Materials Management Program

2022-23 Report to the Legislature

Submitted to: Oregon Legislative Assembly
By: Materials Management Program

May 2023

State of Oregon
Department of Environmental Quality

This document was prepared by
Oregon Department of Environmental Quality
Program Name
700 NE Multnomah Street, Suite 600
Portland Oregon, 97232
Contact: Jaclyn Palermo
Phone: 503-209-8238
www.oregon.gov/deq

State of Oregon
DEQ Department of Environmental Quality

Translation or other formats

Español | 한국어 | **繁體中文** | **Русский** | **Tiếng Việt** | العربية
800-452-4011 | TTY: 711 | deqinfo@deq.oregon.gov

Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age or sex in administration of its programs or activities. Visit DEQ's Civil Rights and Environmental Justice page.

Executive Summary

The Materials Management Program at the Oregon Department of Environmental Quality reduces the environmental, social and health impacts of materials that people in Oregon make, use and discard. Materials Management does this by promoting waste prevention, the sustainable production and use of materials and proper management of waste. The report uses 2022 data, unless otherwise specified.

Materials Management's work is guided by *Materials Management in Oregon: 2050 Vision and Framework for Action* and the updated *2020 Framework for Action*. The Environmental Quality Commission adopted the *2050 Vision* in 2012 to update Oregon's solid waste management plan. It emphasizes the sustainable use of materials across all stages of their life cycle, from their design and production to their use and final disposal. This approach includes strategies for waste prevention–such as by encouraging reuse and repair to extend the useful life of a product–in addition to the more traditional strategies of increasing rates of recycling, composting and energy recovery.

In 2021 and 2022, the Materials Management Program continued working and collaborating with other entities to reduce the impacts of materials that are made, used and disposed of in Oregon. This work involves modernizing Oregon's recycling system, promoting food waste prevention and sustainable food waste management, sustainable government procurement, reducing climate impacts in the built environment, developing new measures of environmental outcomes, reducing toxics and incentivizing cleaner production. The Materials Management Program also continued work in solid waste management–permitting, inspections, investigating complaints, approving qualifying beneficial use requests and overseeing corrective actions. The program collaborated with DEQ's Cleanup Program to redevelop and clean up closed landfills and disposal sites, ensuring that these sites are designed, operated, closed and cleaned up or redeveloped to protect the environment and human health.

Examples of the program's accomplishments in 2021 and 2022 include:

- Engaging in a strategic planning process to update the Materials Management grant program to align funding decisions with the 2050 Vision and better serve the diverse local governments, businesses, nonprofits, schools and communities across Oregon.

- Collaborating with partners across the recycling system to modernize Oregon's recycling system through the Plastic Pollution and Recycling Modernization Act (Senate Bill 582), passed during the 2021 legislative session. The act updates Oregon's outdated recycling system by building on local community programs and leveraging the resources of producers to create an innovative system that works for everyone.
- Continuing priority work to prevent the wasting of food and progress toward the directive in the Governor's Executive Order 20-04 to reduce food waste by half by 2030. This work includes organizing Oregon's first Food Waste Prevention Week in 2021, research-based messaging targeting waste generators in residential areas, ongoing support of regional food waste reductions through the Pacific Coast Collaborative and delivery of commercial food waste prevention workshops across the state.
- Overseeing Oregon's E-cycles program for collecting electronics waste. In 2022, there were 185 collection sites, including public and private transfer stations, landfills, recycling and refurbishment centers, thrift stores and retail locations.
- Providing oversight for PaintCare, a paint stewardship organization, that provides collection locations where the public can take unwanted, leftover paint for recycling. In 2021, PaintCare maintained 183 permanent collection sites.
- Approving plans by two program operators to implement drug take-back programs in Oregon. The programs launched on July 1, 2021 and offered over 300 drop-off sites across the state for in-person medicine disposal, free mail-back envelopes, and other take-back services.
- Establishing a statewide system for the financing, collection, and environmentally sound management of discarded mattresses through the Mattress Stewardship Act (SB 1576).
- Publishing the Waste Impact Calculator in 2021, a model that bridges the gap between traditional weight-based and more holistic impact methods of measuring solid waste. The model allows DEQ to input standard weight-based solid waste data and output estimated life cycle impacts for those same materials, thus providing a foundation to evaluate policy options.
- Evaluating a list of over 500 potential local government and private solid waste orphan sites to determine eligibility and prioritize sites. In fiscal year 2021, DEQ worked on numerous solid waste orphan sites, including a tire disposal and auto scrap yard, a metal scrap yard and clandestine drug lab, an auto dismantler and crusher, and a lumber yard.
- Overseeing more than 300 disposal site permits and 24 waste tire permits statewide in 2021 and 2022.

These accomplishments took place while DEQ continued to adapt to changes due to the ongoing COVID-19 pandemic.

Table of Contents

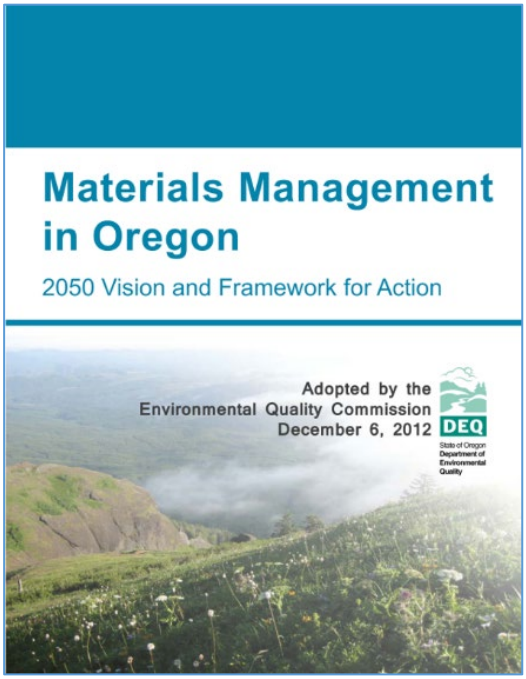
1. Purpose and legal context **6**
2. Introduction: Our Vision and Framework for Action **6**
3. Program priorities **7**
3.1 Lifecycle programs 8
3.1.1 Preventing the wasting of food 8
3.1.2 Built environment 10
3.1.3 Sustainable procurement 12
3.2. Community Involvement 13
3.2.1 Grants to small businesses, nonprofits, local governments, and schools 13
3.3 Measurement 14
3.4 Waste recovery and disposal 15
3.4.1 Product stewardship 15
3.4.2 Household hazardous materials management 21
3.5 Oregon's material recovery and waste generation rates 22
3.6 Management of solid waste and solid waste disposal sites 26
3.6.1 Solid waste disposal facilities and permits 26
3.6.2 Short-term disposal permits and beneficial use determinations 28
3.6.3 Solid Waste Orphan Account 28
3.6.4 Complaints response 29
4.0 Conclusion **30**

1. Purpose and legal context

This report informs the Oregon Legislature about the work of DEQ's Materials Management Program, with a focus on 2021 and 2022. It fulfills DEQ's requirement under ORS 459A.015 and 459A.020 to report biennially to the Oregon Legislature on Oregon's Integrated Solid Waste Management Plan, updated in 2012 as *Materials Management in Oregon: 2050 Vision and Framework for Action*. This report also fulfills DEQ's requirement under ORS 459A.340 to report on the operations of Oregon E-Cycles, the statewide system for collection, transportation, and recycling of covered electronic devices.

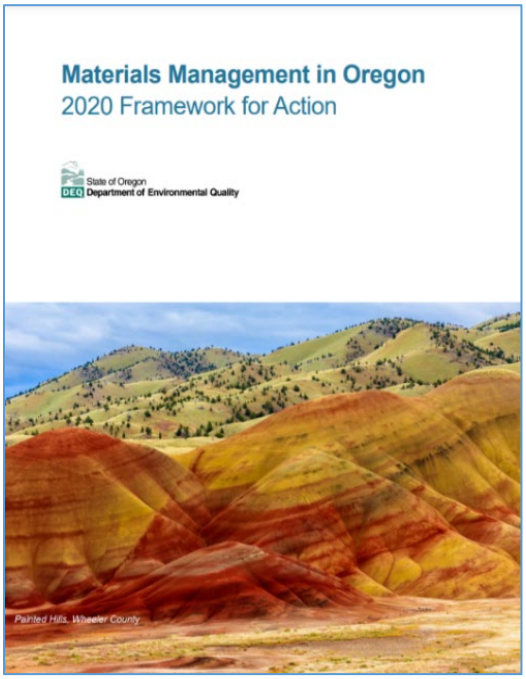
2. Introduction: Our Vision and Framework for Action

Oregon law (ORS 459A.020) requires the state to have an integrated solid waste management plan. In 2012, the Environmental Quality Commission, DEQ's governing body, approved a major update to that plan, *Materials Management in Oregon: 2050 Vision and Framework for Action.*



The *2050 Vision* adopted a "materials management" approach to waste management. This approach considers environmental and human health impacts across the full life cycle of materials, valuing strategic choices that reduce the most significant impacts. As detailed in the *2050 Vision*, many environmental impacts – such as resource depletion, pollution and greenhouse gas emissions – stem not just from how materials are disposed, but also how they are produced, used and managed. DEQ estimates that 66.3% of greenhouse gas emissions associated with Oregon's consumption of goods and services in 2015 occurred before the point of purchase.

The *2050 Vision* describes an Oregon where producers make products sustainably, people live well and consume sustainably and materials have the most useful life possible before and after discard. It includes a list of about 50 actions as a framework to achieve the Vision.



In 2020, the Materials Management program updated the original Framework for Action. The *2020 Framework for Action* elaborates on core values and priorities, including emerging work. The 2020 update serves four primary functions, including:

- Serves as a flexible platform to guide progress toward the *2050 Vision.*
- Identifies Materials Management's priority areas.
- Articulates core values and guiding principles.
- Provides a framework for how to apply the sustainable materials management approach.

The *2050 Vision* remains unchanged and will continue to be DEQ's guiding compass and embody the program's overarching objectives.

3. Program priorities

Using the core tenets of sustainable materials management and applying life cycle thinking, the Materials Management Program identified several priorities critical to achieving the *2050 Vision*. These priorities, identified in the *2020 Framework* update, include a focus on materials that have significant environmental and health impacts (e.g., air pollutants, toxics, and major contributors to greenhouse gas emissions); engagement with existing and new partners and collaborators; and other areas that are critical to achieving the *2050 Vision*.

These priorities are divided into four categories: life cycle programs, community involvement, measurement, and solid waste and recovery.

3.1 Lifecycle programs

3.1.1 Preventing the wasting of food

Growing, eating, and disposing of uneaten food contributes to significant environmental impacts. An estimated 35% of all food produced or imported for consumption in the United States is never eaten. Wasted food has environmental consequences that go far beyond the impacts of disposal in landfills. Preventing food from being wasted is six to seven times more effective at preventing greenhouse gas emissions than putting wasted food through composting or anerobic digestion according to the Environmental Protection Agency's Waste Reduction Model. Both the *2050 Vision* and the Oregon Global Warming Commission's *Interim Roadmap to 2020* identify preventing food waste as a priority for Oregon because of the environmental burdens associated with the production, distribution, refrigeration, preparation and disposal of food. Further, former Governor Kate Brown's Executive Order 20-04, issued in March 2020, highlighted the priority of food and directed DEQ to "take actions necessary to prevent and recover food waste, with the goal of reducing food waste by half by 2030."

Priority food projects

DEQ continued to implement work described in its 2017 *Strategic Plan for Preventing the Wasting of Food*. DEQ developed a statewide campaign based on research completed in 2020 that identified effective messaging to motivate consumers to reduce food waste. The "Bad Apple" campaign launched in October 2021 and both highlights the financial savings associated with reducing food waste and helps consumers with simple steps to reduce food spoilage. "Bad Apple" received a bronze Telly Award (a national recognition of excellence in the video and television industry) in 2022 for its excellence in social video. The campaign also received the Sustainable Oregon Award in 2022 from the Association of Oregon Recyclers.

DEQ continues to lead a regional coalition of interested states and cities to advance food waste reduction through the Pacific Coast Collaborative, an intergovernmental partnership aimed at fostering collaboration among its members—including U.S. states along the Pacific Coast, the Province of British Columbia and the cities of Vancouver (BC), Seattle, Portland, San Francisco, Oakland and Los Angeles. Within the umbrella of the PCC, DEQ and other PCC partners have developed the Pacific Coast Food Waste

Commitment, a voluntary effort to engage food enterprises to reduce food waste by 50% by 2030 and collaborate on identifying effective, industry-wide actions to reduce wasted food. Initiated in 2020 with recruitment of major national grocery retail chains, the project has now expanded to a whole supply chain approach that encompasses food manufacturers/processors, food service businesses and food distributors in addition to grocers. In 2022, the project successfully completed several pilot projects that will be used to inform food waste reduction efforts among the project's participants.

DEQ coordinated Oregon's participation in the first national Food Waste Prevention Week, held April 4-8, 2022. First developed as a state-based effort in Florida, the national week observance includes interactive social media activities that motivate consumers to reduce food waste, inform them about the impacts of food waste and provide tips on how to reduce food waste at home. Oregon contributed to the week by sharing messaging and images from the Bad Apple campaign, obtaining a Governor's Proclamation declaring the week "Oregon Food Waste Prevention Week," facilitating outreach to restaurants, and distributing Bad Apple campaign stickers on to-go and takeout boxes.

New strategic planning process

With the launch of the Bad Apple campaign, DEQ completed all planned projects described in the *Strategic Plan for Preventing the Wasting of Food*. The work conducted over the course of implementing the Plan indicated a need for additional analysis of complex and interconnected food systems. In response, DEQ conducted a food system mapping project to systematically document the Oregon food system and highlight areas for DEQ engagement. As a result of that project, DEQ identified three primary focus areas—sustainable food production, consumption, and waste management. DEQ also developed three key principles:

- Recognizing that food is central to well-being.
- Establishing as a priority ensuring that the benefits of the food system are distributed equitably to all populations in Oregon.
- Recognizing the importance of collaboration and prioritizing the co-creation of the next strategic plan with DEQ's partners across Oregon.

In 2022, DEQ began work on the next strategic plan by hosting a series of listening sessions with key partners focused on sustainable food consumption and food waste management. Listening sessions focused on sustainable food production are planned for early 2023. The listening sessions provide early input from partners about where DEQ should focus future efforts to reduce food impacts across the state. DEQ will identify key areas for additional study and plans to convene working groups comprised of key partners to build the next strategic plan for food impact reduction.

3.1.2 Built environment

The built environment is a complex system of buildings, infrastructure, utilities, and public and private spaces made up of many material types. The public interacts with the built environment daily by driving down a roadway, taking a stroll along a walkway or enjoying a local park. Over time, these daily interactions with various elements have both positive and negative impacts on our environment, health and well-being. The built environment has also been shaped by inequitable systems and policies that disproportionately distribute benefits and burdens, with the burdens being especially placed on communities of color, low-income and rural communities. DEQ's built environment work prioritizes its work by focusing on what will support these overburdened communities.

Building materials account for 8% of Oregon's 2015 consumption-based greenhouse gas inventory and, by 2050, 49% of total carbon emissions from new construction will be attributed to the embodied carbon of building materials[1]. Additionally, the built environment makes up nearly one-third of Oregon's waste stream; affects human health through exposure to toxics in materials, proximity to industrial manufacturing, indoor environmental quality, vulnerability during natural disasters; and continues to play a role in exacerbating environmental injustices and economic disparities.

State Buildings

Executive Order 17-20 aims to accelerate efficiency in Oregon's built environment, reduce greenhouse gas emissions and address climate change. The order primarily focuses on increasing the operational efficiency of new and existing buildings, but also calls for state agencies to play a leadership role in converting state-owned structures to carbon-neutral operations. This directive instructs the Oregon Department of Administrative Services and the Oregon Department of Energy to partner with DEQ to develop strategies that lower the embodied carbon of building materials used in the new construction of state buildings.

DEQ continues to actively work with multiple agencies and design teams to carry out this directive. DAS, ODOE and DEQ published Guidance to Agencies to Comply with Executive Order 17-20, Section 3(B) Directives to provide additional support to state agencies.

In addition to ongoing consulting with these agencies on the North Valley Complex renovation—which will house state laboratories and offices, DAS Executive Building renovation, and Oregon Liquor and Cannabis Commission headquarters and warehouse—DEQ completed a life cycle

[1] [1] UN Environment, "Global Status Report," 2017, https://www.worldgbc.org/sites/default/files/UNEP%20188_GABC_en%20%28web%29.pdf., U.S. Energy Information Administration, "International Energy Outlook," Sept 2017, https://www.eia.gov/outlooks/ieo/pdf/0484(2017).pdf

assessment for the new Oregon Department of Treasury Mill Creek Resiliency building. The results of this assessment are published in a summary report.

Figure 1. The Mill Creek Resiliency building is the first United States Resiliency Council Platinum-rated structure in Oregon and first building made seismically stable as a base isolated structure in the United States. *Photo credit: GBD Architects.*

Low carbon concrete

DEQ played a central role in helping the City of Portland to establish embodied carbon thresholds for concrete mixes on City projects over the past two years. Thresholds established by the City alongside a collaborative workgroup will go into effect January 2023.

DEQ also partnered with Carbon Leadership Forum, Birdsmouth Construction and Wilsonville Concrete Products to conduct a pilot project for low carbon concrete in residential construction. The study found that the low carbon mixes met concrete performance specifications, didn't cause any major delays to the project schedule and lowered the total carbon footprint of the mixes by 42% compared to the usual mixes.

Sustainable Buildings for All

DEQ published the *Sustainable Buildings for All* incentive framework and report in May 2022. *Sustainable Buildings for All* provides a template that local governments may choose to adapt and use to incentivize, and therefore accelerate, the development of building projects in their communities that achieve high levels of environmental performance, social equity and human and environmental health. DEQ convened a coalition of sustainability and equity experts and advocates in the built environment industry to develop the framework.

Pacific Coast Collaborative Low Carbon Construction Task Force

In 2021, the Pacific Coast Collaborative—which includes the U.S. states along the Pacific Coast, the Province of British Columbia, and the cities of Vancouver (BC), Seattle, Portland, San Francisco, Oakland, and Los Angeles—announced the launch of the Low Carbon Construction Task Force. DEQ sits on this task force and supporting the development pf a regional action plan to reduce or eliminate embodied carbon from construction along the Pacific Coast of North America by shifting practices toward clean construction in an equitable way.

Strategic Plan for the Built Environment

DEQ published the *Strategic Plan for the Built Environment* in February 2022. The plan was developed with input from a diverse steering committee that included DEQ staff and other collaborators with experience in architectural design and project management; building codes; diversity, equity, and inclusion; the design, manufacture, and composition of building materials; design justice; and community engagement.

The plan provides a comprehensive framework to guide built environment initiatives through priority areas of work and guiding principles. The steering committee identified the following high impact and high priority areas of work:

- Building relationships and capacity.
- Climate and resilience.
- Design justice and stewardship.
- Housing.
- Infrastructure.

3.1.3 Sustainable procurement

DEQ partners with other departments in Oregon and across the nation to promote sustainable procurement. The goal of sustainable procurement is to incorporate criteria related to environmental, social and economic sustainability into government procurements.

In the 2021-2022 biennium, DEQ continued its work with the Oregon Department of Administrative Services to develop its sustainable procurement program through research, technical assistance and strategizing program development. In 2022, DEQ and DAS finalized the sustainable procurement policy and proposed it to DAS leadership. DEQ also collaborated with DAS to incorporate sustainability considerations into statewide price agreements including for maintenance, repair and operations; nitrile gloves; information technology hardware; other equipment; pest management; and transcription services.

DEQ staff also continued to advise DAS on development of sustainable procurement training course materials, sustainable procurement metrics and specialized topics such as recycling of office furniture and paperless agency operations.

3.2. Community Involvement

3.2.1 Grants to small businesses, nonprofits, local governments, and schools

Since 1991, the annual Materials Management grants program has provided funds to recipients to reduce waste, build capacity for reuse and repair, support responsible recycling in rural communities and make progress towards the *2050 Vision*. Past recipients have included small businesses, local governments, schools and nonprofits from across the state. During these grant cycles, DEQ has awarded an average of $550,000 across 17 different projects each year.

In 2021, the Materials Management Program paused the grants program to better align the program with the *2050 Vision and Framework for Action,* to integrate stronger diversity, equity and inclusion considerations and to build a more accessible process to receive, award and process grants. In 2022, the grants program began a strategic planning process with support from a consultant experienced in creating more equitable sustainable materials management programs. Redesigning the grants program to better align with DEQ's strategic priorities will make the most of each dollar invested by targeting projects with the greatest potential to improve environmental and human health across the diverse communities around Oregon. DEQ expects the grants program to relaunch in mid-2024.

The grants program pause also allowed for the backlog of outstanding grant-funded projects to conclude, which were stalled due to the ongoing impacts of the COVID-19 pandemic. Some of the current active projects include:

- **Salem Public Library** created a new library collection of nontraditional items, a Library of Things, that library patrons can borrow. The project supports the purchase and loan of a variety of consumer goods such as cooking pans and appliances, yard and garden tools, electronic devices, games and toys, and sewing equipment.
- **Wallowa County** launched a new Mobile Recycling Program. The project supports staffing expenses and the purchase of a new trailer and bins to collect sorted recyclable material from local schools, community events and businesses for delivery to the County recycling center.
- **Repair PDX** piloted a repair voucher project, which provides economic assistance for repair costs, increases customers and therefore revenue for repair businesses, and elevates repair culture in Portland. The repair voucher program will subsidize the cost of repair service, allowing access to professional repair service for free or at reduced cost.
- **Habitat for Humanity Lane County** increased capacity to pick up more donations by purchasing a box truck, thus keeping more materials out of the waste stream and providing more inventory for sale.
- **ACCESS Food Share** used grant funds to cover costs associated with the distribution of emergency food boxes to hungry families and individuals in Jackson County through a network of over 24 food pantries. Nearly 1.2 million pounds of food are recovered annually, and the food recovered through Fresh Alliance leads to a direct reduction of

food waste in the local landfill and lowers environmental impact of the food industry in the region.

3.3 Measurement

The *2050 Vision* directs DEQ's Materials Management Program to minimize the environmental impacts linked to Oregon's use of materials across the life cycle of the material. This is a change from the conventional way of evaluating the environmental consequences of materials use. Most state and local governments quantify environmental impacts of materials use by measuring total waste generation in tons, or recovery rates of materials that would otherwise be discarded (e.g., the percentage of the total waste that is recycled or composted). DEQ also uses these measurements, per state law requirements, and annually publishes the results.

However, because the weight of solid waste is an incomplete indicator of life cycle environmental impacts of a material, DEQ has developed several unique measurement alternatives. The consumption-based emissions inventory is a comprehensive model of the life cycle greenhouse gas impacts of Oregon's economy. This model improves DEQ's ability to evaluate which actions will substantially reduce emissions from production, consumption, recovery and disposal of materials. The model provides data instrumental in identifying strategic areas for action, such as food waste.

Oregon's lawmakers recognized the need to gradually shift away from a weight-based approach in favor of the life cycle impacts of waste and materials. ORS 459A.012 allows Oregon wastesheds (usually counties) to report their local recovery rates based on an impact-based calculation, the "Alternative Recovery Rate," rather than sheer weight.

In 2021, Materials Management published the waste impact calculator, which bridges the gap between these weight-based and impact perspectives. The calculator, which is available both as base code and in a web application, allows DEQ to input standard weight-based solid waste data, and output estimated life cycle impacts for those same materials. DEQ uses the model to evaluate policy options, such as increasing composting or preventing food waste.

Beyond the calculating the Alternative Recovery Rate as the law requires, the waste impact calculator includes several other applications. In 2022, the model was extended to help evaluate the socio-economic costs of different management options under consideration for implementation of the Plastic Pollution and Recycling Modernization Act.

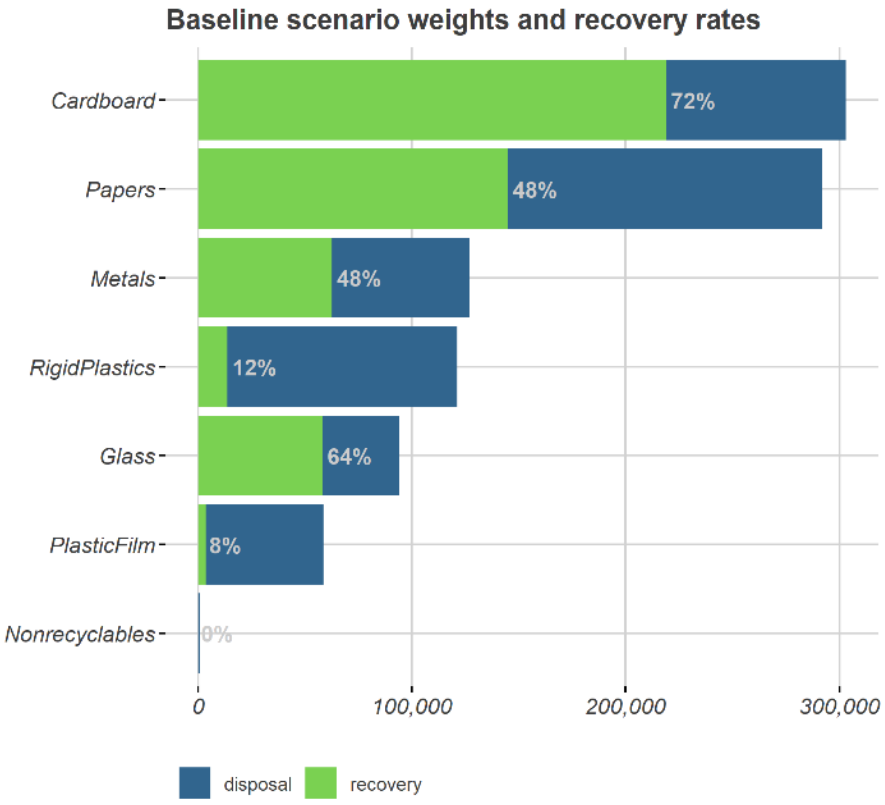


Figure 2. *Baseline scenario weights and recovery rates*. An example of how the waste impact calculator can be used for evaluation or decision making. This example compares the percent of collected recyclables that are recovered into the recycling system versus disposed of in a landfill.

3.4 Waste recovery and disposal

3.4.1 Product stewardship

Product stewardship is an approach to environmental management in which those who design, manufacture, sell and use consumer products take responsibility for reducing negative impacts to the economy, environment, public health and worker safety. For manufacturers, this can include assuring convenient collection of their products and proper waste management of their share of returned products. For retailers and consumers, this can mean taking an active role in recycling or disposing of a product in a proper way. Product stewardship requirements outlined in Oregon law include the following materials in the waste stream: architectural paint, electronics waste, household medicines, mattresses and printed paper and packaging.

3.4.1.1. Architectural paint stewardship

In 2009, Oregon became the first state in the nation to enact a law requiring architectural paint manufacturers to start a program to reduce waste, increase reuse and recycling and safely dispose of remaining unusable paint and other coatings.

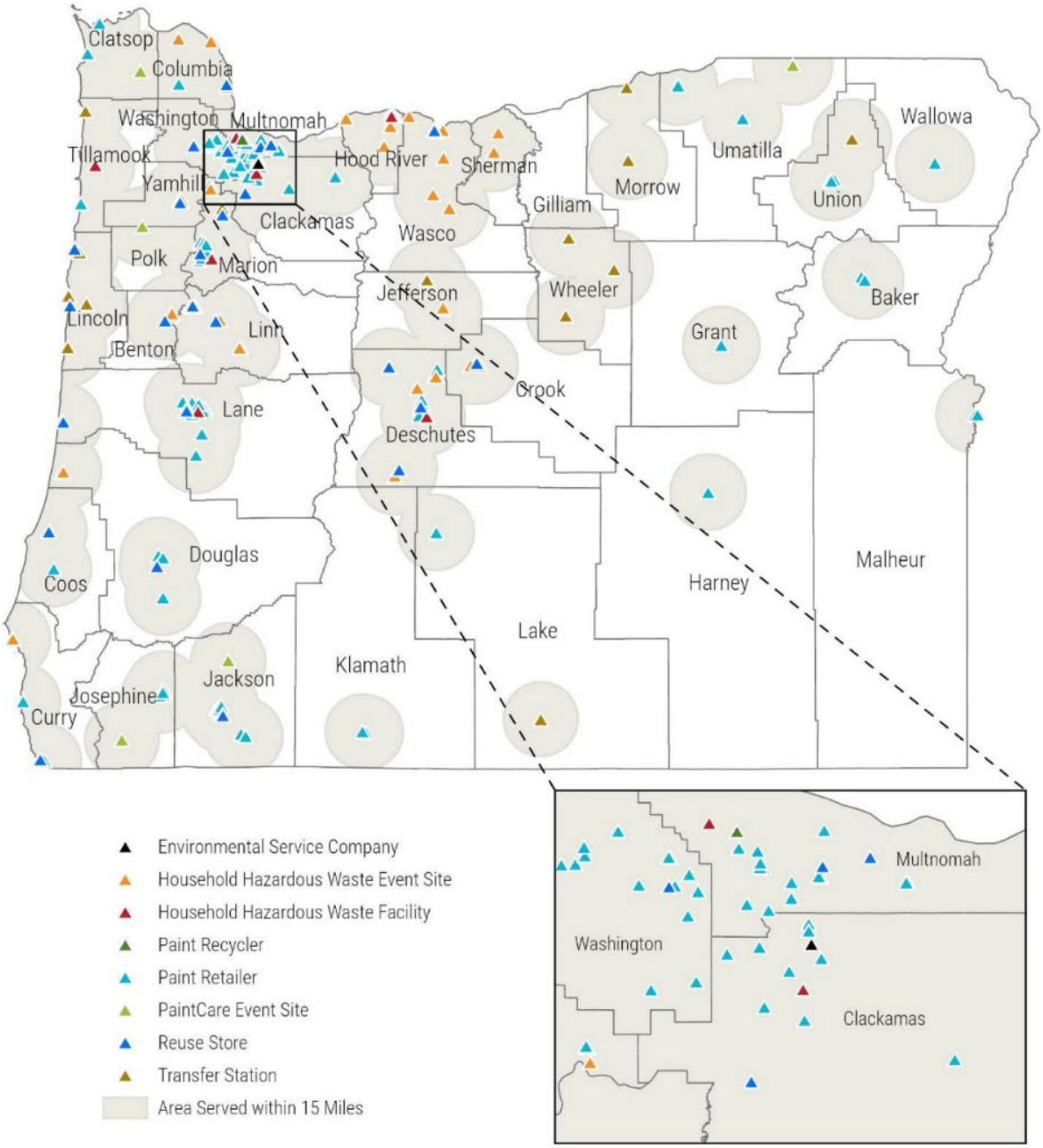


Figure 3. Permanent and supplemental PaintCare drop-off sites and events in Oregon (2021).

Under ORS 459A.820-855 manufacturers of latex and oil-based architectural paints, stains and coatings are required to reduce the generation of these materials to promote reuse and to provide complete end-of-life management including recycling, energy recovery and disposal. Without an architectural paint stewardship program, these substances would comprise a large share of materials delivered to household hazardous waste collection programs. When stored or disposed of improperly, these materials can be hazardous to human health, wildlife and water quality. Managing waste paints is also expensive for local governments. This law has helped to shift much of the cost of paint recycling from local governments to paint purchasers. Metro previously reported that the paint product stewardship program saves the regional government more than $1 million annually. Many Oregon counties that operate household hazardous waste programs also reported cost savings on paint disposal due to decrease quantities of paint disposed.

PaintCare, an industry-run producer responsibility organization, implements this recovery program in Oregon on behalf of architectural paint manufacturers under a plan approved by DEQ. As in other states with paint product stewardship, Oregon's program is funded by a fee assessed on cans of paint, varnishes and stains purchased within the state. From 2010 to December 2021, the Oregon Paint Product Stewardship Program collected an estimated 7.5 million gallons of leftover paint.

In 2021, PaintCare maintained 183 permanent collection sites, mostly at retail locations, as well as many local government and solid waste facilities. At these sites, PaintCare collected over 740,000 gallons of paint, varnishes and stains; recycled 78% of latex paint; and processed 4% of latex paint for reuse. Read more details about PaintCare's 2021 operations.

As required by law, PaintCare provided an updated program plan for 2021-2025 in 2021. DEQ approved this plan in August of the same year.

3.4.1.2. Oregon E-Cycles

Oregon E-Cycles is a statewide program, financed by manufacturers, that provides responsible recycling for televisions, computers, monitors, printers, keyboards and mice. Anyone with seven or fewer items at a time may recycle their electronics at no charge at participating collection sites.

Households, small businesses and small nonprofits may recycle more than seven items at a time.

Electronics contain hazardous substances such as lead, cadmium and mercury that can harm our health and environment. They also contain valuable materials such as copper, gold and aluminum that can be recycled and used in new products. Recycling electronics keeps toxics out of our landfills and incinerators and conserves natural resources.

The Oregon's Electronics Recycling Law Oregon Revised Statute 459A.300-.365 created the Oregon E-Cycles program in 2007. Currently, the law mandates a minimum level of collection service in each county, with at least one site for every city with a population of 10,000 or more. In 2022, there were 185 collection sites, including public and private transfer stations, landfills, recycling and refurbishment centers, thrift stores and retail locations. DEQ's Oregon E-Cycles web page provides a search page and a hotline number for locating collection sites and services.

Manufacturers selling devices in or into Oregon must register their brands with DEQ and join either a state-contracted recycling program or a manufacturer-run recycling program. Each recycling program is funded by participating manufactures and operates under a DEQ-approved plan.[2] Retailers must inform consumers about recycling opportunities under Oregon E-Cycles.

Since operations began in 2009, Oregon E-Cycle sites collected over 297 million pounds of electronic devices and provided significant environmental benefits, from preventing toxins from entering Oregon's landfills, to recovering precious and rare earth metals for new electronics that can reduce the need for mining more resources. In 2021, these sites collected more than 100,000 electronic devices for reuse and over 14 million pounds of electronic devices for recycling. In 2022, the program collected over 12.4 million pounds of devices for recycling and 39,131 devices for reuse.

Since the program's inception, Oregon E-Cycles has significantly expanded opportunities for Oregon residents to recycle electronic wastes and has shifted responsibility and costs for managing this waste from ratepayers and local governments to product manufacturers.

3.4.1.3 Oregon Drug Take-Back Program

In 2019, Oregon became one of few states to require drug manufacturers to fund and develop a statewide drug take-back program that provides safe, convenient and secure disposal of drugs for Oregon residents and other covered entities, excluding pharmaceutical waste from businesses.

Leftover or expired drugs can pose serious environmental and health risks. Drugs left in a household can lead to accidental poisonings, addiction or abuse. Drugs thrown in the garbage or down the drain can release chemical compounds that end up in rivers or groundwater.

Under ORS 459A.200-.266, manufacturer-funded programs must offer drop-off sites, such as at pharmacies and law enforcement agencies, where drugs can be disposed of in-person. Programs must also offer prepaid, pre-addressed envelopes for unwanted drugs to be returned

[2] Manufacturers in the state contractor program pay recycling fees to DEQ to cover that program's recycling costs. Manufacturers in manufacturer-run programs pay recycling fees according to their program agreements.

by mail. They may also hold collection events. Collected drugs are then destroyed at a hazardous waste disposal facility or a municipal solid waste incinerator permitted to accept pharmaceutical waste. DEQ partners with the Oregon Board of Pharmacy to ensure program operators' compliance with their program plans and the Drug Take-Back Law.

In 2021, DEQ approved plans by two program operators to implement drug take-back programs in Oregon. The programs launched on July 1, 2021 and offer over 300 drop-off sites across the state for in-person medicine disposal, free mail-back envelopes through medtakebackoregon.org and 844-482-5322, and other take-back services. More information about the Drug Take-Back Program can be found on DEQ's website.

3.4.1.4 Mattress recycling

In 2022, the Legislature passed the Mattress Stewardship Act (SB 1576), a product stewardship law establishing a statewide system for the financing, collection and environmentally sound management of discarded mattresses. The act requires mattress producers to join a stewardship organization with an approved plan to develop, implement and administer a program. This is a consumer-funded stewardship program similar to that of paint and the fee paid on each new mattress will cover the cost of the program. A stewardship organization will propose this amount in an operations plan to be approved by DEQ. DEQ will require a convenient network of collection sites or events across the state for the public to access and, based on their condition, mattresses will be prioritized for reuse and renovation before disposal. Among other benefits, this law is meant to decrease illegal dumping of mattresses and the costs associated with it, while diverting materials to highest and best use within the waste hierarchy.

Rulemaking is underway, and DEQ anticipates bringing draft rules to the Environmental Quality Commission in summer 2023. DEQ will approve a stewardship organization's program plan for implementation in 2024. As the program continues, DEQ will review and approve annual reports and updated plans, as well as provide general oversight and enforcement. More information about the Mattress Stewardship Program can be found on the DEQ website.

3.4.1.5 Printed paper and packaging: the Plastic Pollution and Recycling Modernization Act

The Oregon legislature passed the Plastic Pollution and Recycling Modernization Act (Senate Bill 582) during the 2021 legislative session. The Recycling Modernization Act, or RMA, requires updates to Oregon's current recycling system that will begin in July 2025.

This innovative new law builds upon existing local recycling programs while leveraging the resources of producers to expand access to recycling services, upgrade the facilities that sort recyclables, create a new statewide list of accepted recyclable materials and generate environmental benefits while reducing social and environmental harms, such as plastic pollution. Producers and manufacturers of packaged items, paper products and food serviceware will pay for many of these necessary improvements and help ensure recycling is successful in Oregon.

To implement all of the changes required by the RMA, DEQ will need several years to conduct research, engage partners and complete two rounds of rulemaking. Other noteworthy accomplishments include:

- Convened the Oregon Recycling System Advisory Council.
- Convened the Truth in Labeling Task Force and submitted the legislative report.
- Drafted concepts for the proposed rules the EQC will hear in September 2023.
- Launched the first local government service expansion needs assessment survey.
- Initiated an enhanced waste composition study.
- Hired five staff to join the RMA implementation team.
- Hosted information sessions for representatives from local governments, service providers, and others interested in learning how the RMA will change the recycling system in their communities.

Over the next two years, DEQ will complete the following RMA requirements:

- Complete the first local government service expansion needs assessment.
- Adopt new administrative rules for:
    - Producer Responsibility Organization requirements.
    - Local government compensation.
    - Accepted material lists.
    - Recycling processor performance standards and fees.
    - Living wage and supportive benefits for workers at recycling processors.
    - Waste prevention and reuse fee.
    - Process and criteria for exempting covered products.
    - Standards for environmental impacts analysis.
- Evaluate cost-effective interventions local governments can implement to reduce recycling contamination and establish a list of approved contamination reduction program elements.
- Review and approve Producer Responsibility Organization program plans.
- Permit recycling processing facilities according to new performance standards.
- Conduct an equity study and a multifamily recycling needs assessment and assist Department of Administrative Services with a public procurement assessment.
- Plan for a multi-tenant recycling requirement, a litter and marine debris needs assessment, and a compostability study.

To learn more and stay informed of new developments, visit RecyclingAct.Oregon.gov.

3.4.2 Household hazardous materials management

Household hazardous materials, if improperly stored or disposed of, can pollute waterways, poison humans and wildlife or cause fires.[3] Since 1991, these materials have been managed in Oregon largely through household hazardous waste, or HHW, collection programs designed to safely dispose of toxic or hazardous products used in households and small businesses.

Oregon law establishes an HHW program under ORS 459.411-418 to serve residences and small enterprises. To accomplish this, DEQ encourages communities to voluntarily build facilities, often incentivized with DEQ matching grants and design consulting. There are permanent facilities for HHW disposal in 19 Oregon counties offering multiple collection opportunities each year. Another seven counties schedule periodic collection events.

DEQ hires a contractor to provide collection events on a rotating basis for 21 cities in eight rural counties, as well as rural areas of other counties, with no other collection options. These contractors average one event every five years in each of these select cities. In 2022, DEQ began a planning effort intended to modernize its approach to managing these hazardous materials in alignment with the *2050 Vision* and *Framework for Action.*

Household hazardous waste collection event in Sandy, OR (2020).

[3] See Oregon Department of Environmental Quality, “What Is Household Hazardous Waste?,” May 2012, https://www.oregon.gov/deq/FilterDocs/WhatisHHW.pdf; and Consumer Product Information Database, managed by DeLima Associates for product manufacturers, accessed December 23, 2020, whatsinproducts.com.

3.5 Oregon's material recovery and waste generation rates

There are two general destinations for materials at the end of their useful lives: disposal and recovery. Disposal is landfilling or incineration. Recovery is recycling, composting, incineration for energy return[4] or other ways of regaining resources from the material.

Oregon's goals under ORS 459A.010 aim to reduce solid waste generation, the sum of disposal and recovery, and increase the rate of material recovery from the general solid waste stream. This is also known as the recovery rate or the percentage of generation that is recovered. DEQ's most recent data from 2021 shows that people in Oregon:

- Generated 6,494,204 tons of waste in 2021, an increase of 9% compared to 2020. This is the 12th consecutive year of increased waste generation, failing to meet the goal set in ORS 459A.010 of no increase in total generation of waste. A substantial portion of the increase in waste generation was due to the cleanup in 2021 of more than 6,000 structures destroyed by 2020 Oregon wildfires in five counties.
- A total of 4,046,936 tons of municipal post-consumer waste from Oregon were disposed in 2021. This increase of over 17% from 2020 is a record high since the material recovery survey began in 1992.
- Recovered 37.7% of waste generated in 2021 – about the same rate as the past five years. This falls below the 2020 goal of 52% and the 2025 goal of 55%
- recovery set by 2015 Oregon legislation (ORS 459A.010). Oregon achieved a recovery rate of nearly 50% in 2011-2013, but the recovery rate dropped sharply in 2016 due partly to loss of major markets for wood waste, as well as a continued decline in the sales of newspapers, magazines and other printed paper.

[4] Under ORS 459A.010(4), materials burned for energy recovery are only counted as recovered if no viable market exists to recycle the material, or, in the case of mixtures of materials burned for energy recovery, if half, or less than half, of the mixed materials by weight could have been recycled if properly source separated.

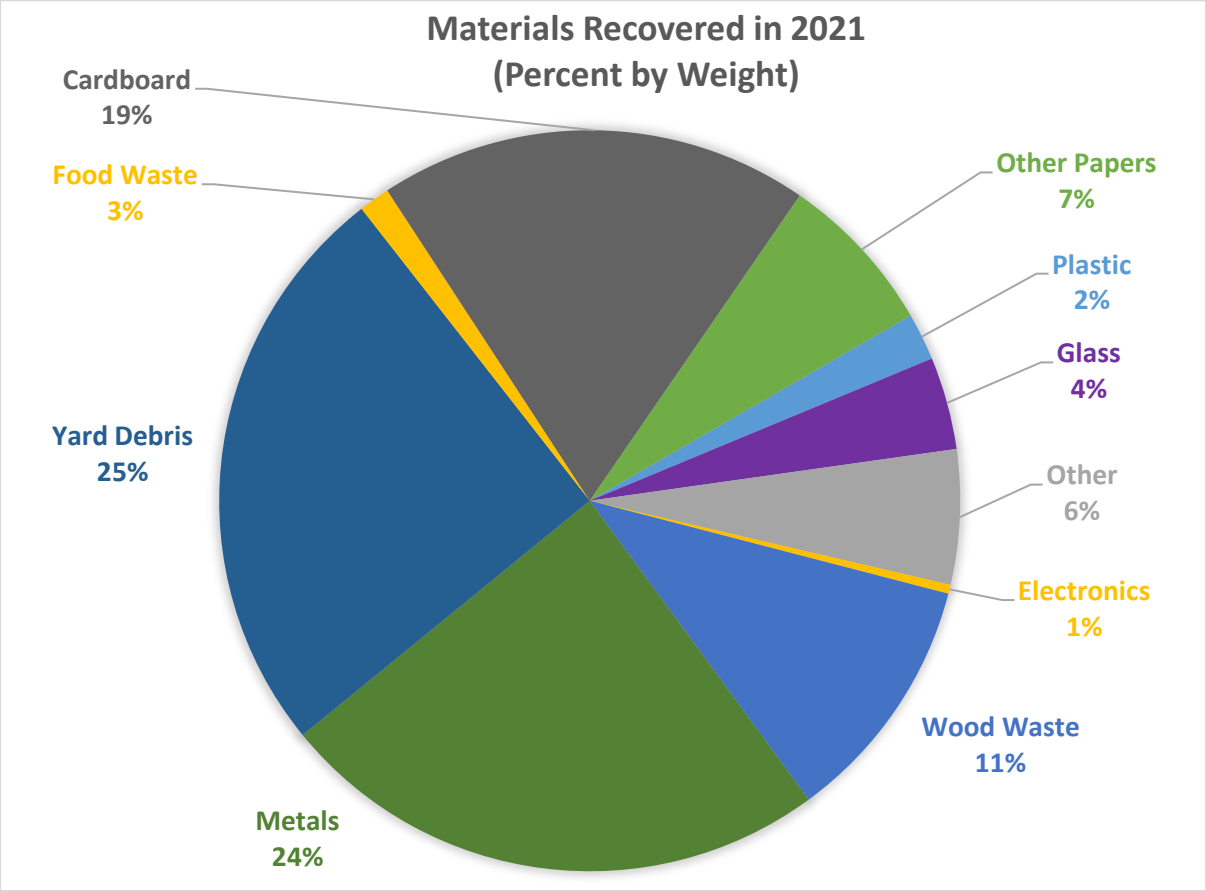


Figure 4. ***Materials Recovered in 2021 (Percent by Weight).*** **This graph shows the recovery rate of various materials recovered from the general solid waste stream statewide in 2021.**

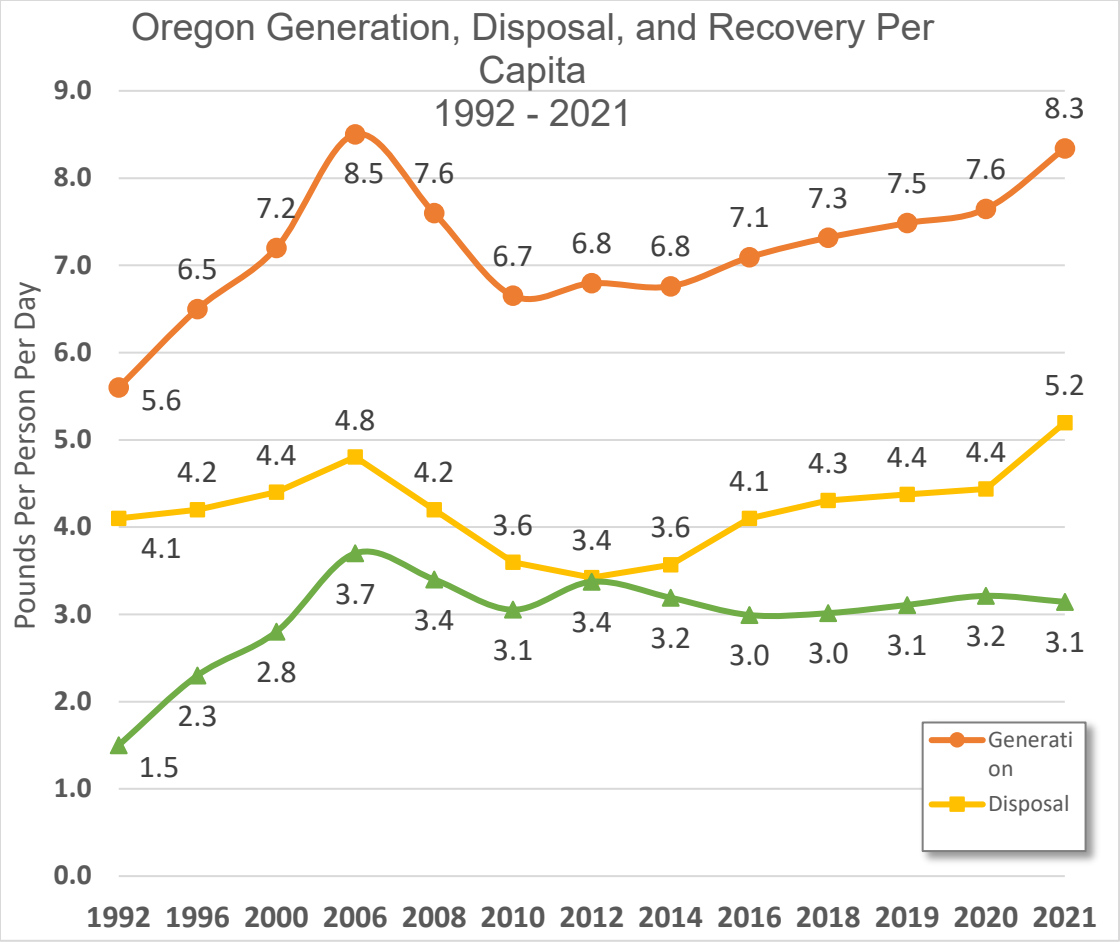


Figure 5. *Oregon Generation, Disposal and Recovery Per Capita 1992-2021*. This graph shows the overall generation of waste, the amount recovered, and the amount that was disposed in pounds per person per day for each year over a 29-year period.

On a per-capita basis, every Oregon resident generated roughly 8.3 pounds of waste a day in 2021, disposed of 5.2 pounds per person per day, and recovered 3.1 pounds per person per day. The graph above shows that waste generation increased steadily through 2006 but tumbled 21% in the 2007-2009 recession. Waste generation then plateaued for about five years and has steadily increased since 2014. This rise in generation was likely the result of a busy economy with abundant construction activity and purchasing of consumer goods. The COVID-19 pandemic and associated shutdowns in 2020 and 2021 likely had various impacts on recovery. For example, beverage container returns dropped on a percentage basis for the first time in a few years as many stores discontinued redeeming beverage containers during shutdown periods as allowed by the Oregon Liquor and Cannabis Commission. At the same time, cardboard generation and the tons of cardboard recovered increased substantially, likely due to the increase in e-commerce while in-person shopping was limited.

Oregon Amount Disposed and Recovered by Wasteshed, 2020					
Wasteshed	**2020 Disposed (tons)**	**Per Capita (lbs.)**	**2020 Recovered (tons)**	**Per Capita (lbs.)**	**2020 Calculated Recovery Rate**
Baker	13,940	1,649	3,386	400	19.5%
Benton	60,967	1,412	39,466	914	39.3%
Clatsop	35,328	1,791	24,262	1,230	40.7%
Columbia	34,174	1,283	11,059	415	24.4%
Coos	55,189	1,743	14,750	466	21.1%
Crook	25,800	2,201	7,342	626	22.2%
Curry	20,176	1,754	6,473	563	24.3%
Deschutes	197,979	2,010	98,491	1,000	33.2%
Douglas	94,378	1,677	41,787	743	30.7%
Gilliam	2,214	2,225	353	355	13.8%
Grant	4,490	1,228	946	259	17.4%
Harney	5,046	1,386	1,131	311	18.3%
Hood River	23,184	1,808	7,562	590	24.6%
Jackson	222,250	1,991	115,701	1,037	34.2%
Jefferson	16,816	1,395	4,140	343	19.8%
Josephine	87,625	2,025	46,828	1,082	34.8%
Klamath	67,802	1,992	18,985	558	21.9%
Lake	5,954	1,475	425	105	6.7%
Lane	283,634	1,487	331,183	1,737	53.9%
Lincoln	54,591	2,260	18,455	764	25.3%
Linn	109,434	1,611	93,426	1,376	46.1%
Malheur	26,438	1,647	5,333	332	16.8%
Marion	287,947	1,651	270,824	1,552	48.5%[5]
Metro	1,357,591	1,447	1,179,812	1,258	46.5%
Milton-Freewater	4,985	1,223	1,519	373	23.4%
Morrow	36,961	5,764	5,847	912	13.7%
Polk	51,685	1,247	44,596	1,076	46.3%
Sherman	1,246	1,388	142	158	10.2%
Tillamook	30,550	2,303	14,000	1,055	31.4%
Umatilla	92,834	2,531	36,670	1,000	28.3%
Union	19,300	1,438	7,086	528	26.9%
Wallowa	6,150	1,718	1,304	364	17.5%
Wasco	28,872	2,116	5,026	368	14.8%
Wheeler	387	537	76	106	16.5%
Yamhill	86,938	1,588	49,561	905	36.3%
Oregon Totals	**3,452,854**	**1,618**	**2,507,951**	**1,175**	**42.1%**

Figure 6. *Oregon Amount Disposed and Recovered by Wasteshed, 2020*. The amount of waste disposed or recovered and the corresponding calculated recovery rate for each wasteshed in the

[5] This percentage includes Marion wasteshed recyclable materials burned for energy in the Covanta energy recovery facility.

state of Oregon. A wasteshed is defined in Oregon law as being an area of the state that shares a common solid waste disposal system, or an appropriate area in which to develop a common recycling system. For the most part, individual Oregon counties are designated as wastesheds.

3.6 Management of solid waste and solid waste disposal sites

To ensure the continued proper end-of-life management of waste materials, DEQ provides regulatory oversight of solid waste management and solid waste disposal facilities. Materials Management staff does substantial work in overseeing recovery, recycling and disposal of waste. This work includes issuing permits and inspecting solid waste facilities such as industrial waste landfills, waste tire disposal sites, transfer stations and municipal construction and demolition sites. Material recovery facilities that provide solid waste treatment through conversion technology, anaerobic digesters and other composting facilities are also permitted and inspected. Materials Management staff provide technical assistance to counties and cities for recovery, recycling, beneficial use, management and disposal of waste. This includes responding to complaints, conducting site visits, ensuring compliance and helping educate the public on waste prevention, recovery, disposal and the *2050 Vision*.

3.6.1 Solid waste disposal facilities and permits

In 2021 and 2022, the Materials Management Program oversaw more than 300 disposal site permits and 24 waste tire permits statewide. The numbers of permits in each major category as of June 2022 are listed in the table below.

	Municipal	Industrial	Total
Open landfills	32	17	49
Closed landfills	36	23	59
Transfer stations & material recovery facilities	139	5	144
Treatment facilities	0	3	3
Incineration/Energy Recovery	1	0	1
Anaerobic Digester Composting Facility Permit	4	0	4
Anaerobic Digester Composting Facility Registration	1	0	1
Aerobic Composting Facility Permit	16	0	16
Aerobic Composting Facility Registration	32	0	32
Conversion Technology Facility Permit		2	2
Tire permits (carrier, storage, and combined storage and carrier)	24	0	24

Figure 7. Municipal and Industrial Permits Statewide, 2022.

Many Oregon landfills closed in the past three decades and continue to be permitted to ensure that the closure process does not contaminate surface or ground water, create harmful landfill gases or cause other environmental problems over time.

DEQ inspects active disposal sites annually or biennially and closed landfills every two or three years to verify that post-closure care (gas and groundwater monitoring) and maintenance of closed landfills are being carried out as required. Facilities also monitor disposal sites and report to DEQ.

3.6.1.1 Composting facilities

Composting facilities use biological processes (microorganisms) to decompose organic feedstocks such as yard debris, animal manures and food discards. In Oregon, composting facilities include aerobic composting facilities and anaerobic digestion facilities. Aerobic composting facilities use microorganisms that prefer oxygen and produce compost. Anaerobic digesters use microorganisms that thrive in low oxygen environments and create and capture methane gas to produce electricity or other fuel products. Digesters also produce liquid and solid by-products called digestate that can be used for soil fertilizing and conditioning or be further processed into compost.

The products of composting facilities provide numerous environmental benefits. When incorporated into soil, the use of compost can improve soil health and provide a more stable form of nitrogen that is less susceptible to leaching into water supplies. Compost also helps soil by reducing soil compaction and increasing water infiltration. Incorporation of compost into soil stores carbon, thus helping to reduce atmospheric carbon. Anaerobic digesters capture methane rather than releasing it to the atmosphere, which is a significant component of greenhouse gas.

Primary aerobic composting methods include large static pile composting (this was used in the past and continues in some places in Oregon) and turned windrow composting with or without installed piping and motorized blowers to force-aerate the piles. Anaerobic digestion is a common technology used at municipal wastewater treatment plants, food-processing facilities and in processing manure on farms. The digestion process takes place in sealed tanks, creating an oxygen free environment needed for microorganisms to breakdown the feedstocks. Methane gases generated can be used to create heat, electricity or transportation fuels. Some wastewater treatment plants burn-off or “flare” the gases because they lack equipment to utilize the methane.

Oregon currently has 48 DEQ-permitted aerobic composting facilities. Thirty-two are assessed as low risk; 16 are located on agricultural lands. There are also approximately 10 farm-composting facilities under Oregon Department of Agriculture oversight. In 2021 and 2022, three compost facilities have been reconstructing their facilities to improve processing and reduce environmental impacts, particularly offsite odor reductions.

There are four DEQ-permitted anaerobic digesters: one receives food waste, two accept manure only and one is permitted for both but is not yet operational. There are also eight anaerobic digesters located on farms under ODA oversight using manure as feedstock, three of these have received very small quantities of food waste. Currently only two of these facilities are operating.

The Materials Management Program maintains a list of active permitted facilities including municipal solid waste disposal landfills, transfer stations, compost, material recovery facilities, waste tire and household hazardous waste facilities.

3.6.2 Short-term disposal permits and beneficial use determinations

In addition to permitting solid waste disposal sites, DEQ works with businesses, local governments, state and federal agencies, ports and others to permit one-time or short-term disposal of slightly contaminated soil or sediment at locations with minimal environmental impacts. DEQ also reviews applications to beneficially use waste in ways that are productive while protecting human health and the environment, thus avoiding expensive and unnecessary disposal costs. Through these efforts, DEQ provides ways to allow redevelopment of contaminated sites, or brownfields, and construction of roads and other infrastructure to take place in a more cost-effective manner. These options also allow waste to be used as fill, to improve agricultural soil or to make new products. DEQ receives approximately five to fifteen short-term disposal authorization requests per year and two to five beneficial use applications per year. DEQ publishes its approved beneficial use determinations online.

3.6.3 Solid Waste Orphan Account

The Solid Waste Orphan Site Account is funded through a $0.13 per ton fee on all domestic solid waste generated in Oregon. Since 1993 this fund has been used to cleanup actual or potential hazardous substance releases from local government solid waste disposal sites (e.g., municipal landfills). Beginning in 2019, DEQ began a pilot project to use a small portion of the funds to clean smaller sites, such as illegal dumpsites, that meet the specified funding criteria (OAR 340-122-0510 through 0590).

DEQ's Environmental Cleanup Program coordinates the agency's efforts to spend funds from the Solid Waste Orphan Account. DEQ is currently evaluating a list of over 500 potential local government and private solid waste orphan sites to determine eligibility and prioritize sites. In fiscal year 2021, The current SWOSA funding plan earmarks $4.8M to clean up 12 high priority sites and to perform site assessments at an additional 100 sites across Oregon.

Additionally, in fiscal year 2021, DEQ worked on numerous solid waste orphan sites, including a tire disposal and auto scrap yard, a metal scrap yard and clandestine drug lab, an auto dismantler and crusher, and a lumber yard. These projects have taken a large amount of intra-agency coordination and interagency coordination between DEQ, Oregon Health Authority, Regional Solutions and local governments. DEQ has worked on multiple SWOSA projects where local governments have contributed resources to help clean up sites. Local government contributions could include funding, labor or reducing waste management fees. Once cleanup actions are complete and threats to human health and the environment are abated, the sale and redevelopment of these sites improves local property value and local tax revenue. Information about activities using these funds is provided in the Environmental Cleanup Program's 2022 Annual Legislative Report.

3.6.4 Complaints response

Materials Management staff respond to solid waste complaints about illegal disposal and unpermitted disposal, as well as concerns about odors, dust, asbestos or other environmental concerns at disposal sites. In 2020, DEQ responded to 172 complaints (19 in the Eastern Region, 68 in the Northwest Region and 85 in the Western Region). In 2021, DEQ responded to 243 complaints (21 in the Eastern Region, 77 in the Northwest Region and 145 in the Western Region).

Materials Management's investigations of complaints are part of DEQ's overall effort to ensure businesses and individuals comply with state and federal environmental laws. DEQ uses a variety of tools to achieve compliance, including technical assistance, compliance inspections, investigation of complaints, warning letters, assessment of civil penalties and compliance orders. Most violations are resolved through informal enforcement: warning letters or warning letters with opportunity to correct. Repeated or more serious violations can result in a formal enforcement action that includes a civil penalty. Formal enforcement actions are handled by the Office of Compliance and Enforcement.

During the 2021-2022 biennium, 21 companies and individuals subject to some type of Materials Management investigation were assessed civil penalties totaling $395,796. Of these 21 cases, DEQ issued 13 to unpermitted sites, seven to sites with some type of solid waste disposal site permit and one to an electronics manufacturer for E-cycles violations.[6] In some of these cases, the penalties reflect not only assessments for Materials Management violations, but also for water quality, hazardous waste or other violations of DEQ rules or permits.

[6] This is likely an undercount of Materials Management violations and penalties due to enforcement led by other programs sometimes also containing a Materials Management violation and/or penalty.

4.0 Conclusion

Materials play a significant role in human and environmental health. People in Oregon and around the world produce, use, consume and discard materials every day. These materials impact the environment as well as the health of people who interact with them such as people living near solid waste facilities and workers employed to extract, manufacture and dispose of the materials. With the 2050 Vision as the guiding compass, the Materials Management Program works to reduce these impacts for a prosperous tomorrow.

In the 2021-2022 biennium, the Materials Management Program made significant headway toward the 2050 Vision. These programs will continue to collaborate with federal, state and local partners to create a more sustainable future where environmental protection and resource conservation enhance the well-being of all the people in Oregon.

Connect with us and learn more about the Materials Management Program online through DEQ's website.

Oregon Amount Disposed and Recovered by Wasteshed, 2020

Wasteshed	2020 Disposed (tons)	Per Capita (lbs.)	2020 Recovered (tons)	Per Capita (lbs.)	2020 Calculated Recovery Rate
Baker	13,940	1,649	3,386	400	19.5%
Benton	60,967	1,412	39,466	914	39.3%
Clatsop	35,328	1,791	24,262	1,230	40.7%
Columbia	34,174	1,283	11,059	415	24.4%
Coos	55,189	1,743	14,750	466	21.1%
Crook	25,800	2,201	7,342	626	22.2%
Curry	20,176	1,754	6,473	563	24.3%
Deschutes	197,979	2,010	98,491	1,000	33.2%
Douglas	94,378	1,677	41,787	743	30.7%
Gilliam	2,214	2,225	353	355	13.8%
Grant	4,490	1,228	946	259	17.4%
Harney	5,046	1,386	1,131	311	18.3%
Hood River	23,184	1,808	7,562	590	24.6%
Jackson	222,250	1,991	115,701	1,037	34.2%
Jefferson	16,816	1,395	4,140	343	19.8%
Josephine	87,625	2,025	46,828	1,082	34.8%
Klamath	67,802	1,992	18,985	558	21.9%
Lake	5,954	1,475	425	105	6.7%
Lane	283,634	1,487	331,183	1,737	53.9%
Lincoln	54,591	2,260	18,455	764	25.3%
Linn	109,434	1,611	93,426	1,376	46.1%
Malheur	26,438	1,647	5,333	332	16.8%
Marion	287,947	1,651	270,824	1,552	48.5%[7]
Metro	1,357,591	1,447	1,179,812	1,258	46.5%
Milton-Freewater	4,985	1,223	1,519	373	23.4%
Morrow	36,961	5,764	5,847	912	13.7%
Polk	51,685	1,247	44,596	1,076	46.3%
Sherman	1,246	1,388	142	158	10.2%
Tillamook	30,550	2,303	14,000	1,055	31.4%
Umatilla	92,834	2,531	36,670	1,000	28.3%
Union	19,300	1,438	7,086	528	26.9%
Wallowa	6,150	1,718	1,304	364	17.5%

[7] This percentage includes Marion wasteshed recyclable materials burned for energy in the Covanta energy recovery facility.

Wasco	**28,872**	**2,116**	**5,026**	**368**	**14.8%**
Wheeler	**387**	**537**	**76**	**106**	**16.5%**
Yamhill	**86,938**	**1,588**	**49,561**	**905**	**36.3%**
Oregon Totals	**3,452,854**	**1,618**	**2,507,951**	**1,175**	**42.1%**

Figure 6. *Oregon Amount Disposed and Recovered by Wasteshed, 2020*. The amount of waste disposed or recovered and the corresponding calculated recovery rate for each wasteshed in the state of Oregon. A wasteshed is defined in Oregon law as being an area of the state that shares a common solid waste disposal system, or an appropriate area in which to develop a common recycling system. For the most part, individual Oregon counties are designated as wastesheds.

3.6 Management of solid waste and solid waste disposal sites

To ensure the continued proper end-of-life management of waste materials, DEQ provides regulatory oversight of solid waste management and solid waste disposal facilities. Materials Management staff does substantial work in overseeing recovery, recycling and disposal of waste. This work includes issuing permits and inspecting solid waste facilities such as industrial waste landfills, waste tire disposal sites, transfer stations and municipal construction and demolition sites. Material recovery facilities that provide solid waste treatment through conversion technology, anaerobic digesters and other composting facilities are also permitted and inspected. Materials Management staff provide technical assistance to counties and cities for recovery, recycling, beneficial use, management and disposal of waste. This includes responding to complaints, conducting site visits, ensuring compliance and helping educate the public on waste prevention, recovery, disposal and the *2050 Vision*.

3.6.1 Solid waste disposal facilities and permits

In 2021 and 2022, the Materials Management Program oversaw more than 300 disposal site permits and 24 waste tire permits statewide. The numbers of permits in each major category as of June 2022 are listed in the table below.

	Municipal	Industrial	Total
Open landfills	32	17	49
Closed landfills	36	23	59
Transfer stations & material recovery facilities	139	5	144
Treatment facilities	0	3	3
Incineration/Energy Recovery	1	0	1
Anaerobic Digester Composting Facility Permit	4	0	4
Anaerobic Digester Composting Facility Registration	1	0	1
Aerobic Composting Facility Permit	16	0	16
Aerobic Composting Facility Registration	32	0	32
Conversion Technology Facility Permit		2	2
Tire permits (carrier, storage, and combined storage and carrier)	24	0	24

Figure 7. *Municipal and Industrial Permits Statewide, 2022*.

Many Oregon landfills closed in the past three decades and continue to be permitted to ensure that the closure process does not contaminate surface or ground water, create harmful landfill gases or cause other environmental problems over time.

DEQ inspects active disposal sites annually or biennially and closed landfills every two or three years to verify that post-closure care (gas and groundwater monitoring) and maintenance of closed landfills are being carried out as required. Facilities also monitor disposal sites and report to DEQ.

3.6.1.1 Composting facilities

Composting facilities use biological processes (microorganisms) to decompose organic feedstocks such as yard debris, animal manures and food discards. In Oregon, composting facilities include aerobic composting facilities and anaerobic digestion facilities. Aerobic composting facilities use microorganisms that prefer oxygen and

produce compost. Anaerobic digesters use microorganisms that thrive in low oxygen environments and create and capture methane gas to produce electricity or other fuel products. Digesters also produce liquid and solid by-products called digestate that can be used for soil fertilizing and conditioning or be further processed into compost.

The products of composting facilities provide numerous environmental benefits. When incorporated into soil, the use of compost can improve soil health and provide a more stable form of nitrogen that is less susceptible to leaching into water supplies. Compost also helps soil by reducing soil compaction and increasing water infiltration. Incorporation of compost into soil stores carbon, thus helping to reduce atmospheric carbon. Anaerobic digesters capture methane rather than releasing it to the atmosphere, which is a significant component of greenhouse gas.

Primary aerobic composting methods include large static pile composting (this was used in the past and continues in some places in Oregon) and turned windrow composting with or without installed piping and motorized blowers to force-aerate the piles. Anaerobic digestion is a common technology used at municipal wastewater treatment plants, food-processing facilities and in processing manure on farms. The digestion process takes place in sealed tanks, creating an oxygen free environment needed for microorganisms to breakdown the feedstocks. Methane gases generated can be used to create heat, electricity or transportation fuels. Some wastewater treatment plants burn-off or “flare” the gases because they lack equipment to utilize the methane.

Oregon currently has 48 DEQ-permitted aerobic composting facilities. Thirty-two are assessed as low risk; 16 are located on agricultural lands. There are also approximately 10 farm-composting facilities under Oregon Department of Agriculture oversight. In 2021 and 2022, three compost facilities have been reconstructing their facilities to improve processing and reduce environmental impacts, particularly offsite odor reductions.

There are four DEQ-permitted anaerobic digesters: one receives food waste, two accept manure only and one is permitted for both but is not yet operational. There are also eight anaerobic digesters located on farms under ODA oversight using manure as feedstock, three of these have received very small quantities of food waste. Currently only two of these facilities are operating.

The Materials Management Program maintains a list of active permitted facilities including municipal solid waste disposal landfills, transfer stations, compost, material recovery facilities, waste tire and household hazardous waste facilities.

3.6.2 Short-term disposal permits and beneficial use determinations

In addition to permitting solid waste disposal sites, DEQ works with businesses, local governments, state and federal agencies, ports and others to permit one-time or short-term disposal of slightly contaminated soil or sediment at locations with minimal environmental impacts. DEQ also reviews applications to beneficially use waste in ways that are productive while protecting human health and the environment, thus avoiding expensive and unnecessary disposal costs. Through these efforts, DEQ provides ways to allow redevelopment of contaminated sites, or brownfields, and construction of roads and other infrastructure to take place in a more cost-effective manner. These options also allow waste to be used as fill, to improve agricultural soil or to make new products. DEQ receives approximately five to fifteen short-term disposal authorization requests per year and two to five beneficial use applications per year. DEQ publishes its approved beneficial use determinations online.

3.6.3 Solid Waste Orphan Account

The Solid Waste Orphan Site Account is funded through a $0.13 per ton fee on all domestic solid waste generated in Oregon. Since 1993 this fund has been used to cleanup actual or potential hazardous substance releases from local government solid waste disposal sites (e.g., municipal landfills). Beginning in 2019, DEQ began a pilot project to use a small portion of the funds to clean smaller sites, such as illegal dumpsites, that meet the specified funding criteria (OAR 340-122-0510 through 0590).

DEQ's Environmental Cleanup Program coordinates the agency's efforts to spend funds from the Solid Waste Orphan Account. DEQ is currently evaluating a list of over 500

potential local government and private solid waste orphan sites to determine eligibility and prioritize sites. In fiscal year 2021, The current SWOSA funding plan earmarks $4.8M to clean up 12 high priority sites and to perform site assessments at an additional 100 sites across Oregon.

Additionally, in fiscal year 2021, DEQ worked on numerous solid waste orphan sites, including a tire disposal and auto scrap yard, a metal scrap yard and clandestine drug lab, an auto dismantler and crusher, and a lumber yard. These projects have taken a large amount of intra-agency coordination and interagency coordination between DEQ, Oregon Health Authority, Regional Solutions and local governments. DEQ has worked on multiple SWOSA projects where local governments have contributed resources to help clean up sites. Local government contributions could include funding, labor or reducing waste management fees. Once cleanup actions are complete and threats to human health and the environment are abated, the sale and redevelopment of these sites improves local property value and local tax revenue. Information about activities using these funds is provided in the Environmental Cleanup Program's 2022 Annual Legislative Report.

3.6.4 Complaints response

Materials Management staff respond to solid waste complaints about illegal disposal and unpermitted disposal, as well as concerns about odors, dust, asbestos or other environmental concerns at disposal sites. In 2020, DEQ responded to 172 complaints (19 in the Eastern Region, 68 in the Northwest Region and 85 in the Western Region). In 2021, DEQ responded to 243 complaints (21 in the Eastern Region, 77 in the Northwest Region and 145 in the Western Region).

Materials Management's investigations of complaints are part of DEQ's overall effort to ensure businesses and individuals comply with state and federal environmental laws. DEQ uses a variety of tools to achieve compliance, including technical assistance, compliance inspections, investigation of complaints, warning letters, assessment of civil penalties and compliance orders. Most violations are resolved through informal enforcement: warning letters or warning letters with opportunity to correct. Repeated or more serious violations can result in a formal enforcement action that includes a civil

penalty. Formal enforcement actions are handled by the Office of Compliance and Enforcement.

During the 2021-2022 biennium, 21 companies and individuals subject to some type of Materials Management investigation were assessed civil penalties totaling $395,796. Of these 21 cases, DEQ issued 13 to unpermitted sites, seven to sites with some type of solid waste disposal site permit and one to an electronics manufacturer for E-cycles violations.[8] In some of these cases, the penalties reflect not only assessments for Materials Management violations, but also for water quality, hazardous waste or other violations of DEQ rules or permits.

4.0 Conclusion

Materials play a significant role in human and environmental health. People in Oregon and around the world produce, use, consume and discard materials every day. These materials impact the environment as well as the health of people who interact with them such as people living near solid waste facilities and workers employed to extract, manufacture and dispose of the materials. With the *2050 Vision* as the guiding compass, the Materials Management Program works to reduce these impacts for a prosperous tomorrow.

In the 2021-2022 biennium, the Materials Management Program made significant headway toward the *2050 Vision.* These programs will continue to collaborate with federal, state and local partners to create a more sustainable future where environmental protection and resource conservation enhance the well-being of all the people in Oregon.

Connect with us and learn more about the Materials Management Program online through DEQ's website.

[8] This is likely an undercount of Materials Management violations and penalties due to enforcement led by other programs sometimes also containing a Materials Management violation and/or penalty.

Oregon Amount Disposed and Recovered by Wasteshed, 2020

Wasteshed	2020 Disposed (tons)	Per Capita (lbs.)	2020 Recovered (tons)	Per Capita (lbs.)	2020 Calculated Recovery Rate
Baker	13,940	1,649	3,386	400	19.5%
Benton	60,967	1,412	39,466	914	39.3%
Clatsop	35,328	1,791	24,262	1,230	40.7%
Columbia	34,174	1,283	11,059	415	24.4%
Coos	55,189	1,743	14,750	466	21.1%
Crook	25,800	2,201	7,342	626	22.2%
Curry	20,176	1,754	6,473	563	24.3%
Deschutes	197,979	2,010	98,491	1,000	33.2%
Douglas	94,378	1,677	41,787	743	30.7%
Gilliam	2,214	2,225	353	355	13.8%
Grant	4,490	1,228	946	259	17.4%
Harney	5,046	1,386	1,131	311	18.3%
Hood River	23,184	1,808	7,562	590	24.6%
Jackson	222,250	1,991	115,701	1,037	34.2%
Jefferson	16,816	1,395	4,140	343	19.8%
Josephine	87,625	2,025	46,828	1,082	34.8%
Klamath	67,802	1,992	18,985	558	21.9%
Lake	5,954	1,475	425	105	6.7%
Lane	283,634	1,487	331,183	1,737	53.9%
Lincoln	54,591	2,260	18,455	764	25.3%
Linn	109,434	1,611	93,426	1,376	46.1%
Malheur	26,438	1,647	5,333	332	16.8%
Marion	287,947	1,651	270,824	1,552	48.5%[9]
Metro	1,357,591	1,447	1,179,812	1,258	46.5%
Milton-Freewater	4,985	1,223	1,519	373	23.4%
Morrow	36,961	5,764	5,847	912	13.7%
Polk	51,685	1,247	44,596	1,076	46.3%
Sherman	1,246	1,388	142	158	10.2%
Tillamook	30,550	2,303	14,000	1,055	31.4%
Umatilla	92,834	2,531	36,670	1,000	28.3%
Union	19,300	1,438	7,086	528	26.9%
Wallowa	6,150	1,718	1,304	364	17.5%
Wasco	28,872	2,116	5,026	368	14.8%
Wheeler	387	537	76	106	16.5%

[9] This percentage includes Marion wasteshed recyclable materials burned for energy in the Covanta energy recovery facility.

Yamhill	**86,938**	**1,588**	**49,561**	**905**	**36.3%**
Oregon Totals	**3,452,854**	**1,618**	**2,507,951**	**1,175**	**42.1%**

Figure 6. *Oregon Amount Disposed and Recovered by Wasteshed, 2020*. The amount of waste disposed or recovered and the corresponding calculated recovery rate for each wasteshed in the state of Oregon. A wasteshed is defined in Oregon law as being an area of the state that shares a common solid waste disposal system, or an appropriate area in which to develop a common recycling system. For the most part, individual Oregon counties are designated as wastesheds.

3.6 Management of solid waste and solid waste disposal sites

To ensure the continued proper end-of-life management of waste materials, DEQ provides regulatory oversight of solid waste management and solid waste disposal facilities. Materials Management staff does substantial work in overseeing recovery, recycling and disposal of waste. This work includes issuing permits and inspecting solid waste facilities such as industrial waste landfills, waste tire disposal sites, transfer stations and municipal construction and demolition sites. Material recovery facilities that provide solid waste treatment through conversion technology, anaerobic digesters and other composting facilities are also permitted and inspected. Materials Management staff provide technical assistance to counties and cities for recovery, recycling, beneficial use, management and disposal of waste. This includes responding to complaints, conducting site visits, ensuring compliance and helping educate the public on waste prevention, recovery, disposal and the *2050 Vision*.

3.6.1 Solid waste disposal facilities and permits

In 2021 and 2022, the Materials Management Program oversaw more than 300 disposal site permits and 24 waste tire permits statewide. The numbers of permits in each major category as of June 2022 are listed in the table below.

	Municipal	**Industrial**	**Total**

Open landfills	32	17	49
Closed landfills	36	23	59
Transfer stations & material recovery facilities	139	5	144
Treatment facilities	0	3	3
Incineration/Energy Recovery	1	0	1
Anaerobic Digester Composting Facility Permit	4	0	4
Anaerobic Digester Composting Facility Registration	1	0	1
Aerobic Composting Facility Permit	16	0	16
Aerobic Composting Facility Registration	32	0	32
Conversion Technology Facility Permit		2	2
Tire permits (carrier, storage, and combined storage and carrier)	24	0	24

Figure 7. *Municipal and Industrial Permits Statewide, 2022*.

Many Oregon landfills closed in the past three decades and continue to be permitted to ensure that the closure process does not contaminate surface or ground water, create harmful landfill gases or cause other environmental problems over time.

DEQ inspects active disposal sites annually or biennially and closed landfills every two or three years to verify that post-closure care (gas and groundwater monitoring) and maintenance of closed landfills are being carried out as required. Facilities also monitor disposal sites and report to DEQ.

3.6.1.1 Composting facilities

Composting facilities use biological processes (microorganisms) to decompose organic feedstocks such as yard debris, animal manures and food discards. In Oregon, composting facilities include aerobic composting facilities and anaerobic digestion facilities. Aerobic composting facilities use microorganisms that prefer oxygen and produce compost. Anaerobic digesters use microorganisms that thrive in low oxygen

environments and create and capture methane gas to produce electricity or other fuel products. Digesters also produce liquid and solid by-products called digestate that can be used for soil fertilizing and conditioning or be further processed into compost.

The products of composting facilities provide numerous environmental benefits. When incorporated into soil, the use of compost can improve soil health and provide a more stable form of nitrogen that is less susceptible to leaching into water supplies. Compost also helps soil by reducing soil compaction and increasing water infiltration. Incorporation of compost into soil stores carbon, thus helping to reduce atmospheric carbon. Anaerobic digesters capture methane rather than releasing it to the atmosphere, which is a significant component of greenhouse gas.

Primary aerobic composting methods include large static pile composting (this was used in the past and continues in some places in Oregon) and turned windrow composting with or without installed piping and motorized blowers to force-aerate the piles. Anaerobic digestion is a common technology used at municipal wastewater treatment plants, food-processing facilities and in processing manure on farms. The digestion process takes place in sealed tanks, creating an oxygen free environment needed for microorganisms to breakdown the feedstocks. Methane gases generated can be used to create heat, electricity or transportation fuels. Some wastewater treatment plants burn-off or “flare” the gases because they lack equipment to utilize the methane.

Oregon currently has 48 DEQ-permitted aerobic composting facilities. Thirty-two are assessed as low risk; 16 are located on agricultural lands. There are also approximately 10 farm-composting facilities under Oregon Department of Agriculture oversight. In 2021 and 2022, three compost facilities have been reconstructing their facilities to improve processing and reduce environmental impacts, particularly offsite odor reductions.

There are four DEQ-permitted anaerobic digesters: one receives food waste, two accept manure only and one is permitted for both but is not yet operational. There are also eight anaerobic digesters located on farms under ODA oversight using manure as feedstock, three of these have received very small quantities of food waste. Currently only two of these facilities are operating.

The Materials Management Program maintains a list of active permitted facilities including municipal solid waste disposal landfills, transfer stations, compost, material recovery facilities, waste tire and household hazardous waste facilities.

3.6.2 Short-term disposal permits and beneficial use determinations

In addition to permitting solid waste disposal sites, DEQ works with businesses, local governments, state and federal agencies, ports and others to permit one-time or short-term disposal of slightly contaminated soil or sediment at locations with minimal environmental impacts. DEQ also reviews applications to beneficially use waste in ways that are productive while protecting human health and the environment, thus avoiding expensive and unnecessary disposal costs. Through these efforts, DEQ provides ways to allow redevelopment of contaminated sites, or brownfields, and construction of roads and other infrastructure to take place in a more cost-effective manner. These options also allow waste to be used as fill, to improve agricultural soil or to make new products. DEQ receives approximately five to fifteen short-term disposal authorization requests per year and two to five beneficial use applications per year. DEQ publishes its approved beneficial use determinations online.

3.6.3 Solid Waste Orphan Account

The Solid Waste Orphan Site Account is funded through a $0.13 per ton fee on all domestic solid waste generated in Oregon. Since 1993 this fund has been used to cleanup actual or potential hazardous substance releases from local government solid waste disposal sites (e.g., municipal landfills). Beginning in 2019, DEQ began a pilot project to use a small portion of the funds to clean smaller sites, such as illegal dumpsites, that meet the specified funding criteria (OAR 340-122-0510 through 0590).

DEQ's Environmental Cleanup Program coordinates the agency's efforts to spend funds from the Solid Waste Orphan Account. DEQ is currently evaluating a list of over 500 potential local government and private solid waste orphan sites to determine eligibility and prioritize sites. In fiscal year 2021, The current SWOSA funding plan earmarks

$4.8M to clean up 12 high priority sites and to perform site assessments at an additional 100 sites across Oregon.

Additionally, in fiscal year 2021, DEQ worked on numerous solid waste orphan sites, including a tire disposal and auto scrap yard, a metal scrap yard and clandestine drug lab, an auto dismantler and crusher, and a lumber yard. These projects have taken a large amount of intra-agency coordination and interagency coordination between DEQ, Oregon Health Authority, Regional Solutions and local governments. DEQ has worked on multiple SWOSA projects where local governments have contributed resources to help clean up sites. Local government contributions could include funding, labor or reducing waste management fees. Once cleanup actions are complete and threats to human health and the environment are abated, the sale and redevelopment of these sites improves local property value and local tax revenue. Information about activities using these funds is provided in the Environmental Cleanup Program's 2022 Annual Legislative Report.

3.6.4 Complaints response

Materials Management staff respond to solid waste complaints about illegal disposal and unpermitted disposal, as well as concerns about odors, dust, asbestos or other environmental concerns at disposal sites. In 2020, DEQ responded to 172 complaints (19 in the Eastern Region, 68 in the Northwest Region and 85 in the Western Region). In 2021, DEQ responded to 243 complaints (21 in the Eastern Region, 77 in the Northwest Region and 145 in the Western Region).

Materials Management's investigations of complaints are part of DEQ's overall effort to ensure businesses and individuals comply with state and federal environmental laws. DEQ uses a variety of tools to achieve compliance, including technical assistance, compliance inspections, investigation of complaints, warning letters, assessment of civil penalties and compliance orders. Most violations are resolved through informal enforcement: warning letters or warning letters with opportunity to correct. Repeated or more serious violations can result in a formal enforcement action that includes a civil penalty. Formal enforcement actions are handled by the Office of Compliance and Enforcement.

During the 2021-2022 biennium, 21 companies and individuals subject to some type of Materials Management investigation were assessed civil penalties totaling $395,796. Of these 21 cases, DEQ issued 13 to unpermitted sites, seven to sites with some type of solid waste disposal site permit and one to an electronics manufacturer for E-cycles violations.[10] In some of these cases, the penalties reflect not only assessments for Materials Management violations, but also for water quality, hazardous waste or other violations of DEQ rules or permits.

4.0 Conclusion

Materials play a significant role in human and environmental health. People in Oregon and around the world produce, use, consume and discard materials every day. These materials impact the environment as well as the health of people who interact with them such as people living near solid waste facilities and workers employed to extract, manufacture and dispose of the materials. With the *2050 Vision* as the guiding compass, the Materials Management Program works to reduce these impacts for a prosperous tomorrow.

In the 2021-2022 biennium, the Materials Management Program made significant headway toward the *2050 Vision.* These programs will continue to collaborate with federal, state and local partners to create a more sustainable future where environmental protection and resource conservation enhance the well-being of all the people in Oregon.

Connect with us and learn more about the Materials Management Program online through DEQ's website.

This report uses Arial font consistently for titles, headings and body text. Use the style settings above in the ribbon to apply the proper headings.

[10] This is likely an undercount of Materials Management violations and penalties due to enforcement led by other programs sometimes also containing a Materials Management violation and/or penalty.

As part of the Classic-Arial Template Package, it has associated Fact Sheet and Generic Document templates for companion documents or can be used alone.

What are cascading headings and why are headings important?

In addition to making a document easier to read and follow by breaking down sections and subsections clearly, by using the styles, Word embeds code so that people using accessibility software can more easily read and navigate between sections. This coding is also carried to documents converted to pdf.

H2 – 20pt Bold - visible in the Table of Contents

The fonts, margins, and cover layout are designed to meet agency style and state accessibility guidelines, as well as readability on the web and should not be altered.

If you are including long tables that don't fit within the report margins, you can use .5 margins all around in a horizontal orientation.

You may replace the cover and executive summary image with one more relevant to your report. Be sure to review our copyright standards for using images and use an image with high enough quality so that the image is clear and crisp.

H3 – 16pt Bold - visible in the Table of Contents

Headings should cascade from largest to smallest so that accessibility readers can differentiate between sections (and for general readability).

H4 – 14pt Bold

H5 – 12pt Bold

H6 – 11pt Bold

Body text, 11pt (minimum 10pt)

If you have difficulty with this template or need assistance adapting this to your information, contact your Public Affairs Specialist or the Web Team.

Caption, 10pt Bold

Table Heading	Table Heading	Table Heading
If you are using color	Be sure to use sufficient contrast	Between your text and the background
Tables should also	Fall between the margins	

Header/Footer text – minimum 9pt font