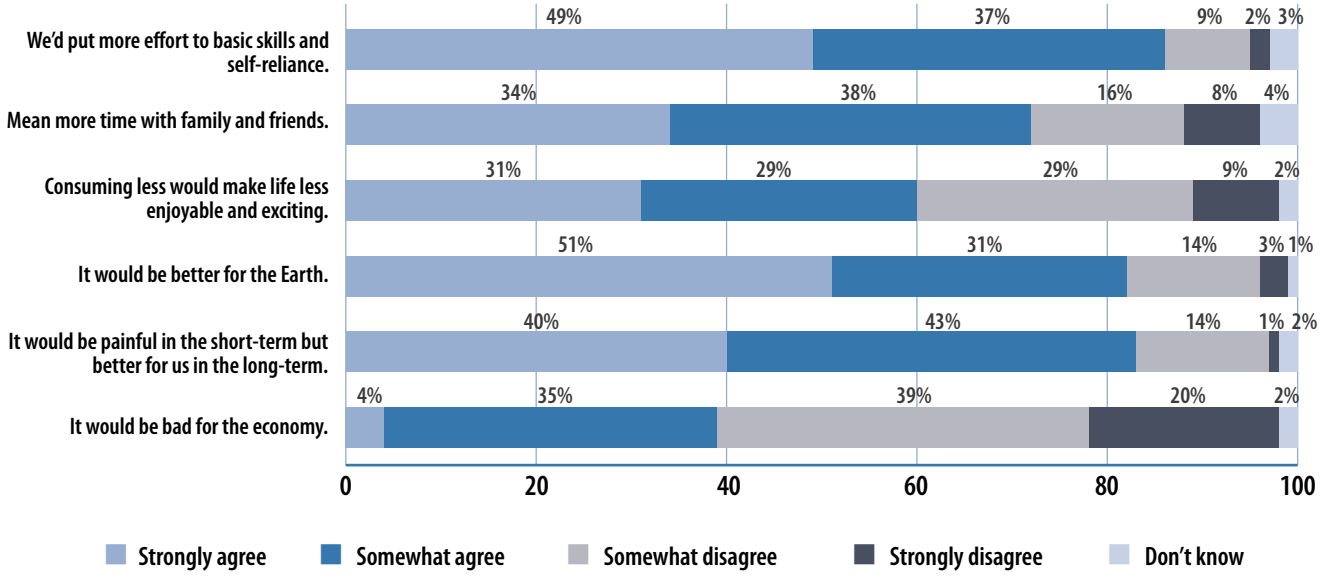
Happily, in the work we do as Master Recyclers, there are plenty of alternative ways to talk about actions and behavior change that don't focus on sacrifice. You will be learning about these later in the chapter and throughout the course.

Benefits: Make it positive

Choosing messages that describe actions that people can clearly see themselves taking can help make those actions seem easier. Two recent local polls showed that Oregonians want to consume less, but if this behavior change is framed as giving something up, most people are unlikely to change.

The first study was a statewide poll of a demographically, geographically and politically representative sample of Oregonians (see Tom Bowerman graph). Residents were asked a series of questions about what they thought might happen if Americans "consumed less." Democrats and Republicans alike felt like it was the right thing to consume less. Eighty-five percent of those polled felt that it would be good for the earth if we consumed less. There was also a sense that it would build self-reliance and enable more time with family. But despite those anticipated benefits people felt that consuming less might make life less interesting and would be hard in the long run. They were fairly split about whether they thought the economy would suffer if we consumed less. These are troubling results if we want people to do more than think about consuming less.

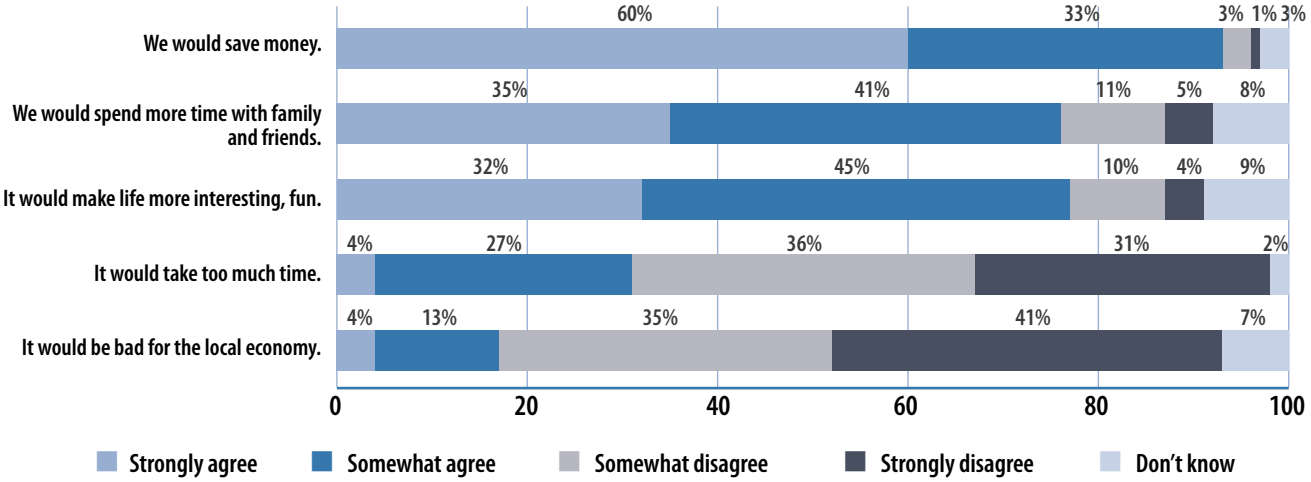
PERCEPTIONS ABOUT CONSUMING LESS – BOWERMAN 2009



Source: Bowerman (2009)

The second study, however, shows that if this change is framed in a way that highlights benefits rather than sacrifices, that people are much more likely to change their behavior. A demographically representative sample of Portland residents were asked about how willing they would be to reuse, borrow, share, rent or fix and maintain. After they discussed their willingness to try some of these activities, they were asked what they thought would happen if Portlanders did these activities.

PERCEPTIONS ABOUT RESOURCEFUL ACTIVITIES



Source: DHM Research (November 2011)

Like the Bowerman study, this study showed that people have a strong association with these activities and protecting the environment. But it also showed that they believed these activities would give them more time with their family, save them money and would make life more interesting. They also did not agree that it would necessarily be hard to take these actions, and they disagreed fairly strongly that it would be bad for the economy.

While this is only one study, it suggests that framing the solution positively, in terms of benefits, can be much more effective. The first study focused on people consuming less. This sounds a lot like giving something up. The second study described the desired activities in simple words and focused on things you would be doing rather than things you would be giving up. These actions seemed clear and easy to do and there was little perceived risk.

Benefits: Emphasize a variety of values

If we believe that an activity matches up with our existing core values, we will be more motivated to change. Similarly, if we believe that an activity is contrary to our core beliefs about who we are, we are not likely to even consider taking the action. People draw on many sets of beliefs – religious, cultural, ethical, environmental, economic – when deciding what that right thing to do is.

When promoting an action, it is important to apply a number of positive values to the activity rather than focusing just on the environmental benefit. If they do not consider environmentalism a core value, you will lose their attention. This is why you find a person that is actively biking to work, but throwing recyclables in the garbage. If you think that they are biking for environmental reasons, it mat seem odd that they wouldn't also recycle. But perhaps they are biking for exercise, they don't have a car or they enjoy biking in the company of their coworkers. It doesn't really matter to the environment why they are biking. This activity still helps the environment.

Making climate-friendly food choices is good for our planet. It is also good for your family's health, better for our small farmers, keeps workers safe from pesticides and the food tastes fresh. But you have to pick your battles. Some activities will go against a core value of a large number of people. For instance, the most climate-friendly food choice you can make is to stop eating red meat. But research shows even in Portland, that many people will stop the conversation altogether when asked to consider this action. From hamburgers to carne asada, red meat is part of many family cultures. Instead, you may have focus on activities that are more broadly appealing, such as eating more unprocessed fruits, grains and vegetables.

Values and concepts that appeal to many Portlanders:

- ***Personal well-being***
- ***Saving money***
- ***Health***
- ***Family***
- ***Community***
- ***Environment***

TERM

Norm: *1: an authoritative standard. 2: a principle of right action binding the members of a group and serving to guide, control, or regulate proper and acceptable behavior.*

Social norms

As social animals, it is important to us that we fit in. We are strongly compelled to live and act in a way that is socially acceptable to others in our community. People in the precontemplative and contemplative stages will consider what they perceive their peers and leaders think when deciding whether to take an action. It is important to understand how norms work in order to assure that you are not asking people to act contrary to what they consider socially acceptable behavior.

How do you think we understand what is normal in our community? What clues do you personally use to understand what is okay? From a young age we navigate our community's sense of right and wrong. Some of this is done through explicit communication ("We don't throw food."), while much of it happens through more subtle clues and observations (No one else seems to be throwing food).

Prescriptive norms

One way people understand what is acceptable behavior in the community is by listening to people they trust. Community leaders, authority figures and peers will tell people what they think is ***the right thing to do*** and so they believe it. Psychologists call this a prescriptive norm. People may even adjust their core values based on what they hear from trusted sources.

Community-based social marketers will utilize trust in community leaders by asking various figures to act as ambassadors of a message. Sometimes this is done by creating ambassadors to carry a message (like Smokey the Bear asking people to prevent forest fires) or by asking existing ambassadors to promote a cause (like Michael Jordan supporting Boys and Girls Club).

Prescriptive norms do not just come from leaders in a community. We also learn about what is right from peers. In this case, community-based social marketing may involve showing people who are similar to the intended audience, declaring that they voted, or gave blood or recycled, because they think it is the right thing to do.

This is one of the most powerful aspects of the Master Recycler program. Master Recyclers are members of diverse communities all over the region who wear a badge in order to show that you think that it is important to conserve our natural resources. You are all powerful and valuable ambassadors.

Descriptive norms

Another, more subtle way that people come to understand what is normal is through descriptive norms. People look for visual clues and other information that conveys what people around them think is normal. We will use littering as an example to illustrate how descriptive norms work. Studies have shown that people will walk down two different streets and make different decisions about what they should do with their trash. If there is already a lot of litter on the ground, many people will conclude that is acceptable and will litter, even when there are garbage cans and do not litter signs. If the street is pristine, people have been shown to carry their garbage a long distance instead of littering. Community-based social marketers would state that you need both the garbage cans with do not litter signs and consistent pickup of random trash to effectively stop litter. That way you have made the task easy, and the descriptive norms are consistent with the desired behavior and the prescriptive norms (that is, the do not litter signs).

Community-based social marketers feel that it is important to actively display environmentally friendly behavior as something everyone does. People can see their neighbors' solar panels. Helmets, bike bags and rain gear in the office are visual social cues that bike commuting is normal. But some actions are less visible and so may be perceived as not happening.

You cannot see that your neighbor has a pesticide-free garden or that they only put their garbage and recycling out once a month. Without prying into their desktop, you might not notice that your co-worker has switched to electronic filing. A common community-based social marketing strategy is to make visible activities that you cannot usually see by strategies such as signs, buttons and story-telling. For example, Metro's Pesticide Free Zone pledge includes a sign that you place in your garden so that people know that you have committed to not using pesticides.

Interestingly, misperceptions about what is normal can override what is actually normal. A study done by the National College Health Assessment demonstrates this phenomena. The study surveyed 76,145 students from 130 colleges. They asked the students how much they drink and how much they think their peers drink. They discovered that students believe that their peers are drinking more than they actually were. They also found that students felt that they had to keep up with the level they believed that their peers were drinking. So while the drinking was not at the same level as perceived, it was higher simply because of the misperception itself. The study concluded that schools that do not seek to reduce these misperceptions are neglecting a potentially powerful component of prevention.

These conclusions are directly applicable to the work of a Master Recycler. It is often perceived that most people don't care very much about recycling, and so maybe it is okay to occasionally join others and throw recyclables in the garbage. But when surveyed, the majority of the community considers themselves recyclers. The more that story is told, the more motivated people will be to place recycling in their proper container.

Why shaming does not work

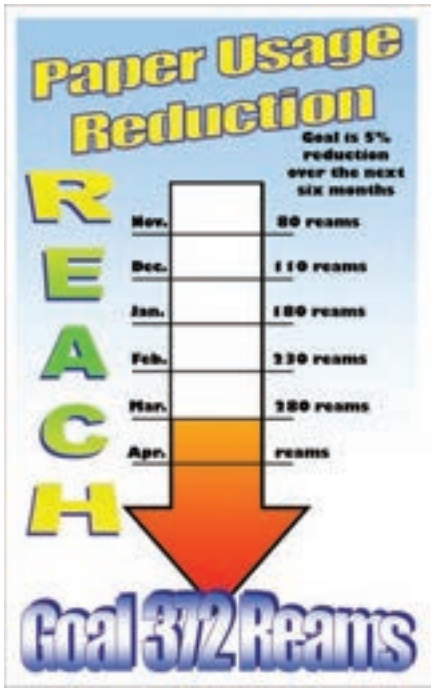
Conservationists tend to believe that if you share data about what big consumers we are enough times, people will feel ashamed and stop. Perhaps, you've seen this dubious statistic that is found widely on the Internet and in public presentations: "Americans are big consumers: we make up 5 percent of the world's population and yet consume 95 percent of the world's resources." While this is clearly an exaggeration, the following statistic, which can be verified by the State of Oregon, is also commonly used to emphasize our overconsumption: "Oregonians throw away 3.5 pounds of trash every day." You also hear people trying to use shame to effect change in the break room with statements like, "No one in this office is properly sorting their recycling." Despite the frequent use of shame, behaviorists report that it is not an effective tool for behavior change.

Shaming has two main problems. First, it makes people feel bad without necessarily addressing the barriers that are keeping them from changing. Second, shaming can actually reinforce the sense that these environmentally unfriendly behaviors are normal. Americans, Oregonians and co-workers are peers. These statements make it clear that you will have to defy the norm if you want to consume less and produce less waste. Some people are willing to be unconventional in order to do the right thing, but many are not.

People are much more likely to take the environmentally friendly action if it is the right thing to do and they believe that it is also a normal thing to do. These are examples of ways to norm the desired behavior: "Oregonians are making a difference! We recycle enough to reduce the equivalent of 2.9 million tons of carbon dioxide. That's as if we removed 670,000 cars from the road every year." "Hey everyone, we are doing a great job working toward our goal of recycling in the office."

A grocery list is a tool that reduces food waste

Metro's Pesticide Free pledge



Progress chart builds team spirit

TRICKS OF THE TRADE

Community-based social marketers use a number of techniques to emphasize social and personal benefits and remove barriers. By using a strategy that specifically addresses the barriers or benefits of the specific action, community-based social marketers believe they can propel individuals and communities through the stages of change.

Tools

Tools are especially helpful in addressing barriers or helping form habits. If a barrier to riding your bike to work is feeling unsafe, then an effective tool might be a map of the safest routes and a buddy who will ride with you the first time. A grocery list is an effective way to help people plan their shopping so that they do not waste food. A recycling box next to your desk will make it easier to recycle a piece of paper, than if you need to walk to the recycling box in the break room.

Commitments

People are more likely to take action if they publicly state that they plan to do it. It is also true that if people try something for about 10 weeks, they will have worked out the biggest problems and have discovered it is easier than they thought it would be. So a popular technique is to ask people to commit to try it for a given period of time.

Prompts

Even after we make the commitment, it is sometimes hard to remember to take the action. How many times have we planned to use a reusable bag, but discovered when we got to the check stand that we left the bag in our car? Community-based social marketers use prompts carefully placed right where people are likely to take the action. Your car window or the parking lot of the store are great places for a decal that reminds us to take our bag out of the car.

Transactional benefits

Sometimes we just need a little coaxing to tip the scale of benefits. Wherever possible, it is helpful to offer some extra incentives. Integrating prizes, public recognition, gold stars, even discounts and cash are great ways to tip folks toward commitment, or to help them stay motivated to keep going. Sometimes just demonstrating a group's success toward a goal in a public way can help people feel more connected to taking that action.

COMMUNITY-BASED SOCIAL MARKETING CHECK LIST

Whether you are starting a green team at work, improving recycling in your apartment complex or trying to reduce food waste in your household, these steps can help you develop strategies that can make the project fun, positive and effective.	☑ Identify a go-to positive behavior you want people to do.
	☑ Identify the barriers to the action.
	☑ Identify who is doing the action and what they value.
	☑ Create messages and tools that help overcome barriers and reinforce benefits.
	☑ Get people to try it.
	☑ Set goals and give feedback.

CONCLUSION

Can you really make a difference?

Some reputable people will challenge the value of a chapter focused on environmental behavior change. They worry that it is not enough to focus on individual actions given the scale of the environmental challenges we face today. They are concerned that manufacturers will not be willing to make the shifts in priorities. They argue that energy is better spent on city design, buildings and policy.

To be sure, we are facing global problems that will require global and systemic solutions. Today's level of consumption is at a scale such that our very climate, which makes the planet habitable, is at stake. With our consumption of resources dramatically overshooting the earth's capacity to renew those resources, slowly changing behaviors can seem futile. The global economies and inequities that drive unsustainable consumption must be addressed.

In light of these systemic problems, it leaves a person wondering what difference they can make.

As individuals and community leaders, Master Recyclers can play a unique role in making much needed change on both a systemic and individual level. So far, the handbook has explained materials management on a systems scale. The next section describes how these systems play out in our lives. You will learn specific individual actions that will effectively conserve natural resources, curb climate change and pollution, and help all people live healthier more satisfying lives.

You will also learn how you can leverage this information to make the biggest difference, not only by supporting individual change, but also by navigating existing systems to build change at a community level.

Master Recyclers and the System

Some of the barriers to action that people face are systemic. It may be problematic to tell people in an apartment complex to recycle properly when their containers are overflowing and unclearly marked. Simple access to the necessary tools and resources are often lacking. An economy that prioritizes the growth in production sometimes also results in laws (or the lack of them) that prohibit the environmental actions we are promoting.

Policy, infrastructure and program design will be described throughout the handbook as well as by presenters in class so that you are informed about where current laws are lacking or even get in the way of taking action. You can share this information in your own community, act on advisory committees or even let your local officials and representatives know where you stand on policies. You can also learn how to make systemic change by voting as a consumer.

Building a community of change

We don't have to wait for government and manufacturers to build systems change. Master Recyclers create projects in their own communities that bring together internal strengths and resources needed to take action. Your community is rich in assets and skills that will be needed to create community change. The Master Recycler program partners with over 50 community organizations so that you can join in building community infrastructure that supports sustainable consumption. You will learn about tool lending libraries, repair fairs, the Rebuilding Center, Community Warehouse, Scrap, seed swaps, and Free Geek, all of which are avenues for helping people conserve natural resources.

You will also learn how to work in your own community of friends, family, place of work, apartment complex, community of faith or neighborhood to build smaller scale systems together. Organize a recycling collection day or a garage sale in your block. Start a green team at your work or kids' school.

Even setting up an information booth at your local community gathering and connecting people to the resources they need to take action is helping build the community connections needed to make change.

Individual behavior makes a difference

Without a doubt, to bring systemic change, the systems must change. Laws and built environments must be designed to reduce consumption. But if people don't use them correctly, it could still amount to no change. Research shows that energy efficient buildings are only maximally efficient when the occupants learn to turn off lights, purchase efficient appliances and understand how to maintain the building. Cities have built compost facilities, created collection systems and then only get about 10 to 20 percent of the food recovered because people did not make the behavior change.

Climate experts at the Garrison Institute calculate that behavior change could amount to as much as 1 billion metric tons of carbon emissions reductions, which is not insignificant at 1/8th of what is needed to stabilize emissions. They are clear it is not all the change that is necessary, but it is a significant wedge of the pie, and one we cannot afford to ignore.

Individual behavior change is absolutely essential as is behavior change at the community level and these two kinds of change are interrelated. Supporting individual change and helping to build communities of change are the central concerns of Master Recyclers. You will all play important roles in helping individuals (including yourself) to make changes and in scaling those changes up to the community level. Sometimes this sort of change will lead the way and drive the development of new laws and policies, while other times it will be essential in ensuring that laws and policies produce the desired results.

The scope of our current environmental challenges is daunting, but be confident that you can and will make a real difference.