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2021 Oregon Material Recovery and Waste Generation Rates Report

By:

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Oregon Department of Environmental Quality



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This report provides one of the most complete and accurate collections of state-level disposal and recycling data in the country.

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Executive Summary

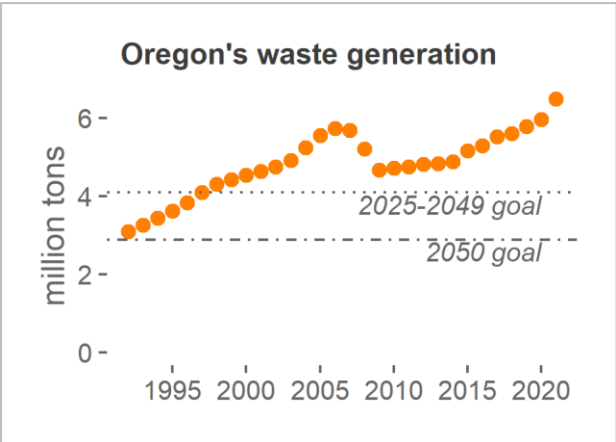
The Oregon Department of Environmental Quality’s Materials Management program takes a holistic view of environmental impacts of materials. It considers the impacts that occur across the full life cycle of materials, including resource extraction, design and production, use, and end-of-life management, including solid waste disposal and recovery.

This report details how Oregon manages materials at the end of their useful lives, via disposal and recovery.

- *Disposal* refers to all materials placed in landfills and many materials burned in incinerators.
- *Recovery* refers to recycling, composting and some incineration with energy recovery.
- *Generation* is the sum of disposal and recovery and represents the total tonnage of the waste stream.
- The *recovery rate* is the percentage of generation recovered.

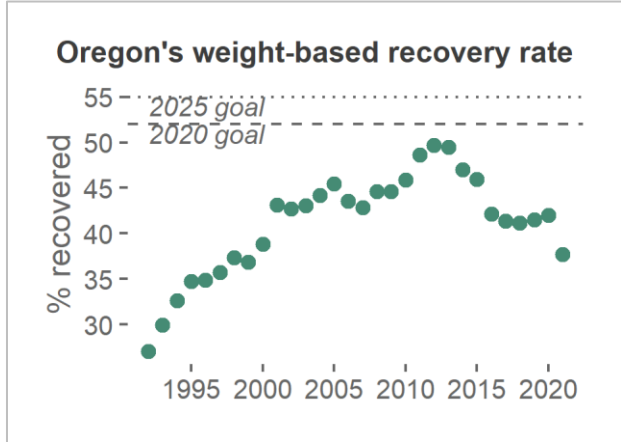
In 2021 people in Oregon:

- Generated 6,494,204 tons of waste, up 9.4 percent from 2020;
- Disposed of 4,046,936 tons into landfills and incinerators, up 17.9 percent from 2020; and
- Recovered 2,447,267 tons of material, down 2.2 percent from 2020. The recovery rate is thus 37.7 percent of waste generated.



The largest factor reducing the recovery rate for Oregon was the large increase in disposal, but much of that increase was due to disposal of fire-damaged structures in early 2021 due to an unprecedented wildfire season at the end of 2020. Although landfills do not report wildfire debris separate from other garbage, DEQ estimated wildfire debris by looking at the increase in disposal quarter by quarter in 2021 compared to the same quarters in 2020 prior to the fire. Based on that analysis, some 435,000 tons of excess disposal was due to fire debris in 2021. The total increase in disposal in 2021 was 614,085 tons, so fire debris accounted for close to 71 percent of the increase in overall disposal. Had that fire debris not been generated in 2021, 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 percent.

The total recovered tons decreased nearly 55,000 tons in 2021 when compared to 2020. Materials showing the biggest changes in recovery were scrap metal (-68,181 tons) and yard debris (-10,542 tons). Meanwhile, tires and cardboard recovery increased. Used motor oil recovery showed an increase of 6,000 tons when compared to 2020, and gypsum wallboard saw an increase of nearly 2,400 tons. Data reported by recycling collection service providers showed a small increase in the percentage of materials



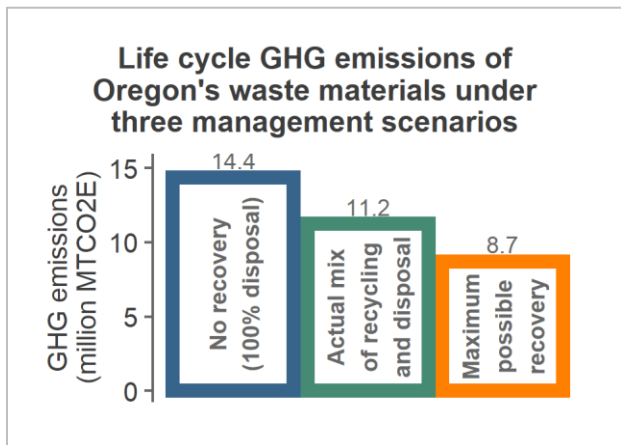
coming from residential sources relative to commercial sources. Such a difference was expected as commercial activities declined due to COVID-19 and many people moved to work at home instead of in an office. Given these changes, DEQ anticipated a larger shift from commercial to residential recycling. However, in 2021, the situation reversed, with the proportion of recycling from commercial sources increasing when compared to residential recycling.

State goals for solid waste:

Waste generation remained well above the goal set for 2009-2024 by the Oregon Legislature. Weight-based recovery rates are lower than the legislated goals set for 2020 and 2025.

Recovery and environmental impacts:

Recovery via recycling and other means has environmental value. DEQ estimates that in 2021, material recovery reduced greenhouse gas emissions by 3.2 million metric tons of carbon dioxide equivalents, compared to a scenario where all waste was disposed. Another 2.5 million MTCO₂E in reductions are possible if recovery rates could be raised in an optimal fashion for reducing greenhouse gas emissions.



Even with maximized recovery, the GHG impacts of materials in the waste system would be considerable, around 8.7 million MTCO₂E. For context, Oregon's total emissions from all sources exceeded 60 million MTCO₂E in 2018.

Thus recovery presents an opportunity for environmental impact reductions, but only a limited one. To achieve deeper reductions in the environmental impacts of materials and waste, DEQ and its partners will need to take actions across the entire materials life cycle, such as redesigning products and reducing overall materials use.

Table of contents

Acknowledgments	2
Executive Summary.....	4
Introduction and purpose	7
Requirement to report.....	8
Materials included in the analysis	8
Recovery and reductions in environmental impacts	10
Summary of analytical results.....	10
Understanding impact reductions.....	12
Methodological details, in brief	13
Recovery rates	15
2021 statewide recovery rate.....	15
Changes in Disposal 2020-2021 – Cleanup of Fire Debris.....	16
How DEQ calculates the statewide recovery rate.....	17
How DEQ calculates individual wasteshed recovery rates.....	17
Marion County adjustment.....	17
Wasteshed recovery rates	18
Materials recovered	19
Factors affecting material recovery in 2021	19
Impact of China’s import bans and 2017-18 recycling market disruption	21
Year to year changes in material collected.....	22
Waste generation	24
Discussion	26
Adjustments to reports from previous years	27
DEQ made the following adjustments for the 2021 report:.....	27
DEQ corrected data in previous years, for the following reasons:.....	27
2021 survey report tables.....	31

Introduction and purpose

This report describes results and methodology for Oregon’s Material Recovery Survey for the calendar year 2021. Material recovery includes all materials collected for recycling or composting, and, for a subset of materials, incineration with energy recovery. Each year, the Oregon Department of Environmental Quality compiles data on municipal post-consumer waste recovery. DEQ sends a survey to all collection service providers and private recycling companies that handle materials for recycling, composting and energy recovery. Survey data is combined with data gathered from quarterly and annual disposal site reporting forms. Together, recovery and disposal numbers make up the amount of waste generated by people in Oregon each year.

Total Recovered	
2,447,267 tons	
<hr/>	= Recovery Rate
Total Generated	
(Total Recovered + Total Disposed)	37.7%
6,494,204 tons	

DEQ uses this information to estimate energy savings and greenhouse gas reductions, two important environmental benefits from material recovery. Additionally, this information allows DEQ to calculate material recovery rates and waste generation values. The recovery rate is the percentage of the total waste generated in Oregon that is recycled, composted, or recovered for energy. Waste generation is the amount of waste recovered plus the amount of waste disposed. Recovery, disposal, and generation data, as well as recovery rates, are calculated for the state and for each of Oregon’s 35 individual wastesheds¹.

Individual wastesheds also use this information to implement and improve their waste prevention and material recovery programs.

¹ 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. Three exceptions are that:

The greater Portland tri-county area, consisting of Clackamas, Multnomah and Washington Counties, is designated as the Metro wasteshed.

Milton-Freewater, a city within Umatilla County, is designated as a separate wasteshed.

For most cities such as Albany that have populations in two counties, the entire city was included in the wasteshed that included the larger portion of the city population. The exception is Salem, where most of Salem is in the Marion Wasteshed, but West Salem is included in the Polk Wasteshed.

This is the 30th year that DEQ has used the survey to gather this data. The 1991 Oregon Legislature enacted requirements (see [Oregon Revised Statute 459A](#)) for this annual survey and set goals for state and local recovery rates. These recovery goals were amended by the Legislature in 2001, and then again in 2015. Wasteshed goals range from 15 percent (Lake Wasteshed) to 64 percent (Metro and Marion Wastesheds) by 2025. The statewide recovery goals are 52 percent recovery by 2020 and 55 percent recovery by 2025.

In 2001, the Legislature also established statewide goals for reducing waste generation. These goals were revised by the Legislature in 2015. The waste generation goals require that the generation of solid waste in the years 2025 to 2049 be 15 percent below the amount of solid waste generated in 2012, and for 2050 and beyond, the generation goal is 40 percent less than the waste generated in 2012.

Requirement to report

Oregon law requires that all publicly and privately operated recycling and material recovery operations complete a Material Recovery Survey form. This includes landfills, local recycling collectors, private recycling collection companies and depots, transfer stations, material recovery facilities, composters, local governments, and any other operation that handles post-consumer recoverable materials. One exception, due to the difficulty of separating post-consumer scrap metal from commercial and industrial scrap metal, are companies handling only scrap metal. These companies are not required to report on privately obtained post-consumer scrap metal, but many do report on a voluntary basis.

The survey requires that companies report all recyclable materials they handle, including the amount of each material collected, the county of origin, the company they received any transfers from, and where or to whom the materials were marketed.

Oregon law further requires DEQ to keep confidential the information reported by private recyclers. This includes customer lists and specific amounts and types of materials collected or marketed by individual companies. For private recyclers, only aggregated information may be released to the public.

Materials included in the analysis

Oregon's analysis of the environmental benefits from material recovery and the recovery rates includes only post-consumer materials generated in Oregon for recycling, composting or energy recovery. Per Oregon's recycling law ([ORS 459A.010 \(3\)\(a\)](#)), waste from manufacturing and industrial processes (pre-consumer materials), reconditioned and reused materials, material that can be disposed of as clean fill without being put in a landfill such as brick and concrete, and waste originating out of state (but handled in Oregon) are excluded. Some scrap metals, including discarded vehicles or parts of vehicles and metal derived from major demolition activities handled by scrap metal dealers, are also excluded. Scrap metal collected at disposal

sites by collection service providers, at community recycling depots or through municipally sponsored collections events counts as recovered material.

The first Material Recovery Survey for the 1992 calendar year included 30 types of materials. Since then, some new materials have been added and other materials consolidated, so that the survey now contains 33 types of material. The major materials for 2021 are:

- Yard Debris
- Metals – Tinned cans, aluminum, and other scrap metals
- Cardboard
- Wood Waste
- Paper Fiber – Other paper fiber (combined high-grade paper, newsprint and mixed scrap paper) not including cardboard
- Container Glass
- Food Waste – Residential and commercial food waste
- Other – Including tires, used motor oil, antifreeze, batteries of all types, gypsum, asphalt roofing materials, textiles, paint, and animal waste and grease
- Plastic – Rigid plastic containers, plastic film, other plastics and composite plastics (including carpet pad)
- Electronics

A complete list of materials recovered is included in Table 8, at the end of this report.

Recovery and reductions in environmental impacts

Summary of analytical results

Oregon's recovery activity in 2021 can be associated with:

- 3.2 million metric tons CO₂ equivalents of reductions in greenhouse gas emissions; and
- 38 trillion British thermal units of savings in energy demand.

These savings in energy and greenhouse gas impacts are similar to the values reported for 2020 (40 trillion BTU and 3.3 MMTCO₂E).

If recovery could be increased from its current rate (about 38 percent by weight) to rate corresponding with a maximum reduction in greenhouse gas emissions (about 64 percent by weight), it can be estimated that:

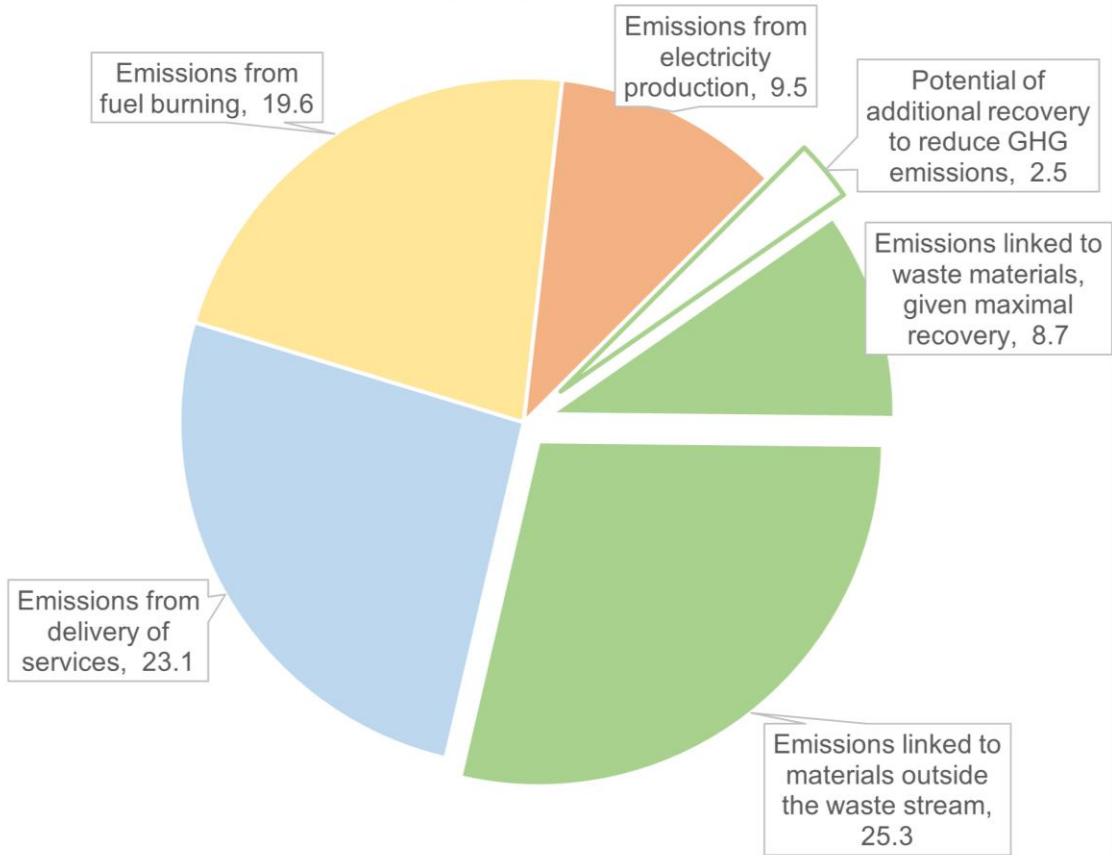
- GHG emissions would decline an additional 2.5 MMTCO₂E; and
- Energy expenditures would decline an additional 52 trillion BTU.

Such savings must be placed within the context of the state's total environmental impacts.

- Oregon's total GHG emissions are more than 60 MMTCO₂E. A [DEQ report](#) gives recent yearly totals as 66.2 MMTCO₂E, from a sector-based method, and 88.7 MMTCO₂E, from a consumption-based method.
- Oregon's overall direct energy expenditures are around 1,015 trillion BTU per year, in a recent [Oregon Department of Energy report](#).

The pie chart below combines results from the consumption-based emissions inventory with estimates of the impacts of waste. It shows that while increased recovery does present an opportunity for environmental impact reductions, the opportunity is limited. Increased recovery, by itself, cannot provide the sizeable decreases in impacts anticipated by the state's greenhouse gas reduction goals ([ORS 468A.205](#)), or the [2050 Vision](#). Achieving greater reductions in environmental impacts of materials will require other materials management strategies, such as the redesign of products and reduced material use.

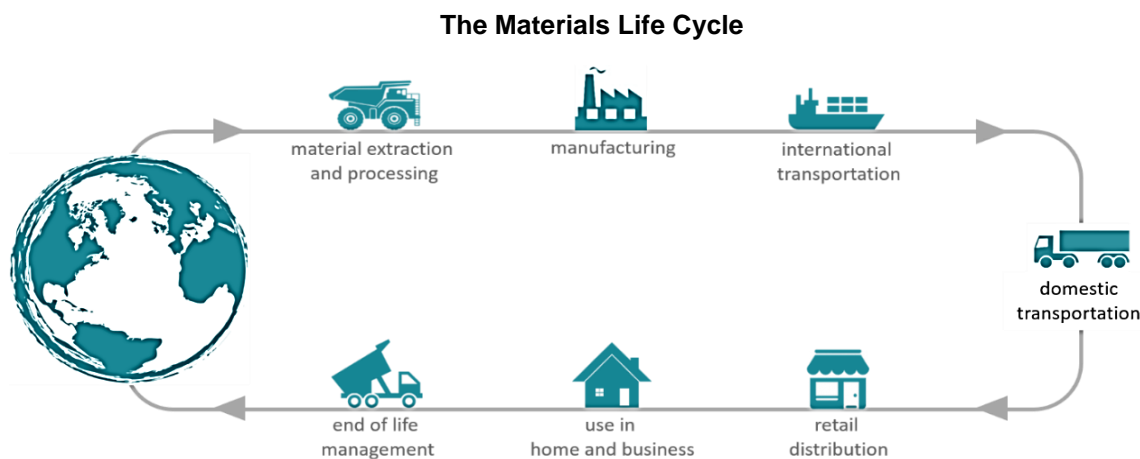
Potential of maximized recovery to reduce statewide GHG emissions in MMTCO₂E



Sources of GHG emissions in Oregon, in MMTCO₂E, according to the state's consumption-based inventory, combined with results from a life cycle assessment of the solid waste stream. The impact of materials (in grey-green) already includes the current benefits of recovery. Additional recovery (above current levels) offers 2.5 MMTCO₂E in possible further impact reductions. The remaining GHG impacts of materials are either not preventable by recovery (8.7 MMTCO₂E), or not represented by the solid waste stream at all (25.3 MMTCO₂E).

Understanding impact reductions

All products and materials can be seen within the context of the materials life cycle. Everything people touch or use has been created somehow – usually via “extraction” from the earth or soil, followed by production, distribution, consumption, and use, and “end-of-life” processes such as disposal or recycling. Environmental impacts occur at every stage of this life cycle. For example, extracting ore or operating a farm uses machinery that emits GHGs and expends energy. The sum total of impacts associated with the materials life cycle are called the “life cycle impacts.”



Recovery activities such as recycling and composting also create impacts. For example, recycling trucks emit GHGs and expend energy as they collect material, as does processing collected recyclables to create new products.

Where, then, do the impact reductions or savings associated with recovery come from?

DEQ assumes, as is conventional in the field of life cycle assessment, that use of recovered materials prevents production from newly extracted material, or otherwise prevents some undesired environmental impact. For example, production of a metric ton of glass from recycled sources may save about 300 kg of GHG emissions, *compared to the emissions of production from newly extracted material.*² Similarly, while aerobic composting does lead to CO₂ emissions, composting may still represent a savings *compared to the methane emissions that could result from disposal in a landfill.*³

² David A. Turner, Ian D. Williams, and Simon Kemp, “Greenhouse Gas Emission Factors for Recycling of Source-Segregated Waste Materials,” *Resources, Conservation and Recycling* 105, Part A (December 2015): 186–97, <https://doi.org/10.1016/j.resconrec.2015.10.026>.

³ US EPA, “Organic Materials Chapters [Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM)],” February 2016, www.epa.gov/sites/production/files/2016-03/documents/warm_v14_organic_materials.pdf.

Accordingly, impact reductions or savings are not direct measurements, but *projections* of how impacts could differ if materials had been managed differently at end-of-life.⁴

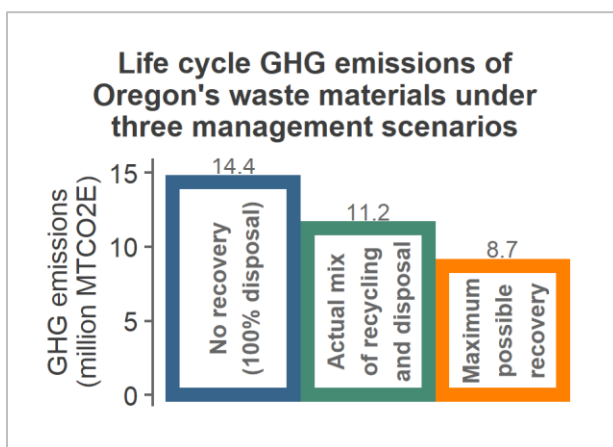
It is important to note that these impacts may occur over multiple years and may occur in areas outside of Oregon. Though we associate the materials in the waste stream with a particular place (Oregon) and time (for example, 2021), the life cycle impacts of those materials are not always so localized. An item recycled in 2021 in Oregon may have been created in another state or country in a different year. An item disposed in 2021 may decay in a landfill, but slowly over a period of many years. Environmental impacts, and savings, are spread out over time and space.

Methodological details, in brief

DEQ calculates impact reductions through a multi-step process. First it characterizes Oregon's solid waste stream, which includes both disposed and recovered materials, by weight and end-of-life disposition (for example, recycling, composting or landfilling). Next it links those weights to impact factors that convert weights into environmental impacts for both production processes and end-of-life dispositions. Appropriate credits are given for recovery activities when it can be presumed that recovery has prevented some other, greater environmental impact, as described earlier. Then it sums life cycle impacts for three possible management scenarios:

- *Actual*: the life cycle impact of materials in the solid waste stream, given the current mix of recovery and disposal.
- *No recovery*: the life cycle impact of materials in the solid waste stream if no recovery had taken place and all materials had been disposed.
- *Maximum possible recovery*: the life cycle impact of materials in the solid waste stream, if all materials were recovered in the fashion that reduced total life cycle GHG emissions the most.

Note that in all scenarios, the weights of materials are the same. The scenarios differ only in the end-of-life dispositions of those materials. The *maximum possible recovery* scenario assumes that recovery has been maximized in the way that produces the lowest total life cycle greenhouse gas impacts, which corresponds to a recovery rate of about 64 percent by weight. (The figure is less than 100 percent because some materials have no realistic recycling path, and for others



⁴ The assumptions behind such projections are important to note. Such calculations, including DEQ's, presume that demand for materials is unaltered by the presence of recycled materials, and that collected recyclables actually replace newly extracted materials at a high rate, often 1:1. Authors such as Zink and Geyer question both these assumptions – see doi://10.1111/jiec.12545 and doi://10.1111/jiec.12355 .

recycling does not reduce greenhouse gas emissions.)

Finally, impact reductions or savings are calculated as differences between the scenarios. The currently realized savings are the difference between the *no recovery* impact and the *actual* impact. The additional savings, which might be realized by maximizing recovery, are the difference between the *actual* impact and the *maximum possible recovery* impact.

For example, the currently realized GHG savings of 3.2 MMTCO₂E, and the additional potential savings of 2.5 MMTCO₂E, were calculated by comparing life cycle emissions for the three scenarios, totaling 14.4, 11.2, and 8.7 MMTCO₂E.

The weight data describing Oregon's waste stream comes from several sources.

- Quantities and dispositions of recovered materials come from DEQ's Material Recovery Survey for 2021.
- Quantities of disposed materials are derived by combining the total amount of material disposed in Oregon in 2021, from DEQ's disposal records, and the [Waste Composition Study](#) for 2016/17, which lists proportions of disposed waste in various material categories.

Impact factors come from Oregon DEQ's new Waste Impact Calculator model. This is a change from reports representing years up to and including 2019, which drew impact factors from EPA's WARM model. The Waste Impact Calculator was created by Oregon DEQ specifically to match assumptions appropriate to Oregon and was independently reviewed by Dr. Christoph Koffler of the life cycle consulting firm Sphera. The WIC model, its documentation, and Koffler's review are available on [github](#).

For further information about how DEQ calculates impact reductions contact Martin Brown at 503-229-5502, or martin.brown@deq.oregon.gov.

Recovery rates

The recovery rate is the percentage of total waste generation that is recovered. DEQ calculates both the statewide recovery rate and a recovery rate for each of the 35 individual wastesheds in the state.

2021 statewide recovery rate

In 2021, the state recovered 2,447,267 tons of material. This represented 37.7 percent of the municipal post-consumer waste stream, well below the statewide goal of 52 percent recovery by the year 2020, and the lowest statewide recovery rate since the year 1999. Recovered tons decreased by 2.2 percent from the previous year surveyed, 2020.

From 1992 through 2005, tons of material recovered increased regularly each year. From 2006 through 2009, recovered tons declined even though recovery rates were steady, as declining consumption of newspapers and magazines, followed by a general decline in overall consumption due to the recession, reduced the amount of material available to be recovered. In 2010, Oregon saw an increase in recovery, as the economy gradually recovered from the recession. Recovery rates peaked in 2012 at close to 50 percent, but then fell, leveling off at about 42 percent in 2016 and remaining at that level through 2020 before dropping again in 2021.

Oregon State Recovered Tons and Recovery Rates

Year	Tons Recovered	Tons Disposed	Calculated Rate ⁵
1992	839,679	2,263,099	27.1
1993	974,685	2,280,513	29.9
1994	1,118,912	2,312,669	32.6
1995	1,257,204	2,362,146	34.7
1996	1,338,259	2,497,170	34.9
1997	1,462,114	2,633,017	35.7
1998	1,604,985	2,695,903	37.3
1999	1,626,271	2,788,699	36.8
2000	1,765,817	2,778,463	38.9
2001	1,999,085	2,635,072	43.1
2002	2,029,261	2,723,365	42.7
2003	2,116,880	2,796,787	43.1
2004	2,317,064	2,923,462	44.2
2005	2,523,367	3,026,457	45.5
2006	2,494,050	3,235,828	43.5
2007	2,437,569	3,248,126	42.9
2008	2,326,146	2,890,503	44.6
2009	2,082,631	2,586,721	44.6
2010	2,163,957	2,550,509	45.9
2011	2,306,124	2,437,767	48.6
2012	2,391,490	2,424,833	49.7
2013	2,390,859	2,442,827	49.5
2014	2,307,269	2,580,933	47.2
2015	2,369,080	2,784,467	46.0
2016	2,225,950	3,059,745	42.1
2017	2,286,969	3,237,214	41.4
2018	2,307,545	3,295,468	41.2
2019	2,402,756 ¹	3,322,349 ¹	42.0 ¹
2020	2,501,960 ¹	3,455,294 ¹	42.0 ¹
2021	2,447,267	4,046,936	37.7

¹ These tonnage figures are corrected from earlier published values.

⁵ Between 2001 and 2015, Oregon’s law specified that “credits” be provided towards the statewide recovery goal for jurisdictions that promoted programs for home composting and for material reuse - programs for which recovery is difficult to measure directly. At the state level, these credits added about 3.6 to 3.8 percent to the statewide recovery rate in those years. Changes in legislation in 2015 eliminated the recovery credits, and so they have been dropped from this table.

Changes in disposal 2020-2021 – cleanup of fire debris

A total of 4,046,936 tons of municipal post-consumer waste from Oregon were disposed in 2021. This increase of over 17 percent from 2020 is a record high since the material recovery survey began in 1992. However, much of the increase in disposal came from the cleanup of fire debris from multiple fires that destroyed more than 6,000 buildings in five counties in late 2020. DEQ estimated that about 435,000 of extra solid waste was generated and disposed in 2021 from cleaning up after the fires.

Landfills did not report fire cleanup debris separate from other solid waste, but DEQ estimated the amounts by comparing the tonnages disposed for that county in each quarter in 2021 that was after the fire but that showed a very large increase in disposal when compared to the same quarter in 2020. The table below shows the excess tons disposed in 2021 when compared to equivalent quarters before the fire in 2020, and shows the fires involved and the structures destroyed by each of the fires.

Estimated Tons of Fire Cleanup and Disposal

County	Tons increased	Percent increase	Fire damage
Jackson (Q1, Q2)	222,245	220.5%	Almeda Drive and South Oberchain Fires, more than 3,000 structures destroyed
Klamath (Q3, Q4)	18,461	54.3%	Bootleg Fire in 2021 - put out by August 14, 408 structures and 342 vehicles destroyed.
Lane (Q1, Q2)	53,289	41.2%	Holiday Farm Fire, 768 structures destroyed
Lincoln (Q1, Q2)	11,985	44.9%	Echo Mountain Complex fire, 293 structures destroyed
Marion (Q1-4)	129,592	44.9%	Lionshead and Beachie Creek Fires, 1,603 structures destroyed in multiple counties
Total	435,571		

There was a very strong correlation between the number of structures reported destroyed by fires in each county and the excess disposal reported by those counties in the quarters following the fire, with a correlation coefficient of greater than 99 percent.

With the fire cleanup debris still included, per-capita disposal was 1,897 pounds for the year, a 25.3 percent increase above the 1992 figure of 1,513 pounds; surpassing the 2007 per capita disposal peak of 1,734 pounds per year. Subtracting the fire cleanup debris, per-capita disposal was 1,693 pounds per person per year, still under the peak year of 2007.

Total tons disposed added to total tons recovered equaled an all-time high of 6,494,204 tons of total waste generated in 2021 (see Waste Generation on page 25). Total generation increased nine percent, with per-capita generation increasing nine percent from 2020 levels. If the fire debris was not included, the generation estimate would have been 6,058,632 tons – still a record high, but only 2.1 percent higher than the 2020 generation rate.

How DEQ calculates the statewide recovery rate

DEQ combines information about quantities of material collected from privately-operated recycling and material recovery facilities with recovery information from collection service providers and disposal site collections, in a manner that eliminates double counting of material that is passed on from collectors through processors to end-users. This determines the total weight of material recovered.

Next, DEQ adds the total weight of material recovered to the total weight of material disposed, obtained from disposal site reports. This sum is the total weight of material generated. The total weight of material recovered is divided by the total weight generated. This results in the calculated recovery rate.

How DEQ calculates individual watershed recovery rates

The total weight of material recovered is allocated to the watershed of origin. Direct collectors of materials are the primary and best information source for the collected materials' watershed of origin. When information from direct collectors is not available, or when a survey respondent does not know the watershed of origin for the collected materials, DEQ uses information from the companies receiving materials from the collectors in order to allocate material back to watersheds. Material is allocated back to watersheds based on population in rare cases when survey respondents and market information is insufficient.

DEQ also uses information from disposal site reporting forms to determine the total weight of material disposed to the watershed of origin. For each watershed, total weight of material disposed is added to total weight of materials recovered to ascertain the amount of waste generated in the watershed. The total weight of material recovered is divided by the total weight generated to determine the calculated recovery rate for each watershed.

Marion County adjustment

As home to the state's only municipal waste-to-energy incinerator, Marion County's recovery and disposal tonnages are revised each year to include certain wastes burned for energy as recovered, as directed by the 2001 Legislature. For 2021, two materials that could be counted toward the recovery rate when burned for energy were wood waste and yard debris. In 2021, 13,847 tons of these materials burned for energy in the county's incinerator were counted as

recovered instead of disposed. Marion County also recovered 5,941 tons of scrap metal from the incinerator ash. DEQ subtracted the scrap metal tonnage from the Marion County disposed tons so that the same tons would not be counted as being both disposed and recycled.

Wasteshed recovery rates

Oregon has 35 individual wastesheds, each with its own recovery rate and goal. Based on the new goals established by Senate Bill 263, seven wastesheds are already at or above their goal for 2025.

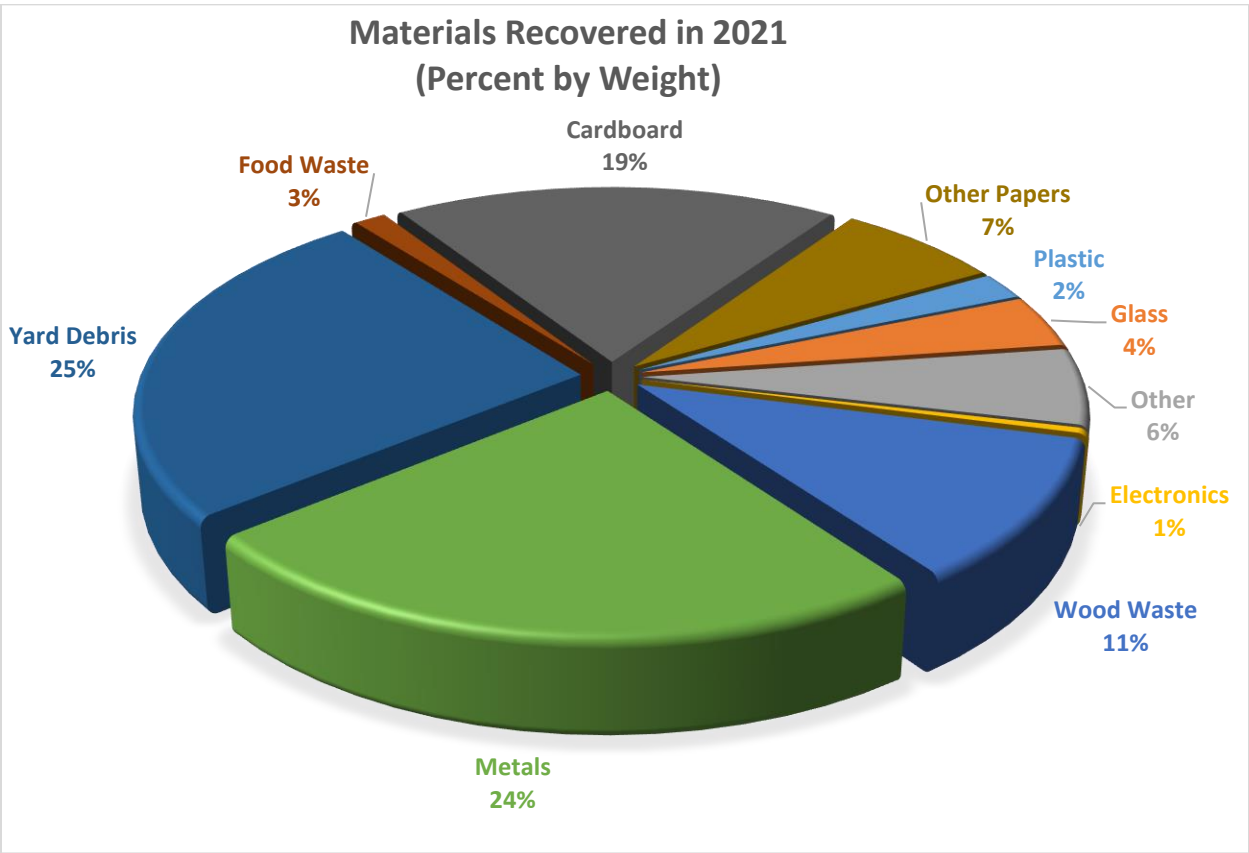
The Survey Report Tables listed on page 31 of this report show 2021 recovery rates for each wasteshed (Table 1), tons of materials recovered in 2021 by wasteshed (Table 2), and tons of solid waste disposed by wasteshed in 2021 (Table 3).

For a historical look at recovery, disposal, and generation data in Oregon, see Survey Report Tables 4, 5, 6 and 7, which provide the most recent and updated recovery rates, recovered material tons, disposal tons, and tons of solid waste generated each year since the Material Recovery Survey began in 1992.

Materials recovered

Oregon’s material recovery rate for 2021 includes materials that were recycled, composted (including yard debris, food waste and some wood waste), and burned for energy (including tires, fuels, oil-based paint, used oil, wood waste and some yard debris). Sixty-two percent of the material recovered was recycled, 27 percent was composted, and 11 percent was burned for energy.

The chart below shows major categories of materials recovered in 2021 and the percentage of total recovery (by weight) for each category. Specific materials included in these categories are listed on page four.



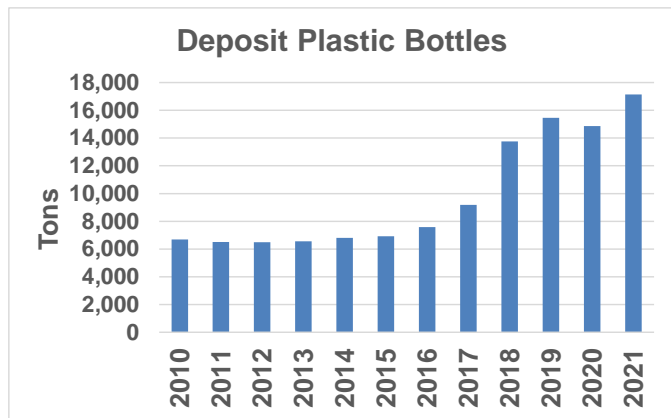
Factors affecting material recovery in 2021

The COVID-19 pandemic continued to have an impact on the generation and recovery of materials in 2021. Data reported by recycling collection service providers showed a small increase in the percentage of materials coming from residential sources relative to commercial sources. Such a difference was expected as commercial activities declined due to the COVID-19 pandemic and many people moved to work at home instead of in an office. Given these changes, DEQ anticipated a larger shift from commercial to residential recycling. However, in

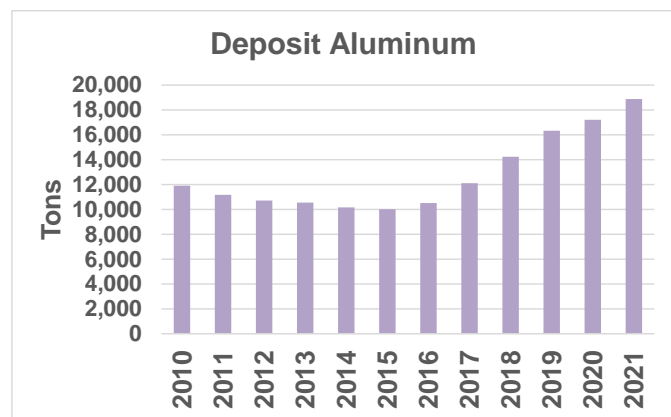
2021, the situation reversed, with the proportion of recycling from commercial sources increasing when compared to residential recycling. Other factors also played a role. Yard debris recovery was up 75,066 tons in 2020 from the previous high in 2019, and only declined 10,541 tons from that high in 2021. This may have resulted from people spending more time at home, and thus having more time for gardening and yard maintenance.

Trends for paper recovery continue the recent patterns. Cardboard recycling increased by 17,047 tons over 2020 reaching an all-time high in terms of absolute tons, but not per-capita tons, despite a likely reduction in commercial activity due to the COVID-19 pandemic and associated quarantine periods. Increase in e-commerce has led to an increase in cardboard generation in residential settings. On the other hand, the recycling of other paper has continued its long, slow decline since its peak in 2007, as newspaper and magazine sales continue to fall as people switch more to electronic media for communication. Recycling of paper other than cardboard was down 6,431 tons (3.6 percent) compared to 2020, and down 81,000 tons (31.9 percent) compared to the average for the previous 10 years.

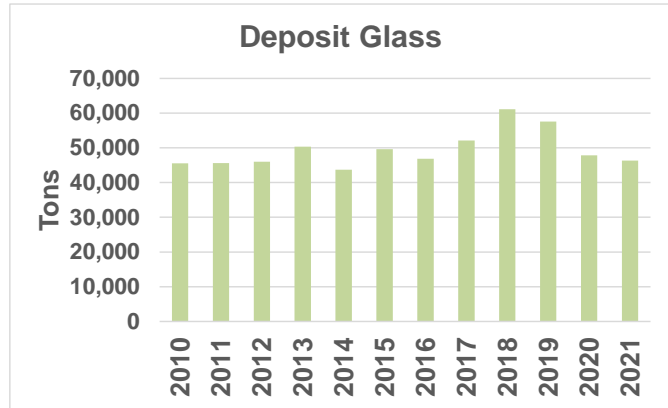
The COVID-19 pandemic impacted the recovery of beverage containers under the Oregon Bottle Bill. Through much of 2020, most stores discontinued the redemption of beverage containers, as allowed by the Oregon Liquor and Cannabis Commission due to concerns over COVID-19 transmission. Redemption centers remained open, but large parts of the state are not served by redemption centers. At the same time though, the consumption of beverages at home increased greatly in 2020. So, even though the redemption rate of beverage containers fell from 85.8 percent in 2019 to 77.2 percent in 2020, the absolute number of containers redeemed only fell by one percent. According to data compiled by the Oregon Liquor and Cannabis Commission, redemption rates rebounded in 2021 back to 80.6 percent, and that absolute number of containers redeemed reached an all-time record of over two billion.



Over this period, there was also a continued shift in beer sales from glass bottles to aluminum cans, increasing the tons of aluminum recycled while decreasing the glass. Plastic bottles sales and returns also had a large increase from 2020 to 2021. The three bar charts to the right show the tons of aluminum, glass and plastic beverage containers recycled under the Bottle Bill since 2010.



The large increase in beverage container redemption starting in 2017 and 2018 resulted from the doubling of the refund value to 10 cents in April 2017 and the addition of juices, teas, and many other beverages to the Bottle Bill in 2018. Increases in recycling tonnage under the Bottle Bill come from two sources:



- More containers being redeemed instead of being disposed or littered, and
- Containers being redeemed instead of being placed out for curbside collection or recycled at depots.

Moving containers from disposal or litter clearly has major environmental benefits. However, even moving containers from depots or on-route collection also results in a greater tonnage of material recycled, as Bottle Bill recycling is much less contaminated than is true for materials collected commingled, resulting in a higher yield of material actually recycled into new products or packaging.

Impact of China’s import bans and 2017-18 recycling market disruption

As discussed in the 2018 and 2019 Oregon Material Recovery and Waste Generation Rate reports, China implemented a ban on importation of mixed recyclables including almost all post-consumer plastics starting in 2018. Many other Asian countries then took similar steps, strongly limiting the markets for plastics and mixed paper. With the disappearance of markets for these materials, the price of plastic and paper for recycling dropped precipitously, and instead of being paid for commingled recyclable materials, on-route collection companies were having to pay to have their materials accepted by the commingled recycling processing facilities. According to data from *RecyclingMarkets.net*, prices for most grades of paper and plastic continued to be very low through the late fall of 2020, although the prices of many recyclables skyrocketed in 2021.

In response to the market disruption, many jurisdictions dropped plastic tubs and pails, and sometimes other materials such as mixed paper, from their collection programs in 2018. Most programs that dropped material in 2018 continued to not collect those materials in 2021, although a few did add back certain items to their on-route programs. Programs in the Portland Metro area, Deschutes County, and Clatsop County did not make any changes to their on-route collection programs despite the market disruption and continue to collect the same materials that they have collected for more than a decade.

Plastics recycling tonnage, particularly film plastic, dropped sharply in 2018 due to the market crisis for recycled plastic. Film plastic tonnage increased slightly in 2020 and 2021 but is still 34 percent lower than the record film plastic recycling tonnage in 2016. Rigid plastic recycled tons have increased back to 2014 levels, but only because the increase in tonnage collected under the Bottle Bill replace the tons of plastic tubs and pails lost when many recycling programs dropped tubs and pails from their collection list.

Year to year changes in material collected

Electronics. Electronics recovery saw an increase of nearly eight percent in 2021 compared to 2020.

Paper (including cardboard). Although there was an overall increase in recovery for paper fibers by nearly two percent in 2021; printing, writing and other papers continued their decline by nearly four percent, a decrease of 6,431 tons from 2020. Cardboard recovery increased by 17,047 tons, nearly four percent up from 2020. It's possible the cardboard increase is still connected to the pandemic and continued increases in the use of mail-order for shopping.

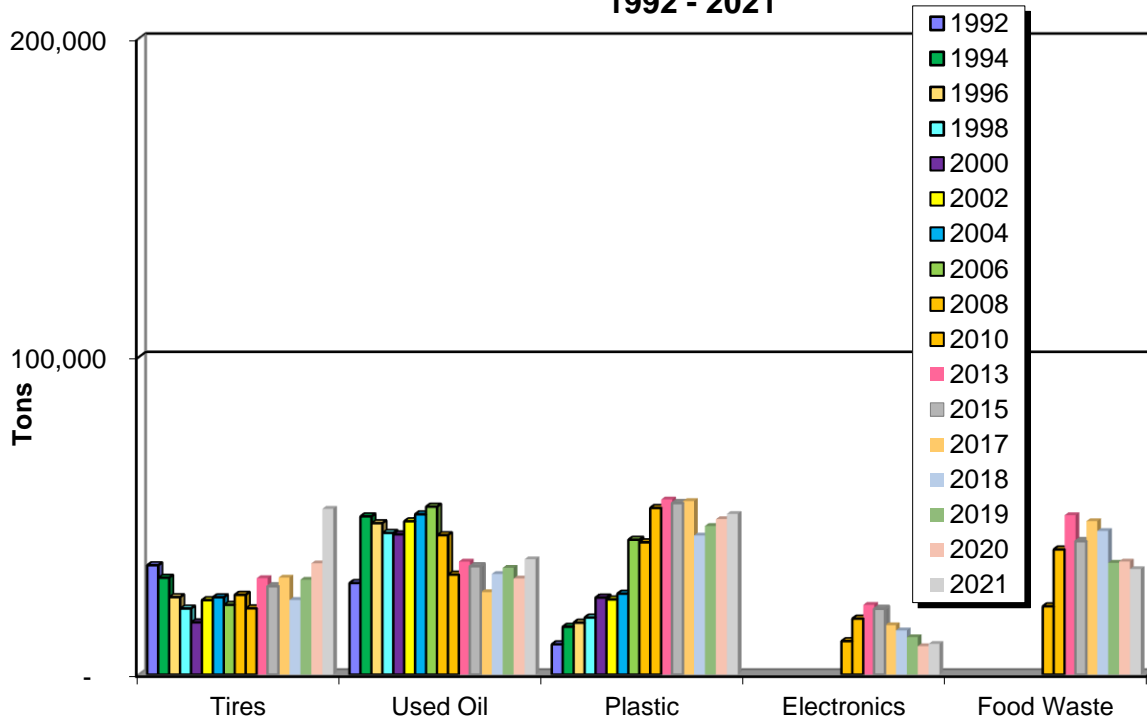
Plastics. A total of 31,531 tons of rigid plastic containers were collected for recycling in 2021, compared to 31,165 tons in 2020. Plastic Film increased by 706 tons, from 9,736 tons in 2020 to 10,442 tons in 2021.

Metals. The total amount of metals decreased by 10 percent in 2021 compared to 2020. Scrap metal saw a decrease of 11 percent, but it was still the third-highest tonnage of scrap metal recycled since reporting began in 1992. It is odd that scrap metal tonnage peaked in 2020, as prices for scrap metal were much lower in 2020 than they were in 2021 or the few years before 2020. Tinned cans continued to decrease by 980 tons in 2021 from 6,963 tons in 2020, while aluminum saw a nearly eight percent increase to 36,412 tons in 2021.

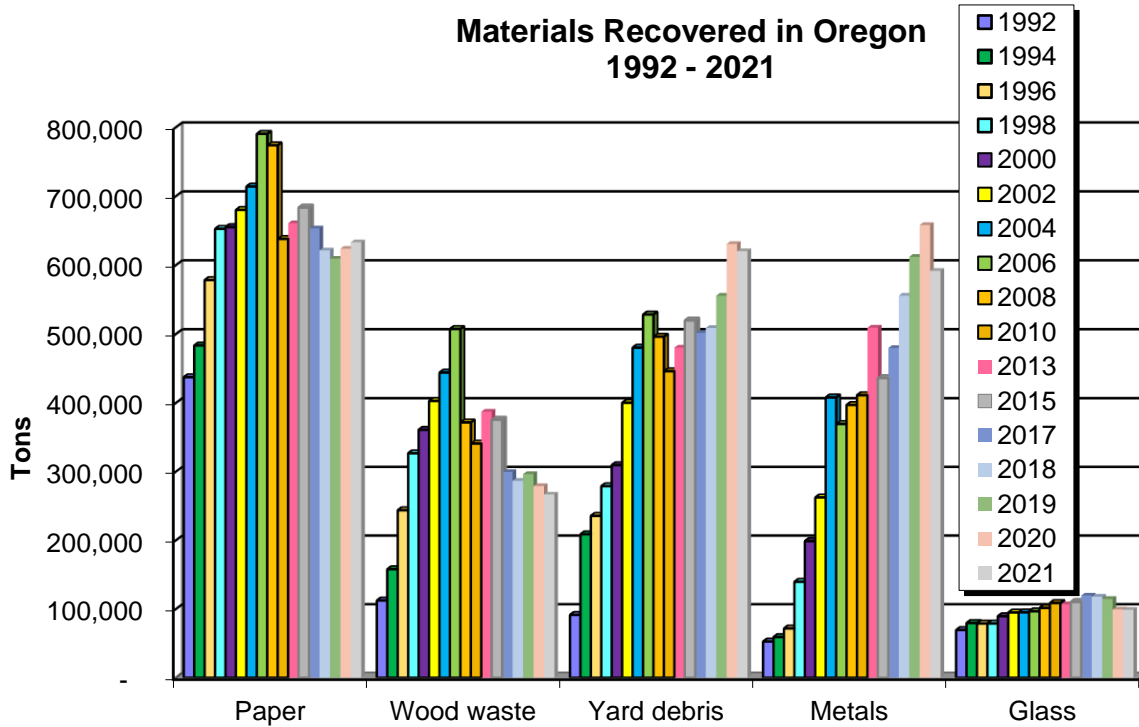
Organics. The total recovery of organics (which includes animal waste/grease, wood waste, yard debris, and food waste) decreased nearly three percent in 2021. There was a decrease of 10,542 tons of yard debris compared to 2020; and a notable decrease in animal waste/grease recovered by nearly 13 percent from 2020.

The following charts compare the materials recovered over the past three decades.

**Materials Recovered in Oregon
1992 - 2021**

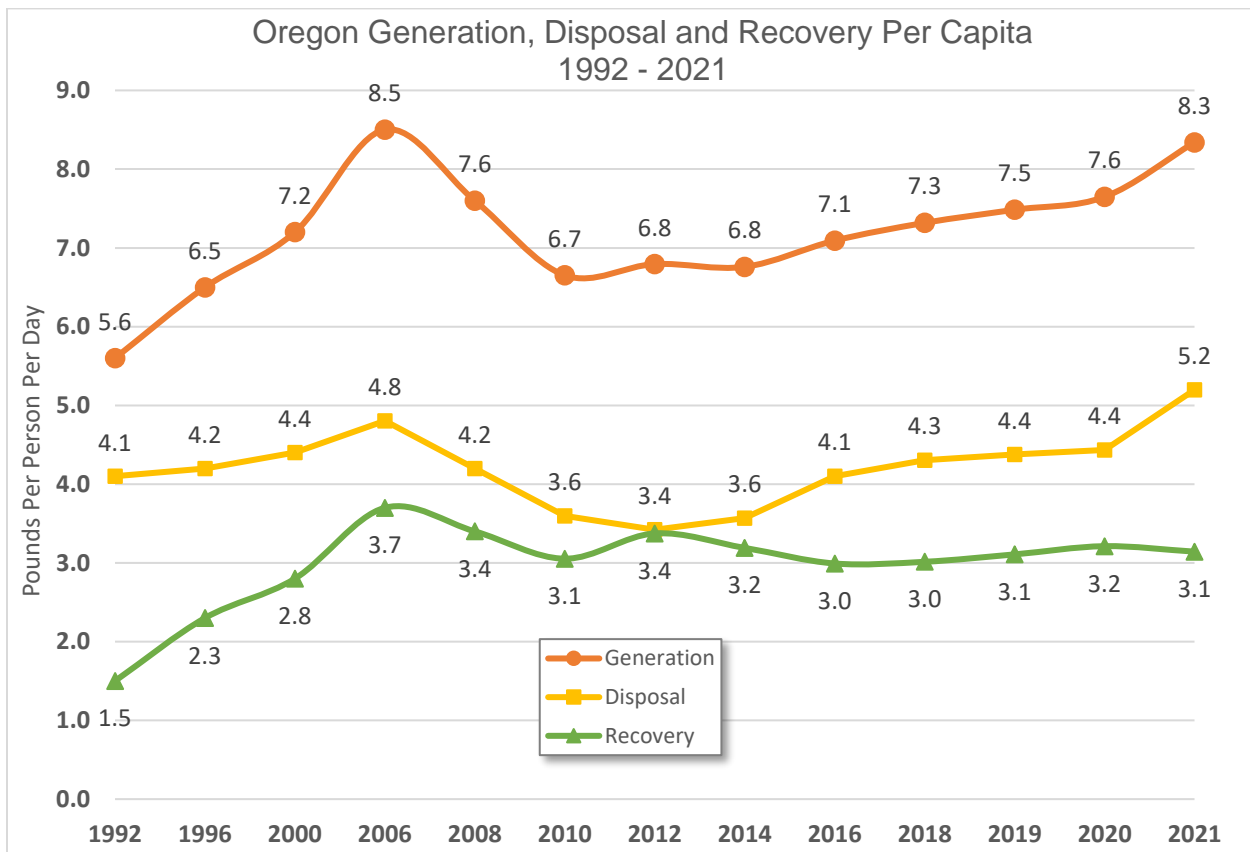


**Materials Recovered in Oregon
1992 - 2021**



Waste generation

Changes in the total amount of municipal solid waste generated (materials recovered plus waste disposed) in Oregon over time tell an interesting story. From 1992 to 2006, total waste generation increased every year, often steeply. Waste generation then declined slightly in 2007 and sharply in both 2008 and 2009, coinciding with the economic recession. Between 2009 and 2014, waste generation started growing again, but at a very slow pace, averaging less than one percent increase per year. In 2021 Oregon generated 6,494,204 tons of municipal solid waste, an increase of nine percent over 2020. This 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. Total waste generation in 2021 reached a new high (764,325 tons over) from its peak in 2006. This is an increase of over 13 percent in total waste generation between 2006 and 2020, or nearly two percent increase in the per-capita amount. As discussed above though, a substantial portion of the increase in waste generation was due to the cleanup in 2021 of more than 6,000 structures destroyed by wildfires in late 2020 in five counties.



Note: Some years within the chart above have been hidden for readability.

The following table shows the disposition of the municipal solid waste generated in Oregon in 2021. See Table 9 for individual wasteshed dispositions.

Disposition of Waste Generated in Oregon in 2021	
Disposition	Percent by weight
Disposed*	62.3
Recycled	23.4
Composted	10.1
Recovered for Energy*	4.1

*For the Marion County's waste-to-energy facility only the portion of waste that counts toward the county's and state's recovery rates is included here in "recovered for energy" (see Marion County Adjustments on page 18). Other wastes burned at the facility are counted here as disposed.

Discussion

In 2015, Oregon adopted new statutory goals of 52 percent recovery by 2020 and 55 percent by 2025. Oregon did not meet the 2020 goal, as its 2020 recovery rate was 42 percent, and its 2021 rate 37.7 percent.

Several historical factors contributed to lower-than-anticipated recovery.

- In 2015, DEQ did not anticipate the closure of the paper mill that by far was the largest user of post-consumer wood waste as a fuel, nor the discontinuance of the use of wood by other mills, strongly impacting the ability to recover and use wood.
- Similarly, DEQ did not anticipate that Oregon and the world would experience disruptions in the markets for most plastics and for mixed paper, as China, the largest importer of recyclable material in the world, restricted the importation of these materials and has banned the importation of unsorted paper and all unprocessed post-consumer plastics in 2018.

Such disruptions motivated a new law, the *Plastics Pollution and Recycling Modernization Act*, which took effect Jan. 1, 2022, and will significantly affect recycling operations starting July 2025. The law has numerous aims and expands the concept of successful recycling beyond the weight-based generation and recovery rates described in this report. The law's goals include making recycling easier for the public to use, expanding access to recycling services, upgrading recycling facilities, and reducing social and environmental harms. In 2025 and beyond, this report may look substantially different.

Adjustments to reports from previous years

DEQ continues to review and use survey data even after publishing the final report each year. Occasionally, we encounter and correct errors in previously reported results. Thus, tonnages published in this report for previous years may not match the tonnages originally reported for that year.

DEQ made the following adjustments for the 2021 report:

- A correction to food waste and yard debris tons recovered in the Metro Wasteshed in 2020 was made due to a formula calculation error.
- A correction to recovered tonnage of some materials reported by a recycler was made to the 2020 survey period, due to some double counts discovered.
- A correction to animal waste/grease tons reported in 2020 and 2019 was made due to a conversion rate error used by the recycler.
- A correction was made to a landfill for allocated tire disposal in 2020.

DEQ corrected data in previous years, for the following reasons:

- A correction to food waste reported in 2019 as recovered was revised to “reuse,” removing those tons from the total recovered for 2019.
- A correction to disposal tonnage, the non-reporting of some disposal tons going out-of-state and the misreporting of counting solid waste tons was made to the 2019 survey period.
- A correction to disposal tonnage, the non-reporting of some disposal tons going out-of-state – was made to the 2018 survey period.
- A correction to recovered tonnage of some materials reported by a recycler was made to the 2017 survey period, due to some double counts discovered.
- Based on the recyclers reporting in 2018, some materials were not reported due to unknown markets. These materials will be revised during the 2019 reporting period.
- A correction to recovered tonnage of cardboard was made to the 2017 survey period, due to a double count discovered.
- A revision was made to the breakdown of food waste and yard debris mix from the curbside tons collected and composted. Prior to 2018 reporting, the breakdown was 90 percent yard debris and 10 percent food waste; the revised breakdown is split between metro area collections (89.3 percent yard debris, 9.5 percent food waste and 1.2 percent solid waste) and non-metro area collections (94.1 percent yard debris, 4.8 percent food waste and 1.2 percent solid waste). This breakdown revision resulted in an overall increase of yard debris

and an overall decrease in food waste; as well as a slight decrease in overall organic tons by accounting for the 1.2 percent solid waste.

- A significant correction to disposal for several wastesheds, increased the total tons disposed in Oregon and dropped the recovery rate from 42.8 percent to 42.1 percent for 2017. This also resulted in the publishing of a revised 2017 report in March 2019.
- A correction to recovered tonnage of yard debris was made to the 2015 and 2016 survey period, due to a double count discovered.
- A correction was made to some asphalt roofing tons that were found to be used as alternative daily cover at a local landfill but that had been reported as recovered. "Alternative daily cover" - material used to cover garbage daily at a landfill instead of using soil, is considered to be a form of disposal rather than recovery. This correction was made to 2015 and 2016 data.
- The yard debris and asphalt roofing corrections resulted in adjustments to the previous year's recovery rates; the recovery rate for 2015 dropped from 46.2 to 46.0 percent, the recovery rate for 2016 dropped from 42.6 to 42.2 percent.
- A correction to recovered tonnage of yard waste was made to the 2015 survey period, a reporting facility for 2016 sent in a missing 2015 report.
- In 2016 a correction was made to some "plastic other" and "plastic film" incorrectly converted to tons from pounds, this increased the total recovered for both materials.
- A couple of 2015 disposal reports were revised. This adjustment increased disposal tonnage for 2015; which dropped the state recovery rate from 46.5 percent to 46.2 percent for 2015.
- A correction to recovered tonnage of wood waste in two wastesheds was made to survey years 2014 and 2013, as some tonnage was determined to be pre-consumer material.
- Adjustments were made to 2014 and 2013 animal waste/grease collection amounts, as well as correctly identifying wastesheds of origin, based on revised reporting by an end-user.
- Disposal tonnage was reported for the wrong wasteshed. This adjustment increased disposal tonnage for 2014 for one wasteshed; which changed the wasteshed rate of the two wastesheds involved. This did not affect the state's recovery rate.
- An error in reporting was discovered by one of the recycling processors; a large amount of newspaper was double counted in the previously published 2004 results. The paper was counted both at the processing facility and at the paper mill.
- An enforcement action carried out by Metro showed that most of the brick reported as being recycled by one facility was falsely reported. DEQ subsequently decided that brick more closely resembled other inert materials such as cement and asphalt. Since these are not counted toward the recovery rate, brick was removed from all previous recovery tonnages.
- New information showed that corrections needed to be made to tonnages for roofing and non-container glass in 2003 and 2004, as well as other minor adjustments in other categories.
- Field visits showed that some plastic for 2005 had been reported as 'Plastic Other' and that this material was actually 'Rigid Plastic Containers.' The 2005 numbers have been adjusted for this change, along with a few other minor adjustments.

- Field visits and continued investigation showed that previously reported 'Wood Waste' collections for 2006 were actually collected in three years – 2004, 2005 and 2006. These years are now correct.
- The 2006 and 2007 plastics numbers were adjusted between grades of "Rigid Plastic Containers," "Plastic Other," and "Plastic Film." This may have led to small changes in the recovered tonnages for these materials.
- Investigation of disposal numbers at two landfills led to deductions in the amount of SW disposed – these were really Industrial Waste, non-counting for the purposes of this survey.
- Some changes were made in 2006 and 2007 to disposition of materials. Changes were made to composted, burned for energy recovery and disposed amounts.
- Adjustments were made to the 2007 collection amounts, correctly identifying the wasteshed of origin.
- For 2006 and 2007, some non-counting slaughterhouse material was deleted from the recovered tonnage.
- Sawdust material from manufacturing was deleted for 2006 and 2007.
- Beginning with 2006, material previously identified as "CD – Construction and Demolition" was separated out into individual materials.
- Textiles previously counted were determined to be re-used, which does not count for recovery. 2006, 2007, 2010 and 2011 recovered tonnage was decreased.
- Some gypsum sent for disposal was included in the 2006 and 2007 tonnage – this was removed.
- Bottle Bill materials, container glass and aluminum had better reporting for 2009, and DEQ made some adjustments to those materials for 2008.
- Municipal solid wastes from another landfill were determined to be industrial and were deleted from the 2007 and 2008 counting tonnages.
- Minor disposal adjustments were made to two wastesheds for 2006 data with incorrectly reported county of origin.
- Yard debris numbers contained a large double counting for the Metro region – the correction caused a decrease in recovered tons
- Some roofing material was deleted - it was determined to be industrial material.
- Added in disposal tonnages for 2009 and 2010 for material sent out of state for disposal.
- Corrected the disposition methods for food waste and yard debris in 2011.
- Fixed the disposal tonnages originally recorded for the incorrect wasteshed in 2011.
- An error in food waste reporting discovered by DEQ showed a large amount of food waste was double counted in the 2011 and 2012 reports. The food waste was counted both by the composting facility and by the recycling collectors.
- More accurate reporting identified corrections needed in tonnages for used oil, antifreeze, solvents and used oil filters in 2011 and 2012.
- Adjustments were made to 2013 and 2012 collection amounts, as well as correctly identifying wastesheds of origin.
- Municipal solid waste from one landfill was reported incorrectly as out-of-state waste, this adjustment increased the "counting" disposal tonnage for 2013. This in turn adjusted the state recovery rate from 54 percent for 2013 to 53.4 percent.

2021 survey report tables

List of data tables one through nine used for this report.

Table 1: Wasteshed Recovery Rates, 2021

Table 2: Amount Recovered in 2021 by Wasteshed

Table 3: Solid Waste Disposed in 2021 by Wasteshed

Table 4: Oregon Calculated Recovery Rates by Wasteshed, 1992-2021

Table 5: Oregon Amount Recovered by Wasteshed, 1992-2021

Table 6: Oregon Solid Waste Disposed by Wasteshed, 1992-2021

Table 7: Oregon Solid Waste Generated by Wasteshed, 1992-2021

Table 8: Oregon Materials Recovered, 1992-2021

Table 9: Disposition of Recovered Materials, 2021

Table 1: Wasteshed Recovery Rates, 2021

Wasteshed				Calculated Recovery Rate ¹	SB 263
	Tons Disposed	Tons Recovered	Tons Generated		Goal ³ 2025
Baker	14,129	3,313	17,442	19.0%	25%
Benton	67,055	35,129	102,184	34.4%	44%
Clatsop	42,832	19,381	62,213	31.2%	53%
Columbia	35,779	11,438	47,217	24.2%	45%
Coos	58,344	15,498	73,842	21.0%	30%
Crook	26,257	7,360	33,617	21.9%	20%
Curry	22,134	5,625	27,759	20.3%	30%
Deschutes	220,125	89,304	309,429	28.9%	45%
Douglas	91,146	35,055	126,200	27.8%	34%
Gilliam	2,451	373	2,823	13.2%	25%
Grant	4,552	951	5,503	17.3%	25%
Harney	5,230	1,232	6,462	19.1%	25%
Hood River	25,000	7,644	32,644	23.4%	35%
Jackson	437,251	103,948	541,199	19.2%	25%
Jefferson	18,916	4,698	23,615	19.9%	32%
Josephine	94,497	43,599	138,096	31.6%	20%
Klamath	88,223	21,195	109,418	19.4%	20%
Lake	5,770	558	6,328	8.8%	15%
Lane	341,663	337,169	678,832	49.7%	63%
Lincoln	64,134	24,868	89,002	27.9%	37%
Linn	111,890	74,686	186,576	40.0%	45%
Malheur	25,096	6,639	31,735	20.9%	25%
Marion ^c	425,320	289,995	715,315	40.5%	64%
Metro	1,433,959	1,137,532	2,571,491	44.2%	64%
Milton-Freewater	5,297	2,255	7,552	29.9%	25%
Morrow	28,848	5,570	34,418	16.2%	20%
Polk	55,921	36,270	92,191	39.3%	48%
Sherman	1,228	445	1,673	26.6%	20%
Tillamook	32,416	15,836	48,251	32.8%	37%
Umatilla	91,730	41,766	133,496	31.3%	20%
Union	20,083	6,966	27,049	25.8%	25%
Wallowa	5,340	2,114	7,454	28.4%	25%
Wasco	22,128	6,097	28,225	21.6%	35%
Wheeler	440	73	513	14.1%	20%
Yamhill	121,752	52,685	174,437	30.2%	45%
OR Totals	4,046,936	2,447,267	6,494,204	37.7%	

¹ The recovery rate is calculated using the following formula:

1) Tons Disposed + Tons Recovered = Total Tons Generated

2) Tons Recovered / Total Generated = Calculated Recovery Rate

² The Marion County disposal and recovery rates reflect 22,443 tons of recyclable materials burned for energy in 2020 (per ORS 459A.010(3)(f)(B)).

³ ORS 459A.010(6).

Table 2: Amount Recovered in 2021 by Wasteshed

Wasteshed	2021 Tons Recovered	2021 Pounds Per Capita	2021 Wasteshed Population
Baker	3,313	393	16,860
Benton	35,129	830	84,654
Clatsop	19,381	936	41,428
Columbia	11,438	432	53,014
Coos	15,498	476	65,154
Crook	7,360	578	25,482
Curry	5,625	475	23,662
Deschutes	89,304	878	203,390
Douglas	35,055	628	111,694
Gilliam	373	365	2,039
Grant	951	263	7,226
Harney	1,232	327	7,537
Hood River	7,644	640	23,888
Jackson	103,948	929	223,827
Jefferson	4,698	378	24,889
Josephine	43,599	983	88,728
Klamath	21,195	607	69,822
Lake	558	136	8,177
Lane	337,169	1,762	382,647
Lincoln	24,868	977	50,903
Linn	74,686	1,067	140,011
Malheur	6,639	415	31,995
Marion*	289,995	1,672	346,933
Metro	1,137,532	1,229	1,851,024
Milton-Freewater	2,255	560	8,052
Morrow	5,570	882	12,635
Polk	36,270	824	87,992
Sherman	445	467	1,908
Tillamook	15,836	1,146	27,628
Umatilla	41,766	1,153	72,471
Union	6,966	530	26,295
Wallowa	2,114	569	7,433
Wasco	6,097	459	26,581
Wheeler	73	100	1,456
Yamhill	52,685	965	109,185
OREGON TOTALS	2,447,267	1,147	4,266,620

Source for population data is the Center for Population Research and Census, Portland State University, published April 2020. Wastesheds populations are not the same as County populations for the Wastesheds of Benton, Linn, Marion, Metro, Milton-Freewater, Polk, Umatilla, and Yamhill (see OAR 340-090-0050).

*Includes certain Marion County recyclable materials burned for energy (per ORS 459A.010(3)(f)(B)).

Table 3: Solid Waste Disposed in 2021 by Wasteshed

Wasteshed	2021 Tons Disposed	2021 Pounds Per Capita	2021 Wasteshed Population
Baker	14,129	1,676	16,860
Benton	67,055	1,584	84,654
Clatsop	42,832	2,068	41,428
Columbia	35,779	1,350	53,014
Coos	58,344	1,791	65,154
Crook	26,257	2,061	25,482
Curry	22,134	1,871	23,662
Deschutes	220,125	2,165	203,390
Douglas	91,146	1,632	111,694
Gilliam	2,451	2,404	2,039
Grant	4,552	1,260	7,226
Harney	5,230	1,388	7,537
Hood River	25,000	2,093	23,888
Jackson	437,251	3,907	223,827
Jefferson	18,916	1,520	24,889
Josephine	94,497	2,130	88,728
Klamath	88,223	2,527	69,822
Lake	5,770	1,411	8,177
Lane	341,663	1,786	382,647
Lincoln	64,134	2,520	50,903
Linn	111,890	1,598	140,011
Malheur	25,096	1,569	31,995
Marion*	425,320	2,452	346,933
Metro	1,433,959	1,549	1,851,024
Milton-Freewater	5,297	1,316	8,052
Morrow	28,848	4,566	12,635
Polk	55,921	1,271	87,992
Sherman	1,228	1,287	1,908
Tillamook	32,416	2,347	27,628
Umatilla	91,730	2,532	72,471
Union	20,083	1,528	26,295
Wallowa	5,340	1,437	7,433
Wasco	22,128	1,665	26,581
Wheeler	440	605	1,456
Yamhill	121,752	2,230	109,185
OREGON TOTALS	4,046,936	1,897	4,266,620

Source for population data is the Center for Population Research and Census, Portland State University, published April 2020. Wastesheds populations are not the same as County populations for the Wastesheds of Benton, Linn, Marion, Metro, Milton-Freewater, Polk, Umatilla, and Yamhill (see OAR 340-090-0050).

*Includes certain Marion County recyclable materials burned for energy (per ORS 459A.010(3)(f)(B)).

Table 4: Oregon Calculated Recovery Rates by Wasteshed, 1992-2021

Wasteshed	1992 Rate	1996 Rate	2000 Calc. Rate*	2006 Calc. Rate*	2007 Calc. Rate*	2008 Calc. Rate*	2009 Calc. Rate*	2010 Calc. Rate*	2011 Calc. Rate*	2012 Calc. Rate*	2013 Calc. Rate*	2014 Calc. Rate*	2015 Calc. Rate*	2016 Calc. Rate*	2017 Calc. Rate*	2018 Calc. Rate*	2019 Calc. Rate*	2020 Calc. Rate*	2021 Calc. Rate*
Baker	10%	25%	18%	16.8%	21.9%	20.6%	26.3%	21.7%	22.4%	23.2%	22.7%	28.4%	26.2%	20.0%	17.4%	16.4%	16.2%	19.5%	19.0%
Benton	27%	37%	35%	36.2%	38.9%	41.1%	37.9%	38.4%	38.3%	41.4%	41.5%	37.3%	35.3%	35.5%	34.0%	35.1%	35.5%	39.3%	34.4%
Clatsop	19%	20%	25%	33.9%	34.0%	36.5%	36.0%	36.0%	38.7%	39.9%	44.3%	37.8%	39.5%	37.8%	41.8%	41.5%	35.9%	36.8%	31.2%
Columbia	34%	22%	31%	30.5%	28.5%	29.9%	32.1%	35.8%	35.3%	33.3%	34.7%	28.6%	31.0%	32.5%	23.8%	24.4%	25.3%	24.4%	24.2%
Coos	21%	29%	23%	20.8%	19.7%	22.3%	23.0%	35.0%	47.7%	43.7%	40.3%	38.3%	23.5%	22.5%	22.4%	19.8%	23.2%	21.1%	21.0%
Crook	16%	23%	27%	25.6%	25.1%	33.2%	31.6%	33.6%	31.5%	34.6%	30.5%	26.1%	20.9%	20.6%	23.1%	19.7%	22.1%	22.2%	21.9%
Curry	21%	35%	41%	18.1%	23.7%	21.0%	19.8%	20.4%	27.2%	25.3%	22.8%	26.6%	24.1%	26.6%	21.4%	24.2%	22.9%	24.3%	20.3%
Deschutes	15%	23%	31%	27.0%	29.8%	31.1%	39.1%	35.1%	39.3%	38.8%	38.2%	35.8%	36.6%	33.0%	31.7%	31.6%	31.5%	33.2%	28.9%
Douglas	26%	26%	26%	23.7%	25.8%	34.4%	28.7%	35.9%	42.9%	41.0%	37.4%	32.8%	30.3%	27.0%	28.6%	28.2%	25.8%	30.7%	27.8%
Gilliam	17%	19%	14%	8.5%	12.9%	14.4%	27.0%	20.9%	18.0%	44.2%	41.8%	17.6%	35.4%	13.7%	14.8%	7.1%	10.4%	13.7%	13.2%
Grant	18%	16%	19%	21.2%	24.2%	25.1%	22.4%	22.1%	25.0%	21.5%	28.8%	18.4%	24.5%	27.4%	17.2%	16.3%	16.5%	17.4%	17.3%
Harney	18%	24%	20%	28.0%	25.2%	33.8%	23.6%	26.2%	31.1%	28.4%	27.3%	27.6%	21.8%	22.3%	23.7%	18.7%	15.3%	18.3%	19.1%
Hood River	16%	17%	18%	33.1%	29.5%	28.2%	29.3%	26.5%	34.4%	31.4%	32.2%	28.1%	29.5%	26.9%	21.9%	23.9%	24.4%	24.6%	23.4%
Jackson	15%	34%	28%	33.7%	30.4%	32.3%	35.6%	42.0%	41.6%	43.3%	43.1%	40.9%	37.2%	38.6%	35.0%	33.0%	38.3%	34.2%	19.2%
Jefferson	21%	24%	27%	27.7%	36.2%	33.7%	30.7%	41.3%	47.2%	44.8%	41.6%	33.2%	24.6%	31.6%	25.9%	22.3%	17.1%	19.8%	19.9%
Josephine	14%	38%	33%	38.9%	34.3%	38.9%	37.6%	40.1%	49.0%	49.9%	46.0%	40.3%	34.5%	35.4%	35.2%	31.7%	28.7%	34.8%	31.6%
Klamath	13%	15%	18%	33.6%	34.8%	45.4%	32.9%	29.2%	28.1%	33.1%	29.9%	30.9%	22.3%	25.6%	23.4%	20.5%	20.6%	21.9%	19.4%
Lake	6%	7%	8%	19.4%	21.8%	34.5%	25.1%	27.2%	28.5%	26.8%	26.3%	16.7%	12.5%	12.1%	8.6%	10.7%	6.4%	6.7%	8.8%
Lane	19%	39%	46%	46.9%	46.3%	46.4%	46.1%	51.2%	55.5%	54.7%	50.9%	53.1%	50.4%	50.0%	52.4%	53.8%	55.1%	53.9%	49.7%
Lincoln	20%	16%	23%	26.3%	27.6%	30.8%	29.4%	32.6%	32.4%	35.9%	29.2%	32.1%	31.2%	26.3%	22.6%	24.1%	27.2%	25.2%	27.9%
Linn	15%	32%	29%	40.5%	37.4%	41.3%	40.5%	43.8%	49.2%	45.0%	44.0%	42.4%	39.3%	38.0%	36.9%	40.1%	42.2%	46.1%	40.0%
Malheur	19%	20%	25%	22.8%	22.6%	21.9%	18.9%	23.3%	20.9%	27.3%	27.8%	24.7%	24.2%	26.4%	22.6%	16.5%	18.5%	16.9%	20.9%
Marion	26%	28%	38%	**51.9%	**50.4%	**52.4%	**52.2%	**50.1%	**54.7%	**54.4%	**55.2%	**53.8%	**52.2%	**49.4%	**48.3%	**49.7%	**47.7%	**48.4%	**40.5%
Metro	35%	41%	45%	49.6%	48.9%	50.2%	50.4%	51.9%	53.3%	56.3%	57.0%	53.6%	53.0%	46.9%	46.1%	45.4%	46.1%	46.5%	44.2%
Milton-Freewater	16%	21%	21%	32.8%	30.8%	43.0%	34.9%	35.3%	37.9%	27.0%	41.2%	39.0%	40.1%	28.8%	35.2%	17.6%	14.4%	23.4%	29.9%
Morrow	11%	13%	15%	21.5%	26.4%	24.8%	23.2%	22.0%	23.2%	25.1%	18.3%	20.9%	21.1%	24.4%	21.4%	22.0%	15.6%	13.7%	16.2%
Polk	20%	19%	33%	47.9%	46.4%	47.0%	45.9%	45.6%	47.7%	44.2%	43.6%	46.0%	45.1%	45.9%	47.3%	41.5%	47.3%	46.4%	39.3%
Sherman	24%	21%	17%	18.5%	16.4%	14.8%	14.3%	11.5%	13.9%	21.9%	14.2%	15.9%	15.9%	11.8%	11.1%	13.5%	6.6%	10.2%	26.6%
Tillamook	31%	26%	26%	33.4%	30.6%	31.5%	29.1%	31.2%	33.7%	33.0%	31.9%	29.6%	28.9%	26.1%	27.8%	27.8%	25.7%	30.1%	32.8%
Umatilla	14%	20%	26%	35.0%	36.5%	37.9%	31.7%	29.3%	29.3%	31.1%	28.6%	28.1%	29.5%	25.0%	26.9%	29.7%	36.2%	28.3%	31.3%
Union	16%	26%	22%	33.7%	31.5%	29.8%	29.3%	28.6%	30.7%	30.5%	30.4%	25.2%	24.8%	25.1%	22.0%	26.9%	27.2%	26.9%	25.8%
Wallowa	6%	11%	21%	22.2%	27.4%	24.1%	23.5%	19.4%	23.5%	22.4%	23.7%	26.6%	22.4%	27.0%	24.3%	21.4%	21.8%	17.5%	28.4%
Wasco	25%	30%	34%	18.8%	23.0%	23.4%	32.7%	28.0%	31.3%	27.8%	32.0%	28.0%	28.1%	26.6%	19.6%	19.2%	16.6%	14.8%	21.6%
Wheeler	7%	20%	14%	23.9%	26.9%	27.1%	20.0%	8.1%	12.9%	8.8%	8.7%	7.3%	15.6%	12.8%	17.5%	26.0%	15.3%	16.5%	14.1%
Yamhill	19%	35%	44%	39.0%	35.7%	35.6%	39.7%	34.2%	40.2%	32.8%	38.1%	37.1%	38.3%	29.9%	28.7%	29.9%	35.3%	35.8%	30.2%
OREGON TOTALS	27.1%	34.9%	38.9%	43.5%	42.9%	44.6%	44.6%	45.9%	48.6%	49.7%	49.5%	47.2%	46.0%	42.1%	41.4%	41.2%	42.0%	42.0%	37.7%

*does not include 2% credits

**does include certain Marion County recyclable materials burned for energy

Table 8: Oregon Materials Recovered, 1992-2021

Material Type	1992 Tons	1996 Tons	2000 Tons	2006 Tons	2011 Tons	2013 Tons	2015 Tons	2017 Tons	2019 Tons	2020 Tons	2021 Tons
Container glass	69,284	77,231	87,889	95,946	114,982	106,840	110,101	119,561	113,052	98,590	97,927
Other glass	41	1,557	1,578	673	840	28	186	1	1,531	661	808
Total glass	69,325	78,788	89,467	96,619	115,822	106,868	110,287	119,562	114,583	99,251	98,736
Aluminum	18,245	17,815	18,209	21,521	19,985	23,176	19,310	25,499	33,861	33,778	36,412
Scrap metal	26,927	45,271	165,728	339,723	550,158	477,097	408,326	444,487	567,617	617,258	549,077
Tinned cans/aluminum			14,779	-	-	-	-	-	-	-	-
Tinned cans	7,400	8,635	-	8,399	9,298	8,944	8,327	9,611	10,450	6,963	5,983
Aerosol cans	0	0	-	1	1	1	1	1	1	-	0
Total metals	52,572	71,722	198,716	369,644	579,442	509,217	435,963	479,599	611,929	658,000	591,472
Cardboard/kraft paper	204,729	304,093	310,776	440,813	320,162	361,735	409,082	403,392	415,560	443,030	460,077
Paper Fiber ⁶	-	-	-	-	277,353	299,004	274,318	249,753	193,626	179,400	172,969
High-grade paper ⁶	67,077	49,298	54,358	47,324	-	-	-	-	-	-	-
Magazines	11,246	17,250	8,375	-	-	-	-	-	-	-	-
Phone books ¹	-	3,103	2,881	-	-	-	-	-	-	-	-
Mixed waste paper ⁶	24,012	53,771	91,559	39,347	-	-	-	-	-	-	-
Newspaper ⁶	130,181	141,412	187,108	263,193	-	-	-	-	-	-	-
Fiber-based fuel		9,235	-	-	-	-	-	-	-	-	-
Total papers	437,245	578,161	655,057	790,677	597,515	660,739	683,400	653,145	609,186	622,431	633,047
#1 PET beverage	3,329	5,803	-	-	-	-	-	-	-	-	-
#1 other	58	-	-	-	-	-	-	-	-	-	-
#2 milk jugs	1,940	3,049	-	-	-	-	-	-	-	-	-
#2 other	1,841	1,331	-	-	-	-	-	-	-	-	-
#3 PVC	25	144	-	-	-	-	-	-	-	-	-
#4 LDPE	1,196	2,501	-	-	-	-	-	-	-	-	-
#5	360	283	-	-	-	-	-	-	-	-	-
#6	471	430	-	-	-	-	-	-	-	-	-
Composite plastic	-	1,077	863	2,004	2,594	2,222	2,346	1,305	715	685	1,185
Mixed plastic	300	1,708	-	-	-	-	-	-	-	-	-
Other plastic (P7)	-	12	-	-	-	-	-	-	-	-	-
Plastic bottles ²			-	-	-	1	-	-	-	-	-
Plastic film			3,969	11,594	11,747	14,583	13,680	14,755	8,170	9,736	10,442
Plastic other			3,718	9,426	10,167	9,562	13,348	8,761	8,010	7,327	7,380
Rigid plastic containers			15,672	19,439	30,100	28,740	24,613	29,773	29,857	31,165	31,531
Total plastic	9,520	16,338	24,222	42,463	54,608	55,107	53,988	54,593	46,752	48,913	50,538
Antifreeze	5	52	424	3,085	3,060	2,680	2,916	2,545	2,366	2,480	2,018
C & D -- roofing ⁷			25,162	10,072	12,998	15,895	21,410	18,661	9,219	25	30
Carpeting -- used			919	-	1,807	1,409	654	-	-	-	-

2021 Oregon Material Recovery and Waste Generation Rates Report

Material Type	1992 Tons	1996 Tons	2000 Tons	2006 Tons	2011 Tons	2013 Tons	2015 Tons	2017 Tons	2019 Tons	2020 Tons	2021 Tons
Diesel				151	32	32	34	-	-	-	-
Electronics			617	6,345	19,586	21,929	20,696	15,513	11,752	8,920	9,630
Fluorescent lamps	-	7	21	453	673	600	172	343	311	278	269
Gypsum wallboard	3,695	9,419	5,300	4,174	3,364	4,057	3,630	3,862	8,460	6,185	8,573
Household Haz Waste			14	143	295	323	276	273	276	289	285
Alkaline batteries				-	-	-	-	-	-	-	-
Mixed batteries				120	336	375	259	172	360	254	433
Lead acid batteries ³	176	559	1,184	15,509	14,467	14,637	16,750	16,758	19,667	22,052	20,550
NiCad batteries				-	-	-	-	-	-	-	-
Paint ⁵	120	489	555	1,434	3,015	3,652	4,414	4,201	3,506	3,483	3,744
Porcelain	-	5	-	307	203	960	840	85	201	565	533
Rubber tire buffings ⁴	-	2,935	-	-	-	-	-	-	-	-	-
Scrap film (X-ray)	42	68	21	-	-	-	-	-	-	-	-
Solvents ⁵	16	110	188	261	406	369	454	475	280	111	80
Textiles		508	4,033	1,819	232	948	1,186	681	317	207	197
Tires ⁵	34,392	24,360	16,420	21,931	23,361	30,326	27,793	30,504	29,820	34,995	52,141
Used Motor Oil ⁵	28,796	47,632	44,114	52,837	30,052	35,544	34,103	25,916	33,582	30,216	36,278
Total other	67,243	86,145	98,969	118,640	113,885	133,736	135,586	119,989	120,117	110,060	134,763
Animal waste/grease	-	22,957	25,670	15,928	7,680	7,621	13,009	10,923	13,226	21,470	18,750
Food waste	-	5,000	3,486	12,430	42,741	50,143	41,991	48,276	35,157	36,182	33,186
Wood waste ⁵	112,425	243,773	360,819	503,967	368,356	387,196	375,462	299,359	296,312	275,187	266,601
Yard debris ⁵	91,348	235,562	309,407	543,683	426,095	480,238	519,561	501,528	555,494	630,560	620,019
Total organics	203,773	507,292	699,382	1,076,008	844,872	925,198	950,024	860,086	900,189	963,399	938,556
Adj. rounding/unspecified		2	1								
OREGON TOTALS	839,678	1,338,446	1,765,814	2,494,050	2,306,144	2,390,865	2,369,248	2,286,974	2,402,756	2,502,054	2,447,110

¹Phone books included in mixed waste paper in 1992, 1993 and 2001 and subsequent years.

²About 900 tons of plastic bottles was included with mixed plastics in the 1995 survey.

³Includes only batteries collected at household hazardous waste collection events until 2001.

⁴From 1998 rubber tire buffings were included with tires.

⁵Includes Marion Co. materials in 2001 and subsequent years burned for energy.

⁶In 2007 and subsequent years, Mixed Waste Paper, Hi Grade & Newspaper was combined into Paper Fiber

⁷Asphalt Roofing was included as burned for energy only in years 2001-2006

Data from some years is not shown due to page formatting. Please contact DEQ directly for data from these years.

Table 9: Disposition of Recovered Materials, 2021

Wasteshed	Total Recovered	Recycled	% of Total	Energy Recovery	% of Total	Compost	% of Total	Stock
Baker	3,313	2,347	71%	184	6%	783	24%	0
Benton	35,129	21,132	60%	620	2%	13,377	38%	0
Clatsop	19,381	14,733	76%	3,923	20%	726	4%	0
Columbia	11,438	9,037	79%	69	1%	2,332	20%	0
Coos	15,498	15,129	98%	314	2%	56	0%	0
Crook	7,360	6,605	90%	320	4%	435	6%	0
Curry	5,625	5,464	97%	160	3%	2	0%	0
Deschutes	89,304	51,844	58%	6,253	7%	31,207	35%	0
Douglas	35,055	26,217	75%	8,137	23%	701	2%	0
Gilliam	373	373	100%	-	0%	-	0%	0
Grant	951	838	88%	51	5%	60	6%	2
Harney	1,232	1,164	94%	64	5%	-	0%	4
Hood River	7,644	5,483	72%	182	2%	1,980	26%	0
Jackson	103,948	60,534	58%	8,376	8%	35,038	34%	0
Jefferson	4,698	4,522	96%	35	1%	136	3%	6
Josephine	43,599	24,900	57%	6,084	14%	12,615	29%	0
Klamath	21,195	17,179	81%	3,037	14%	979	5%	0
Lake	558	546	98%	2	0%	-	0%	10
Lane	337,169	195,176	58%	57,423	17%	84,571	25%	0
Lincoln	24,868	17,283	70%	877	4%	6,707	27%	1
Linn	74,686	58,924	79%	1,637	2%	14,125	19%	0
Malheur	6,639	5,967	90%	31	0%	641	10%	0
Marion	289,995	155,612	54%	58,482	20%	75,889	26%	12
Metro	1,137,516	707,828	62%	96,991	9%	332,695	29%	3
Milton-Freewater	2,255	2,060	91%	14	1%	181	8%	0
Morrow	5,570	5,284	95%	276	5%	-	0%	10
Polk	36,270	19,258	53%	9,187	25%	7,825	22%	0
Sherman	445	412	93%	33	7%	-	0%	0
Tillamook	15,836	13,445	85%	666	4%	1,720	11%	5
Umatilla	41,766	37,203	89%	3,459	8%	1,105	3%	0
Union	6,966	5,310	76%	54	1%	1,602	23%	0
Wallowa	2,114	1,204	57%	10	0%	900	43%	0
Wasco	6,097	4,988	82%	244	4%	865	14%	0
Wheeler	73	72	99%	-	0%	-	0%	1
Yamhill	52,685	23,098	44%	492	1%	29,095	55%	0
Total	2,447,252	1,521,170	62%	267,682	11%	658,347	27%	53