Seattle Public Utilities

SEATTLE'S NEW SOLID WASTE METRICS AND TARGETS

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Overview

When the City Council approved *Seattle's 2022 Solid Waste Plan Update: Moving Upstream to Zero Waste (2022 Plan Update)* in April 2023, it requested Seattle Public Utilities (SPU) to provide the City Council's Parks, Public Utilities, and Technology Committee a report identifying new metrics it will use to quantify waste reduction and diversion to recycling and composting in the city (Resolution 32082). This report details the modern weight-based metrics and targets for SPU's approach to solid waste management that will replace the outdated solid waste metrics established in the 2007 Zero Waste Resolution (Resolution 30990). SPU's Solid Waste Line of Business (SWLOB) will begin reporting on these key metrics starting with the 2024 annual report due to City Council on October 1, 2025.

Development of New Key Solid Waste Metrics for Annual Reporting

SPU's SWLOB developed new solid waste metrics and targets consistent with key focus areas in Seattle's *2022 Plan Update*, including waste prevention, responsible recycling, and food waste reduction. Through an extensive process involving research, data analysis, and evaluation of quantitative and qualitative criteria, SPU established five (5) key weight-based metrics and four (4) targets to quantify waste reduction and diversion to recycling and composting.

New Key Solid Waste Metrics for Annual Reporting

The new metrics and targets improve alignment with the city's zero waste vision and with the goals of other leading cities confronting the climate crisis. This table summarizes SPU's new high-level key solid waste performance metrics, and, where applicable, targets for annual reporting to City Council per Resolution 32082.

Focus Area	Key Metric	Description of Measurement *(all measurements are estimates)*[1]	Target
Waste Prevention	Daily pounds of municipal solid waste (MSW) generated per capita (lbs.)	Pounds of total waste (garbage + recycling + compostable organics) created per person per day[2]	15 percent reduction (2015-2030 to 5.07 lbs./person/day (aligns with C40 goal)[3]
	Daily pounds of MSW disposed per capita (lbs.)	Pounds of garbage thrown away per person per day[4]	15 percent reduction (2015-2030) to 2.13 lbs./person/day
Responsible Recycling	Residential recycling capture rate (percent, %)[5]	Tons of residential recyclable material collected for recycling divided by tons of recyclable material in the residential waste overall (garbage + recycling + compostable organics)	≥ 70 percent
	Construction and demolition (C&D) debris diversion rate (percent, %)	Percentage of construction and demolition debris diverted from landfill disposal to reuse, recycling, or beneficial use	≥ 80 percent and increase proportion reused
Food Waste Reduction	Annual tons of food waste disposed (residential + commercial) (tons)	Tons of food waste thrown away in the garbage by residents and businesses per year (through city-contracted garbage collection services)	Not applicable – Data collected every 4 to 5 years

[1] Refer to the table on page 5 for definitions of the key terms used in this report.
[2] Excluding construction and demolition debris hauled to third-party facilities.
[3] Seattle is a member of C40, a global network of cities that are "united in action to confront the climate crisis."
[4] Excluding construction and demolition debris hauled to third-party facilities.
[5] Refer to page 11 of this report for a comparison of how the recycling capture rate differs from the recycling rate.

Background

The City's solid waste management plans have included a weight-based recycling rate goal since 1988, with the original plan setting a recycling rate target of 60 percent for commercial, residential, and self-haul waste by 1998. As a reference for this target, the City's recycling rate in 1987 was only 24 percent. The City's recycling rate has improved significantly since then, increasing to about 40 percent in 2000 and reaching a high of 59 percent in 2016 (see Figure 2.3, *2022 Plan Update*).

In July 2007, the Council adopted Resolution 30990, known as the zero waste resolution, which established goals and actions in support of zero waste, including revised recycling rate targets and a waste prevention goal. The resolution reaffirmed the 60 percent recycling rate goal with a target of 2012 and established a 70 percent target for 2025. The Council later accelerated the 70 percent target date to 2022 through the adoption of the *2011 Solid Waste Plan Revision*, with the city achieving a record-high recycling rate of 59 percent in 2016. Reaching even higher rates has been complicated by factors including the changing composition of the waste stream (e.g., smaller amounts of newspaper, phone books, and office paper with the emergence of e-commerce), a shift to lighter weight materials (e.g., plastic bottles instead of glass bottles), and the proliferation of non-recyclable plastic and multi-material product packaging (e.g., flexible film pouches).

Achieving the City's recycling rate goals has proven problematic, not only given significant changes in the waste stream, but also because of Seattle's shift in focus over time toward minimizing waste upstream in the life cycle of materials to reduce environmental and social impacts. In contrast to traditional solid waste management practices that focus primarily on end-of-life management of waste, considering the entire life cycle of materials includes design, extraction of raw materials, production and transport, use and repair, and end-of-life management. This shift to a sustainable materials management approach is consistent with Seattle's zero waste vision and with the actions of other solid waste industry leaders, such as the U.S. Environmental Protection Agency (EPA), the Oregon Department of Environmental Quality (DEQ), and the Washington State Department of Ecology (Ecology), which discontinued tracking of the statewide recycling rate in 2016.

Figure 1. Key Elements of Seattle's Zero Waste Vision

Source: Seattle Public Utilities' Strategic Business Plan (2021-2026)

In recognition of this emphasis on stopping waste at the source, profound changes to the waste stream, and consistent with the *2022 Plan Update*, SPU will no longer use the recycling rate as the primary data point for program-related decision making. Instead, SPU will use the metrics and targets described in this report to measure, evaluate, and report on solid waste data. The new metrics and targets improve the alignment between Seattle's zero waste vision and the city's waste reduction and climate goals. SPU will detail the city's progress toward reducing waste and building a more circular economy through annual reporting due on October 1, as required by Section 3 of Resolution 32082.

Development of New Key Solid Waste Metrics for Annual Reporting

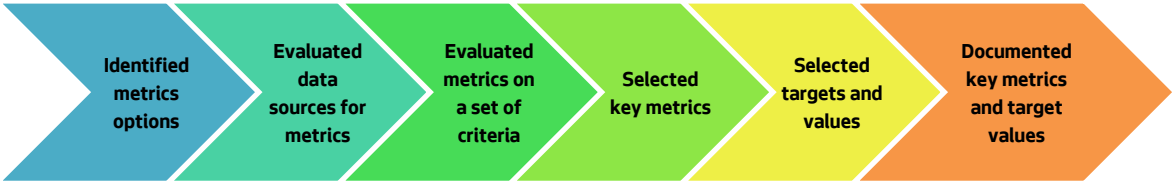
SPU's SWLOB has developed key solid waste metrics and targets aligned with focus areas in Seattle's *2022 Plan Update*. These focus areas are described below:

1) **Waste Prevention**: Help Seattle residents and businesses prevent products and materials from becoming waste by planning and implementing waste prevention policies and programs, including for reuse, repair, and sharing initiatives.
2) **Responsible Recycling**: Increase the capture of readily recyclable materials and ensure collected recyclables are effectively processed and sent to responsible end markets.
3) **Food Waste Reduction**: Reduce food waste in the garbage through prevention and composting.

To develop key solid waste metrics for annual reporting consistent with these solid waste focus areas, SPU undertook an extensive process involving research, data analysis, and evaluation of quantitative and qualitative criteria. This six-step (6-step) process involved:

1) **Identifying metric options** aligned with Seattle's zero waste vision, the waste diversion and waste prevention initiatives in the 2021-2025 SPU Strategic Business Plan, and recommendations in the *2022 Plan Update*.
2) **Evaluating the data sources used to calculate the metric options** for relevance, timeliness, reliability, and cost effectiveness.
3) **Evaluating the metric options on a set of criteria** including usefulness, understandability, SPU's ability to influence outcomes and measure the metric, and feasibility.
4) **Selecting key metrics** based on SPU's quantitative and qualitative evaluations of the metrics options and their data sources.
5) **Selecting targets and values** based on significance, or analysis of past, current, and potential future performance and comparability over time and relative to goals set by other industry leaders.
6) **Documenting key metrics and target values** in this report for City Council as described in Resolution 32082.

Figure 2. SWLOB's Process to Develop High-level Metrics and Targets



Source: Seattle Public Utilities

Using this process, SPU established a set of five (5) weight-based metrics to quantify waste reduction and diversion to recycling and composting. For four (4) of these metrics, SPU has set targets. SPU developed these with support from Cascadia Consulting Group.

New Key Solid Waste Metrics for Annual Reporting

This section describes the key high-level solid waste metrics and, where applicable, targets, to report to City Council annually, per Resolution 32082. The table below summarizes these metrics and targets. Detailed descriptions of the rationale for each of the metrics and targets are presented after the table. For a complete list of high-level solid waste metrics tracked by SPU, see Appendix I.

Focus Area	Metric	Description of Measurement (all measurements are estimates)	Existing or new metric	Target
Waste Prevention	Daily pounds of municipal solid waste (MSW) generated per capita (lbs.)	Pounds of total waste (garbage + recycling + compostable organics) created per person per day[6]	New	15 percent reduction (2015-2030 to 5.07 lbs./person/day (aligns with C40 goal)[7]
	Daily pounds of MSW disposed per capita (lbs.)	Pounds of garbage thrown away per person per day[8]	New	15 percent reduction (2015-2030) to 2.13 lbs./person/day
Responsible Recycling	Residential recycling capture rate (percent, %)[9]	Tons of residential recyclable material collected for recycling divided by tons of recyclable material in the residential waste overall (garbage + recycling + compostable organics)	New	≥ 70 percent
	Construction and demolition (C&D) debris diversion rate (percent, %)	Percentage of construction and demolition debris diverted from landfill disposal to reuse, recycling, or beneficial use	Existing	≥ 80 percent and increase proportion reused
Food Waste Reduction	Annual tons of food waste disposed (residential + commercial) (tons)	Tons of food waste thrown away in the garbage by residents and businesses per year (through city-contracted garbage collection services)	New	Not applicable – Data collected every 4 to 5 years

Terms Used in this Report

- C&D debris = Construction and demolition debris or waste refers to any combination of recyclable or nonrecyclable construction and demolition waste that results from construction, remodeling, repair or demolition of buildings, roads or other structures, and requires removal from the site of construction and demolition.
- MSW = Municipal solid waste includes all the garbage, recyclable materials, and compostable organic materials collected in Seattle at home or work or hauled to a city transfer station. It includes some materials and items that need special handling, such as old refrigerators and tires, and excludes construction and demolition debris hauled to third-party facilities.
- MSW disposed = Material collected as garbage and transported to landfill for final disposal.
- MSW generated = Total of garbage + recycling + compostable organics.
- Residential = Single-family + Multifamily.
- Recyclable = Materials accepted for recycling collection and designated as recyclable in Seattle's 2022 Plan Update, Table 5.1.

Focus Area: Waste Prevention

Though Seattle has decreased landfill disposal over time—even while experiencing booming population growth—by pursuing strategies aimed at meeting ambitious recycling rate goals, SPU has learned that the greatest potential for reducing the climate and other impacts of waste is by stopping waste at the source. That's why Seattle is focusing on waste prevention, or on reducing as much waste as possible as early as possible.

With the waste prevention focus area, SPU aims to develop and implement waste reduction policies, programs, and incentives consistent with the zero-waste vision described in *SPU's Strategic Business Plan* and *Seattle's 2022 Plan Update*. Seattle's vision of a zero waste future builds toward an inclusive and circular economy, where all materials with value are reused or recycled, and nothing is wasted. To advance toward zero waste, Seattle looks at

[6] Excluding construction and demolition debris hauled to third-party facilities.
[7] Seattle is a member of C40, a global network of cities that are "united in action to confront the climate crisis."
[8] Excluding construction and demolition debris hauled to third-party facilities.
[9] Refer to page 11 of this report for a comparison of how the recycling capture rate differs from the recycling rate.

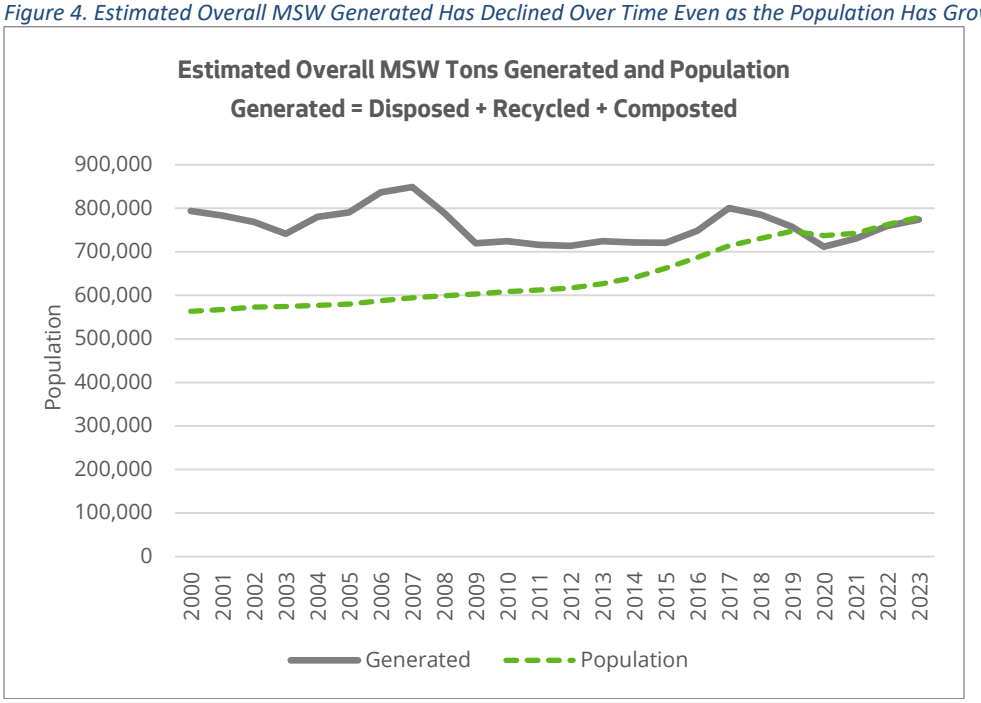
the whole life cycle of how products and packaging are made to eliminate waste and toxins, prevent pollution, reduce carbon emissions, and conserve natural resources from the start.

Figure 3. Examples of Waste Prevention in Seattle

Source: Seattle Public Utilities

To assess waste prevention, SPU uses readily available weight-based data to measure tons of waste generated (i.e., created), disposed, recycled, and composted by customer sector and waste stream. Decreasing waste generation can indicate progress in preventing waste. In Seattle, overall municipal solid waste (MSW) generation (municipal solid waste disposed + recycled + composted organics) has fluctuated with major economic shocks but trended downward over time, even as the population has grown significantly.

Figure 4. Estimated Overall MSW Generated Has Declined Over Time Even as the Population Has Grown



Source: Seattle Public Utilities, Washington State Office of Financial Management (OFM)

Key Metric: Daily Pounds of MSW Generated Per Capita (lbs.)

MSW generation represents the total amount of materials disposed, recycled, or composted by Seattle residents and businesses, excluding construction and demolition (C&D) debris hauled to third-party facilities. One way that SPU will measure MSW generation is in pounds per person per day. With waste generation increasing faster than any other environmental pollutant, C40, a global network of which Seattle is a member, has identified per capita MSW generation as a key metric for cities interested in reducing waste and associated climate pollution.[10]

Municipal solid waste (MSW) *includes all the garbage, recyclable materials, and compostable organic materials collected in Seattle at home or work or hauled to a city transfer station. It includes some materials and items that need special handling, such as old refrigerators and tires, and excludes construction and demolition debris hauled to third-party facilities.*

Tracking daily pounds of MSW generation per capita marks a shift from past practice in the *SPU Strategic Plan Quarterly Report* where SPU reported only on *residential* MSW generation in pounds per person per day. Observers will notice that pounds of overall MSW generated per person per day will be higher than residential MSW generation alone. Tracking overall MSW generation rather than only residential MSW generation provides a more comprehensive assessment of waste generation trends in Seattle.

Using population estimates from the Washington State Office of Financial Management (OFM),[11] SPU will compute daily generation per capita rates by translating the total of MSW tons generated each year into a daily generation rate and then dividing by the City's population estimate for that year. Many other jurisdictions, such as Washington State Department of Ecology, Washington D.C., and Austin also track and report per capita MSW generation rates.[12]

Figure 5. Calculating Daily Pounds of MSW Generated Per Capita

Source: Seattle Public Utilities and Cascadia Consulting Group

With more than 20 years of waste generation tonnage data, which SPU obtains annually from both the contracted collection haulers (i.e., WM and Recology King County), third-party recyclers and composters, and the city's transfer stations, SPU can evaluate trends in waste generation over time. Translating total tons of waste generated into a per capita metric helps SPU measure progress toward waste prevention goals even while the population grows and commercial activity increases following the end of the COVID-19 Public Health Emergency.

Target: Reduce Daily Pounds of MSW Generated Per Capita by 15 Percent by 2030 Relative to 2015 Levels

Provided current programs and initiatives continue, SPU has set a bold yet feasible target of reducing the amount of MSW generation by at least 15 percent by 2030 relative to 2015. This would mean reducing daily pounds of waste generated per capita from 6.0 pounds per person per day in 2015 to 5.07 pounds per person per day in 2030. Using the baseline year of 2015 aligns with the C40 network and many other jurisdictions. The target year of

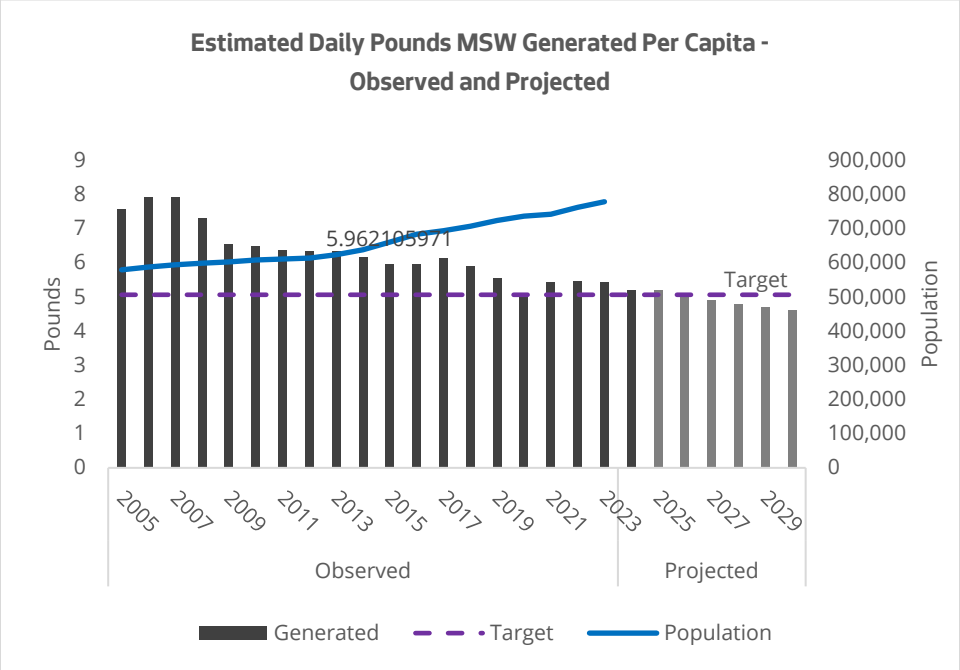
[10] "Towards Zero Waste Accelerator," C40 Cities Climate Leadership Group, Inc., accessed August 21st, 2024, www.c40.org/accelerators/zero-waste/.

[11] "April 1 official population estimates," Washington State Office of Financial Management, last updated June 28, 2024, ofm.wa.gov/washington-data-research/population-demographics/population-estimates/april-1-official-population-estimates

[12] Although numerous jurisdictions have identified daily per capita pounds of MSW generation as a key metric for tracking solid waste, few calculate the metric the same way, making direct comparisons difficult.

2030 signifies a significant international milestone for reducing worldwide climate-changing greenhouse gas emissions as detailed in Seattle's Climate Action Plan (2013). Cities such as Vancouver, Boston, Toronto, and San Francisco have also pledged to reduce waste generation to this target on this timeline.

Figure 6. Estimated Daily Overall MSW Generated Per Capita Is Projected to Decline Over Time

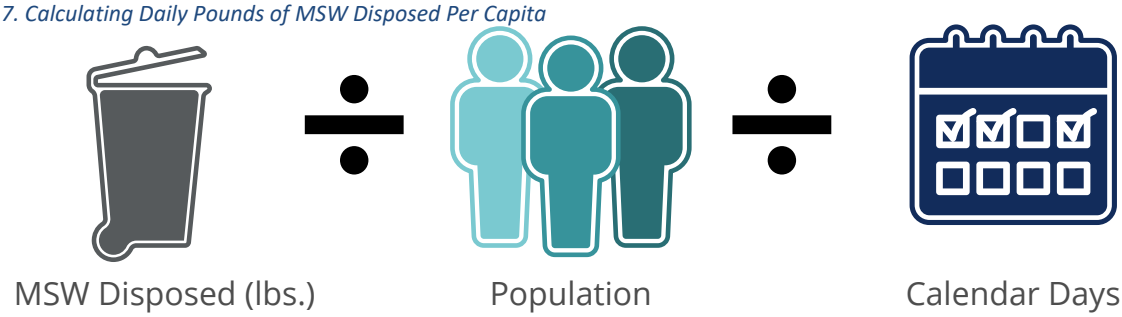


Source: Seattle Public Utilities

Key Metric: Daily Pounds MSW Disposed Per Capita (lbs.)

Daily pounds of MSW disposed (garbage) per capita, excluding C&D debris hauled to third-party facilities, measures the total amount of Seattle waste collected for landfill disposal across customer sectors. Measuring daily MSW disposed per capita will be new for SPU, which has been reporting on daily pounds of *residential* MSW disposed per capita in the *SPU Strategic Plan Quarterly Report*. Once again, observers will note that the rate of pounds of overall MSW disposed per person per day will be higher compared to the historic metric of residential MSW disposal. As with MSW generation, tracking overall MSW disposal rather than only residential MSW disposal provides a more comprehensive assessment of waste disposal trends in Seattle.

Figure 7. Calculating Daily Pounds of MSW Disposed Per Capita



Source: Seattle Public Utilities and Cascadia Consulting Group

SPU has more than 20 years of disposal tonnage data obtained from both the City's contracted collection haulers and the transfer stations. Like the daily pounds of MSW generated per capita metric described above, SPU will compute daily per capita disposal rates by translating total annual tons disposed of in a landfill into a daily disposal rate and then dividing by the city's population estimates from the Washington State OFM. Other jurisdictions, such

as the U.S. EPA, New York State, and the State of California commonly report this metric, though like per capita waste generation, no two jurisdictions calculate the rate in the same way.

Easy to calculate and to communicate, the metric of daily per capita MSW disposed taken together with MSW generation provides insights into whether declines in MSW disposed reflect greater diversion to recycling and composting or to waste prevention. An increase in per capita daily pounds of MSW disposed indicates that SPU should take action to reduce disposal of garbage, whereas declines in this metric indicate either gains in waste diversion or in waste prevention.

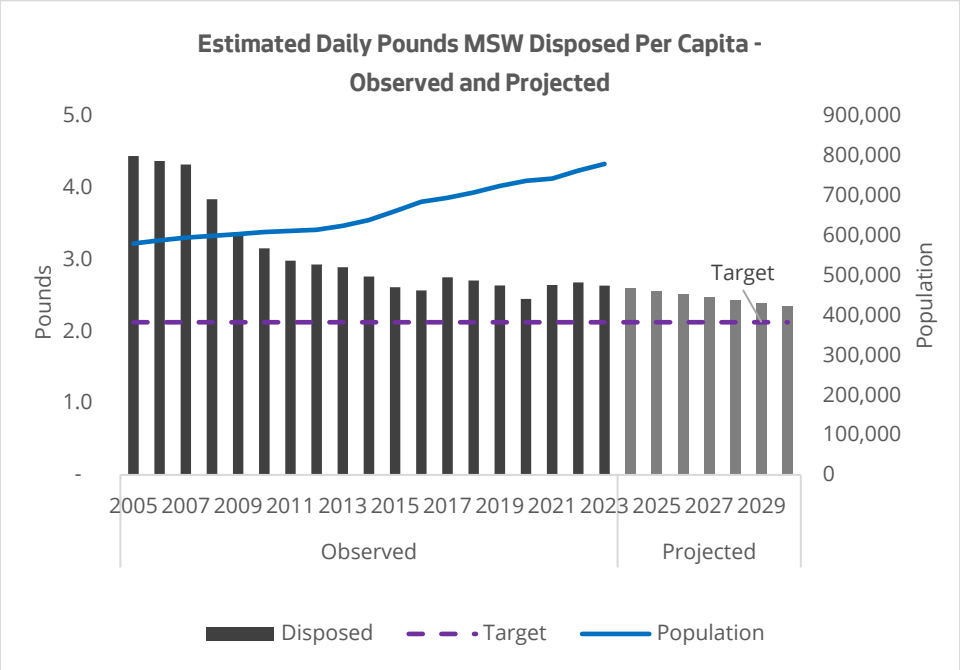
Target: Reduce the Amount of MSW Disposed by at Least 15 Percent by 2030 Relative to 2015

Daily pounds of MSW disposed per capita have fluctuated around two and one-half to three (2.5 to 3) pounds per capita per day since 2010 and dropped to a low of 2.4 pounds per capita per day in 2020. Recent SPU projections indicate that, under status quo conditions, per capita daily MSW disposed will continue to decline, though not to levels consistent with SPU's target for reducing daily MSW generated per capita by 15 percent from 2015 levels by 2030.

To align targets in reductions for daily MSW generated per capita with reductions in daily MSW disposed per capita, SPU will aim to reduce the amount of MSW disposed by at least 15 percent by 2030 relative to 2015. This translates to reducing daily pounds of MSW disposed per capita from 2.5 pounds per person per day in 2015 to 2.13 pounds per person per day in 2030.

Reducing the amount of MSW disposed by at least 15 percent by 2030 relative to 2015 will require SPU to take actions, such as increasing compliance activities, that will involve additional analysis and possible reallocation of existing resources or additional resources to implement effectively.

Figure 8. Estimated Daily Overall MSW Disposed Has Remained Around 2.5 Pounds per Person per Day Since 2015



Source: Seattle Public Utilities

Focus Area: Responsible Recycling

Following China's implementation of import bans of certain recyclable materials around 2018, SPU and its partners in King County adopted a "responsible recycling" philosophy as an approach to improve the quality of recyclables

and to minimize the unintended consequences of recycling now and in the future.[13] One of SPU's solid waste focus areas, responsible recycling, aims to maximize recovery of valuable materials, minimize the cost of waste management programs, and reduce the environmental and social impact of what Seattle residents and businesses buy, sell, and use. In addition to the waste residents and businesses generate, building construction and demolition (C&D) projects produce a significant amount of material. While most C&D handling occurs outside of the city's contracted collection system, SPU works to promote and encourage salvage, reuse, recycling, and beneficial use of these materials.

Figure 9. Key Elements of the Responsible Recycling Approach

Source: Seattle Public Utilities with Cascadia Consulting Group

Responsible recycling begins with customers correctly sorting their recyclables and ends with verification that processed recyclables are delivered to responsible end markets. Developing a responsible recycling system is a commitment to ensuring that the recyclable materials collected, transported, and processed are recycled in ways that do not cause harm to the environment or create social inequities in the United States and other countries that might have less stringent regulations for safeguarding human health and the environment.

SPU's efforts to advance responsible recycling also involve advocating for consumer product companies to take responsibility for designing and using recyclable materials, accurately and clearly labeling products' recyclability, and using non-toxic recycled content in their products and packaging. SPU actively engages in state, national, and global efforts to improve recycling systems in general while continuing to work on improving responsible recycling outcomes in the City's recycling program.

SPU takes the same responsible recycling approach to C&D materials as to the recyclables collected from homes and businesses. In the U.S., waste generation from C&D activities is estimated to be double MSW generation, with 30 percent of C&D waste disposed in a landfill.[14,15] To decrease the environmental impacts of disposing of C&D

[13] For more on the origins of "responsible recycling," refer to Seattle Public Utilities, "Chapter 5: Recycling and Composting Policy and Markets," 2023, www.seattle.gov/documents/Departments/SPU/Documents/Plans/SolidWaste/2022SolidWaste-Chapter5-RecyclingCompostingPolicyMarkets.pdf.
[14] "Advancing Sustainable Materials Management: 2018 Fact Sheet. Assessing Trends in Material Generation and Management in the United States," U.S. EPA, 2020, https://www.epa.gov/sites/default/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf.
[15] "Municipal Solid Waste and Construction & Demolition Debris," U.S. Department of Transportation, Bureau of Transportation Statistics, last updated September 23rd, 2016, https://www.bts.gov/archive/subject_areas/freight_transportation/faf/faf4/debris.

debris, SPU works to ensure the reuse, recycling, or beneficial use of C&D debris. For C&D debris that cannot be reused, recycled, or put to beneficial use, SPU has designated certain facilities to ensure responsible disposal of C&D materials. SPU encourages diversion of C&D materials to reuse, recycling, and beneficial use by requiring "salvage assessments" to identify potentially reusable and recyclable materials prior to the start of construction and demolition projects; tracking where and how material generated from Seattle jobsites is handled through Waste Diversion Reports; and, requiring monthly reporting of quantities from recycling and disposal facilities that receive material generated in Seattle.

Key Metric: Residential Recycling Capture Rate (percent, %)

The residential recycling capture rate refers to the tons of materials designated as recyclable that are collected in the residential (single-family + multifamily) recycling stream divided by the total tons of designated recyclables found across all residential waste streams (garbage + recycling + compostable organics). The residential recycling capture rate provides an alternative to the residential recycling rate metric, which measures the percentage of recoverable materials diverted from landfill through recycling divided by the total quantity of MSW generated, including non-recyclable materials.

To measure residential recycling capture rates, SPU collects detailed data on materials in all three waste streams (garbage, recycling, and compostable organics) through residential (single-family + multifamily) waste composition studies. Due to time and cost considerations, SPU obtains the data required to calculate residential recycling capture rates at approximately 5-year intervals. SPU does not have the data necessary to evaluate commercial recycling capture rates, so it measures the residential recycling capture rate exclusively.[16]

$$\textit{Residential Recycling Capture Rate} = \textit{Weight of Recyclable Material Collected for Residential Recycling} \div \textit{Weight of All Residential Recyclables in the Waste Stream}$$

SPU's latest residential waste characterization studies (2020-2021) estimated a residential recycling capture rate of 74 percent, meaning that together, single-family and multifamily customers correctly sorted 74 percent of their recyclable materials. By contrast, U.S. households with a curbside program recycle about 57% of recyclable materials, on average, according to the Recycling Partnership.[17]

As the City moves upstream to avoid more waste in the first place, SPU requires new metrics that help it measure waste prevention, as successful waste prevention efforts can negatively impact the recycling rate. Because the recycling rate depends on the total weight of MSW generated, not just recyclable materials, preventing or reducing waste of materials that are recyclable can lead to a lower recycling rate, even though customers may get better at recycling.

Unlike the recycling rate, the recycling capture rate includes only those materials designated as recyclable in the calculation, making the recycling capture rate a better metric for reflecting gains from waste prevention efforts and less sensitive to changes in material weight and type over time. Thus, the residential recycling capture rate provides a more constant measure of the effectiveness of SPU's recycling program. By better understanding the residential material steams and customer behavior, SPU can adjust programs to achieve better results. In addition, SPU can calculate rates for the entire recycling stream or at a sub-level such as for individual materials and

[16] Due to cost considerations, SPU does not conduct waste composition studies of open market, or non-city-contracted, commercial recycling and composting.

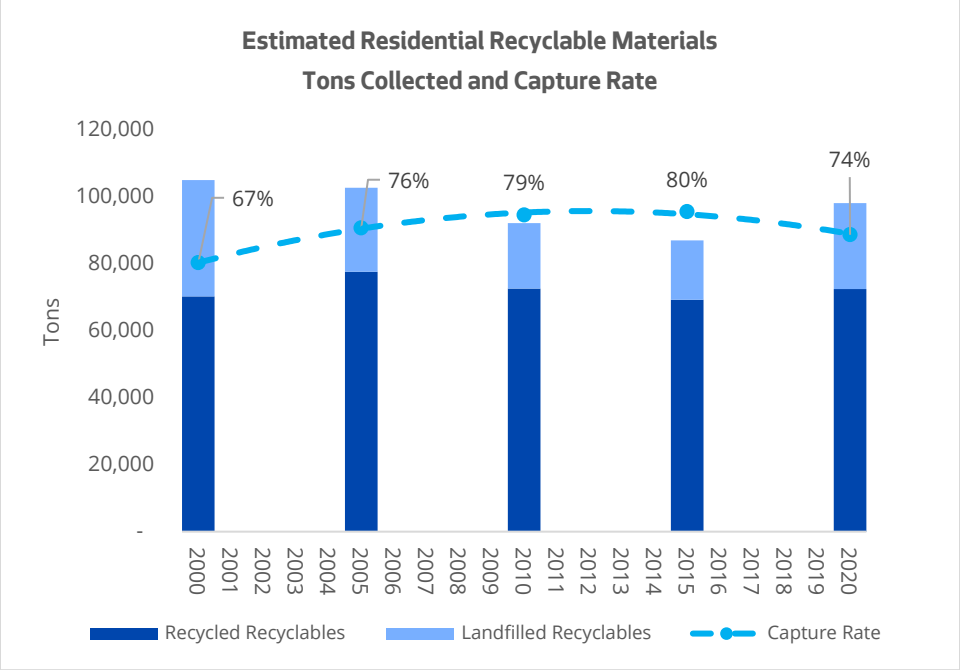
[17] "State of Recycling: The Present and Future of Residential Recycling in the U.S.," Recycling Partnership, 2024, https://recyclingpartnership.org/wp-content/uploads/dlm_uploads/2024/01/Recycling-Partnership-State-of-Recycling-Report-1.12.24.pdf.

residential sub-sectors (e.g., single-family, multifamily), allowing for the development of targeted initiatives at the customer sector and/or recyclable material level.

Target: Maintain a Residential Recycling Capture Rate Equal to or Greater than 70 Percent

SPU aims to maintain at least a 70 percent recycling capture rate based on both the latest residential recycling capture rate and historic residential recycling capture rates. Seattle's residential recycling capture rate has stayed above 70 percent since 2005, hitting a high of 80 percent in 2015 before dropping to 74 percent in 2020. This target is consistent with the spirit of Seattle's historic 70 percent recycling rate target while better accounting for accomplishments in waste prevention and acknowledging that the City has limited ability to influence the recyclability of products and materials in the municipal solid waste stream.

Figure 10. Seattle Residents Tend to Recycle Properly



Source: Seattle Public Utilities in consultation with Cascadia Consulting Company

Key Metric: Construction and Demolition (C&D) Debris Diversion Rate (percent, %)

The C&D diversion rate measures the estimated total tons of C&D material diverted from landfill disposal divided by the estimated total tons of C&D debris generated (diverted + disposed) and expressed as a percentage. The C&D diversion rate provides SPU with key data about the quantities of C&D material diverted from disposal in a landfill to reuse, recycling, and beneficial use relative to the total amount of C&D debris generated.[18] Measuring the C&D debris diversion rate helps to identify trends in C&D management even while the quantities of C&D waste fluctuate with construction cycles.

Construction and demolition (C&D) debris *or C&D waste refers to any combination of recyclable or nonrecyclable construction and demolition waste that results from construction, remodeling, repair or demolition of buildings, roads, or other structures, and requires removal from the site of construction and demolition.*

SPU began estimating the C&D diversion rate in 2007, when the City started requiring annual recycling

[18] Beneficial use is diverting C&D debris from landfills in a way that replaces another material in a manufacturing process. A common example is using untreated wood waste as a fuel for industrial boilers to replace other fuels. SPU defines "beneficial use" in Administrative Rule #SPU-DR-01-07. The Washington State Department of Ecology may also approve a specific use of C&D debris as beneficial use under Washington Administrative Code 173-350-200.

reporting and licenses of third-party recyclers.[19] Using data from the following three (3) sources, SPU estimates the C&D diversion rate:

1) Tonnage data for unpainted and untreated wood waste and scrap or mixed metals brought to the City's two transfer stations for recycling.
2) Self-reported C&D tonnage data reported by C&D recycling facilities in the monthly Qualified C&D Receiving and Recycling Facilities Report.[20] For facilities specially designated to recover targeted construction materials for recycling and beneficial use, the Qualified Receiving and Recycling Facilities Report identifies incoming and outgoing construction materials for reuse, recycling, beneficial use, and disposal.
3) C&D tonnage data self-reported by recyclers in the Annual Recycling and Reuse Report, which contains information on the collectors and processors of reusable and recyclable C&D materials, the materials they handle, companies receiving the materials, and the final use of the materials.

Taken together, these data sources provide SPU with crucial information on the types, quantities, and flow of materials in the "C&D sector," which operates largely outside the city's municipal waste management system. With few exceptions, C&D debris, such as concrete, asphalt paving, aggregates, wood waste, structural metals, gypsum wallboard, and insulation, is handled by construction contractors, third-party private haulers, or the City's contracted C&D waste collector—not collected through the city's municipal waste program. These vendors haul most C&D debris from job sites directly to private recycling facilities for sorting or to city-designated disposal facilities. C&D materials are also sometimes disposed of at the city's transfer stations. In some cases, construction contractors collect C&D materials in intermodal freight containers at C&D jobsites so they can be hauled directly to railheads for transport to a landfill.

Figure 11. Example of Clean Wood Brought to the South Transfer Station by a Construction Contractor

Source: Seattle Public Utilities

C&D debris makes up a considerable portion of the overall waste generated within the city. With the population in Seattle growing at a rapid pace, the C&D sector has created more waste than any customer sector for 12 of the last 14 years. In 2023, as much C&D debris was generated as commercial MSW—roughly 350,000 tons. Of the C&D debris generated in the city, over two-thirds is diverted from landfill to reuse, recycling, or beneficial use. Seattle has consistently diverted at least 66 percent of C&D debris since 2013, peaking at 78.3 percent in 2019.

Given the relative size of the C&D sector, tracking diversion for this waste stream provides a measure of SPU's overall progress on preventing and reducing waste. Detailed C&D diversion data, annual residual sampling at "Qualified Receiving and Recycling Facilities," and third-party certification of diversion data helps SPU to monitor the C&D debris industry's compliance with the City's several C&D-related regulations, including:

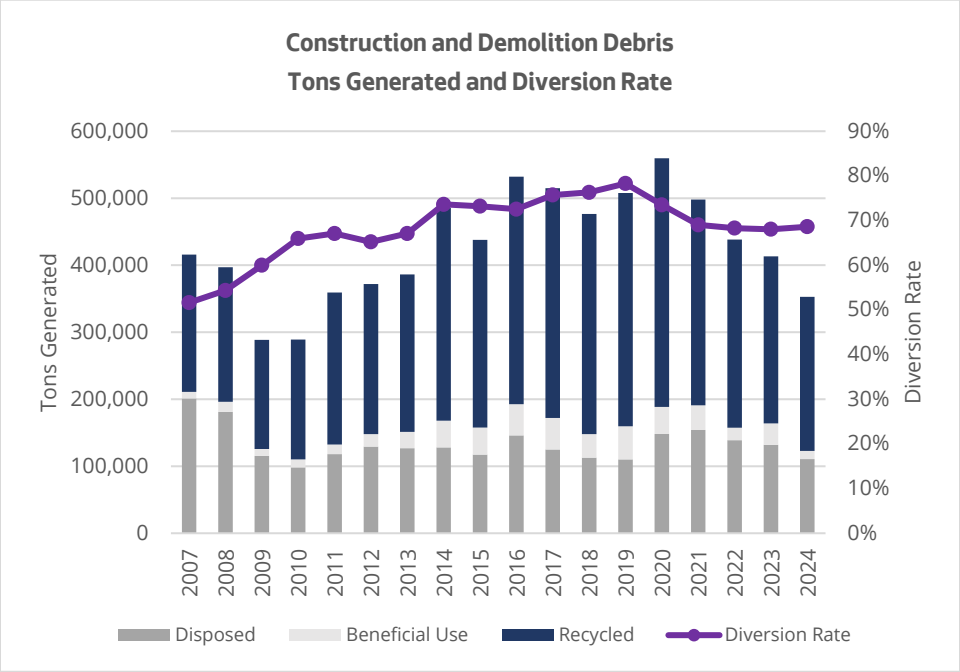
[19] For more on Seattle's reporting and license requirements for collectors and processors of recyclable materials, visit Annual Recycling and Reuse Report and Recycler License - Home.

[20] City code requires that recyclable material from jobsites in Seattle must be sent to a Qualified Receiving and Recycling Facility. Qualified Receiving and Recycling Facilities are specially designated facilities for recovering targeted construction materials for recycling and beneficial use and must report monthly to SPU on incoming and outgoing construction materials for reuse, recycling, beneficial use, and disposal.

- Bans on the disposal of certain types of recyclable C&D materials,[21]
- Limits on the amount of non-recyclable materials allowed in loads sent for C&D recycling, and
- Requirements for sending materials to reuse, recycling, or beneficial use—where markets for the materials exist—rather than to landfill disposal.

At the same time, these data enable SPU to track progress toward reducing C&D disposal in a landfill or burning for energy and to develop initiatives to increase salvage, reuse, and recycling of C&D materials.

Figure 12. C&D Debris Waste Generation Has Declined in Recent Years



Source: Seattle Public Utilities, Seattle's 2023 Waste Prevention & Recycling Report

Target: Achieve a C&D Diversion Rate Equal to or Greater than 80 Percent and Increase the Proportion Reused

Many C&D materials, like concrete, wood, and gypsum wallboard, are carbon-intensive to produce, heavy, and take up considerable space in a landfill. And many of these materials can be reused, recycled, or put to other "beneficial use" if properly sorted and handled. Keeping reuseable and recyclable C&D debris materials circulating in the local economy represents a significant waste reduction and thus a carbon-cutting opportunity for Seattle. That is why SPU aims to reach a C&D diversion rate of at least 80 percent or higher.

SPU believes this target is achievable but will require SPU to complete additional analysis of programs, policies, and compliance options to strengthen C&D diversion systems and markets, including increasing deconstruction, salvage, and reuse of C&D materials. Studies indicate that by increasing the proportion of C&D material diverted to salvage and reuse, the city could do even better in reducing waste and climate impacts.[22,23,24]

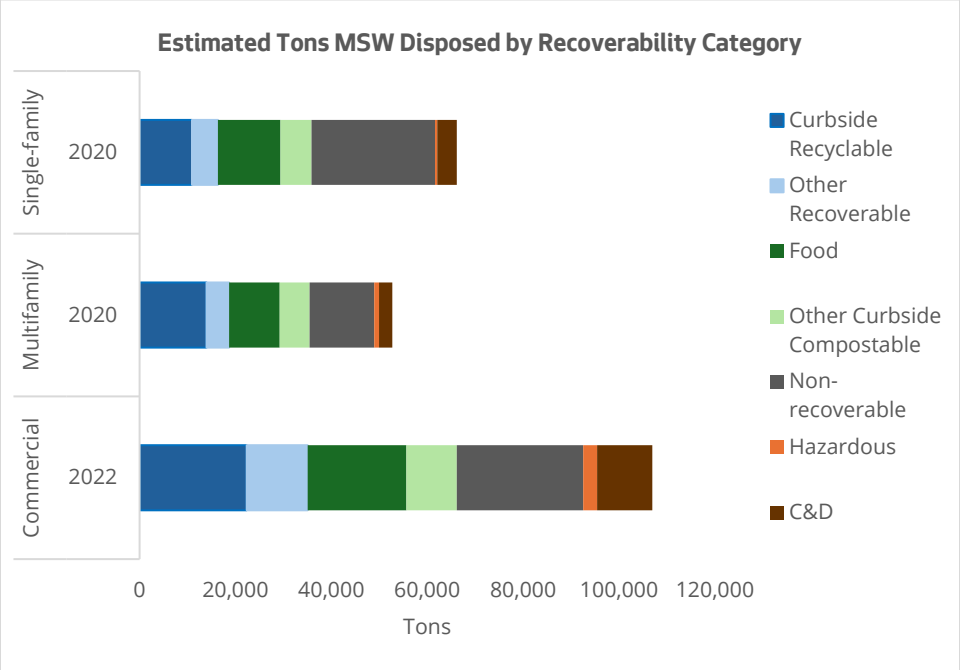
[21] Under SMC 21.36.089, with supplemental guidance under SPU Director's Rule SW-640, the following materials are currently banned from disposal in C&D containers in Seattle: concrete, bricks, asphalt paving, metal, cardboard, clean wood, and clean gypsum scrap.
[22] "Construction and Demolition Waste," Center for Science and Environment, last updated May 6th, 2019, cdn.cseindia.org/attachments/0.49371000_1560337022_Construction-demolition C&D-WasteFactsheet.pdf.
[23] "Vision and Action Plan for a Low-Carbon Pacific Coast Construction Sector," Pacific Coast Collaborative, 2024, https://pacificcoastcollaborative.org/wp-content/uploads/2024/01/PCC-Low-Carbon-Construction-Vision-and-Action-Plan-011124.pdf.
[24] C40 has a number of related resources, including "How to start deconstructing and stop demolishing your city's built assets," available at https://www.c40knowledgehub.org/s/article/How-to-start-deconstructing-and-stop-demolishing-your-citys-buildings?language=en_US.

Focus Area: Food Waste Reduction

SPU has a Focus Area for Food Waste Reduction aligned with actions to decrease food waste in Seattle's *2022 Plan Update,* initiatives detailed in SPU's *Strategic Business Plan*, and goals in Seattle's Food Action Plan. Reducing food waste in the garbage offers SPU one of the most promising options for decreasing the environmental and social impacts of municipal solid waste. Food not only comprises the single largest share of Seattle's residential and commercial garbage by weight, making up 20 percent of the tons disposed of in each sector, but also has a disproportionately large environmental impact.[25,26]

***Food waste** refers to uneaten or unused food lost at any stage in the food lifecycle, such as production, distribution, and cooking. Food waste includes, but is not limited to, edible unused food, spoiled food, and unusable food, such as pits and bones.*

Figure 13: Food Makes Up At Least 20 Percent of the Residential and Commercial Garbage



Source: Seattle Public Utilities, 2020 Residential Waste Composition Study

According to the Intergovernmental Panel on Climate Change, at least 20 percent of the world's total greenhouse gas emissions comes from the production, transport, and disposal of food that ultimately ends up as waste. The U.S. EPA estimates that food waste alone generates 58 percent of landfill methane emissions. Food waste has social impacts as well. Of the disposed food waste in Seattle, 70 percent was edible and could have been used to address food scarcity in the community.

[25] "2020 Residential Waste Composition Study," Cascadia Consulting Group for Seattle Public Utilities, 2021, www.seattle.gov/documents/Departments/SPU/Documents/Reports/SolidWaste/2020ResidentialWasteRecyclingCompositionStudies.pdf.
[26] "From Farm to Kitchen: The Environmental Impacts of Food Waste," U.S. EPA, 2021, www.epa.gov/system/files/documents/2021-11/from-farm-to-kitchen-the-environmental-impacts-of-u.s.-food-waste_508-tagged.pdf.

Key Metric: Annual Tons of Food Waste Disposed (residential + commercial) (tons)

SPU measures the total amount of food waste thrown away in the garbage by residents and businesses through contracted collection services. To calculate the amount of food waste disposed in a landfill, SPU, once again, uses waste composition data from residential and commercial sector garbage studies conducted every four (4) to five (5) years. The summed percentages of each category defined as "food waste" for each sector in the most recent garbage composition studies are multiplied by the total tons of garbage collected from each sector in each year. The resulting estimated tons from each sector are combined to calculate the annual tons of food waste disposed of through Seattle's municipal solid waste system. Again, while tracked, this metric has not previously been reported publicly by SPU except for in the waste composition study reports.

Figure 14. Disposed Food Waste at the City's Transfer Station

Source: Seattle Public Utilities

Annual tons of food waste disposed through Seattle's contracted collection services measures progress toward the City's goals of reducing food waste, enforcing its ban on food in the garbage, and reducing the environmental impacts of the municipal solid waste system. Disposal of food in landfills is one of the largest sources of methane emissions, a potent greenhouse gas, so understanding how much food is being thrown away in the garbage by Seattle residents and businesses is key for assessing whether the City's efforts to reduce carbon emissions from food waste are succeeding. In 2022, the residential sector disposed, on average, 135 pounds of food per household and each business with contracted collection service account disposed, on average, 555 pounds of food.

Conclusion

Seattle has obtained a reputation as one of the foremost solid waste management programs in the country due to thoughtful strategic planning, an environmental ethic among residents, and strong political leadership. Driven by ambitious recycling rate goals for the past 40 years, the City has successfully implemented extensive incentives, policies, and programs to reduce waste to landfill and increase diversion to recycling and composting. But in today's world of global climate change, recycling is no longer enough. Now is the time to stop waste upstream in the first place. Seattle gets closer to zero waste by producing and using less.

To guide solid waste system planning into a future shaped by rapid climate change, SPU has identified key weight-based metrics and targets in this report to measure progress reducing waste in support of Seattle's zero waste vision. A complete list of high-level solid waste metrics tracked by SPU is available in Appendix I. SPU is also developing social, environmental, and economic metrics to measure the impacts of waste prevention as part of the *Waste Prevention Plan*.

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Appendix I. High-level Solid Waste Metrics Tracked by SPU

This table provides an inventory of high-level solid waste metrics monitored by SPU and where SPU most commonly reports that metric as of the end of 2024. The items in this inventory may change at any time and do not include all operational or customer program-specific metrics monitored by SPU staff. Key performance metrics for annual reporting to the City Council that are detailed in this report appear highlighted in blue below.

Metric	Sector(s)	Key performance metric for annual reporting to City Council	Where reported
Annual tons of MSW generated (tons)	Overall	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW generated (tons)	Single-family	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW generated (tons)	Multifamily	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW generated (tons)	Commercial	No	• Annual Solid Waste Report
Annual tons of MSW generated (tons)	Self-haul	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Daily pounds of municipal solid waste (MSW) generated per capita (lbs.)	Overall	Yes	Annual Solid Waste Report
Annual pounds MSW generated in a commercial setting per million $ of B&O-taxable revenue (lbs.)	Commercial	No	Internal to Solid Waste Line of Business (planned)
Annual pounds of MSW generated per household (lbs.)	Single-family; Multifamily; Residential (single-family + multifamily)	No	Internal to Solid Waste Line of Business (planned)
Annual food waste generated (tons)	Single-family; Multifamily; Residential (single-family + multifamily)	No	Internal to Solid Waste Line of Business (planned)
Daily pounds of residential food waste generated per capita (lbs.)	Single-family; Multifamily	No	Internal to Solid Waste Line of Business (planned)
Daily pounds of residential food waste generated per capita (lbs.)	Residential (single-family + multifamily)	No	Annual Solid Waste Report
Annual tons of MSW disposed (tons)	Overall	No	Annual Solid Waste Report
Annual tons of MSW disposed (tons)	Single-family	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW disposed (tons)	Multifamily	No	• Municipal Solid Waste Quarterly Tonnage Report

Metric	Sector(s)	Key performance metric for annual reporting to City Council	Where reported
			• Annual Solid Waste Report
Annual tons of MSW disposed (tons)	Commercial	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW disposed (tons)	Self-haul	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Daily pounds of municipal solid waste (MSW) disposed per capita (lbs.)	Overall	Yes	Annual Solid Waste Report
Annual pounds of MSW disposed per household (lbs.)	Single-family; Multifamily; Residential (single-family + multifamily)	No	Internal to Solid Waste Line of Business (planned)
Annual food waste disposed (tons)	Single-family; Multifamily; Residential (single-family + multifamily); Commercial	No	Internal to Solid Waste Line of Business (planned)
Annual food waste disposed (tons)	Residential + Commercial	Yes	Annual Solid Waste Report
Annual edible wasted food (tons)	Single-family; Multifamily; Residential (single-family + multifamily); Commercial; Residential + Commercial	No	Internal to Solid Waste Line of Business (planned)
Annual inedible wasted food (tons)	Single-family; Multifamily; Residential (single-family + multifamily); Commercial	No	Internal to Solid Waste Line of Business (planned)
Annual tons of MSW recycled (tons)	Overall	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW recycled (tons)	Single-family	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW recycled (tons)	Multifamily	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW recycled (tons)	Commercial	No	Annual Solid Waste Report
Annual tons of MSW recycled (tons)	Self-haul	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report

Metric	Sector(s)	Key performance metric for annual reporting to City Council	Where reported
Annual pounds of MSW recycled per household (lbs.)	Single-family; Multifamily; Residential (single-family + multifamily)	No	Internal to Solid Waste Line of Business (planned)
Recycling capture rate (percent, %)	Single-family; Multifamily	No	Internal to Solid Waste Line of Business (planned)
Recycling capture rate (percent, %)	Residential (single-family + multifamily)	Yes	Annual Solid Waste Report
Recycling contamination rate (percent, %)	Residential (single-family + multifamily)	No	Annual Solid Waste Report
Annual tons of MSW composted (tons)	Overall	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW composted (tons)	Single-family	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW composted (tons)	Multifamily	No	• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual tons of MSW composted (tons)	Commercial	No	Annual Solid Waste Report
Annual tons of MSW composted (tons)	Self-haul		• Municipal Solid Waste Quarterly Tonnage Report • Annual Solid Waste Report
Annual pounds of MSW composted per household (lbs.)	Single-family; Multifamily; Residential (single-family + multifamily)	No	Internal to Solid Waste Line of Business (planned)
Construction and demolition (C&D) debris generated (tons)	C&D	No	Annual Solid Waste Report
Annual pounds of waste generated in a C&D setting per C&D permit issued (lbs.)	C&D	No	Internal to Solid Waste Line of Business (planned)
C&D debris disposed (tons)	C&D	No	Annual Solid Waste Report
Annual pounds of waste disposed in a C&D setting per C&D permit issued (lbs.)	C&D	No	Internal to Solid Waste Line of Business (planned)
C&D recycled (tons)	C&D	No	Annual Solid Waste Report
C&D recycling rate (percent, %)	C&D	No	Annual Solid Waste Report
C&D beneficial use rate (percent, %)	C&D	No	Annual Solid Waste Report
C&D diversion rate (percent, %)	C&D	Yes	Annual Solid Waste Report
Qualified C&D Receiving and Recycling Facility monitoring – Quarterly and annual	C&D	No	Qualified C&D Receiving and Recycling Facilities

Metric	Sector(s)	Key performance metric for annual reporting to City Council	Where reported
diversion rates by facility (percent, %)			
Waste Diversion Report compliance rate (percent, %)	C&D	No	Annual Solid Waste Report
Missed collections per 1,000 pick-ups (number, #)	Single-family	No	Internal to Solid Waste Line of Business
Missed collections per 1,000 pick-ups (number, #)	Multifamily	No	Internal to Solid Waste Line of Business
Missed collections per 1,000 pick-ups (number, #)	Residential (single-family + multifamily)	No	Internal to SPU
Average repeat missed collections per 10,000 pickups (number, #)	Residential (single-family + multifamily)	No	Internal to SPU
Annual recycler reporting requirement compliance rate (percent, %)	NA	No	Internal to Solid Waste Line of Business
Kent Landfill methane probe measurements compliance rate (percent, %)	NA	No	Internal to SPU
Midway Landfill methane probe measurements compliance rate (percent, %)	NA	No	Internal to SPU
Solid waste inspection and compliance field activities – Cancelled, in progress, open, and complete (number, #)	Single-family; Multifamily; Residential (single-family + multifamily)	No	Internal to Solid Waste Line of Business (planned)
Solid waste inspection and compliance field activities – Average days open (number, #)	Residential (single-family + multifamily)	No	Internal to Solid Waste Line of Business
Solid waste inspection and compliance extras monitoring – Count (number, #), hit rate (percent, %), billing accuracy (percent, %)	Single-family; Multifamily	No	Internal to Solid Waste Line of Business
Solid waste inspection and compliance Business District monitoring – In progress, complete (number, #)	Commercial	No	Internal to Solid Waste Line of Business
Solid waste women and minority business enterprise (WMBE) consulting (percent, %)	NA	No	Internal to SPU
Solid waste WMBE spend (percent, %)	NA	No	Internal to SPU