



Seattle Solid Waste Trends

20



Marita Dingus

Outdoor baby (hanging), 2010

Pull tabs, champagne wire muselet,
electric ceramic tubes, plastic curler
attachments, glass

26 x 9 x 3 inches

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Chapter 2 SEATTLE SOLID WASTE TRENDS

This chapter describes Seattle’s physical setting, population, and solid waste generation trends. All of these factors set the landscape of the solid waste planning environment. The forecast for Seattle’s population indicates increases. Employment should rise, with a shift away from manufacturing. With people and jobs increases, the total generation of discards will also rise. Robust sources of data and analytic tools support projections and progress tracking.

2.1 PHYSICAL ENVIRONMENT

Seattle enjoys a central location in the Greater Puget Sound Region. The city takes up just over 142 square miles, including nearly 60 square miles of water. Puget Sound borders the city to the west, with Lake Washington bordering to the east. Some of the city's terrain is hilly, and the entire region is in a major earthquake zone. Seattle's marine climate is mild year-round, with wet winters and relatively dry summers.

Seattle's two major north-south transportation corridors are State Hwy 99 (Aurora Ave through much of the city) and Interstate 5. Interstate 90 connects eastward to the rest of the country. Seattle is also well serviced by rail lines to the north, south, and east. Washington State ferries are the city's major connection to the west.

2.2 HUMAN ENVIRONMENT

Demographic factors important for solid waste planning include population, household trends, and employment trends. Outreach planners need information on the various languages spoken in the city. From looking at employment trends, SPU learns what kinds of businesses (and their attendant wastes) will be contributing to the commercial waste stream.

2.2.1 POPULATION

Seattle's population is forecast to increase by almost 8% between 2010 and 2020 (Table 2-1). Over the same period, numbers of single-family homes will increase by about 3% and multi-family units by about 12%.

**Table 2-1
Seattle Population and Household Trends through 2020**

Year	2000	2005	2010	2015	2020
Population ¹	563,374	573,076	608,660	631,350	655,947
Occupied Household ¹	258,481	266,204	283,510	294,158	303,557
Single-Family thru 4-plex units ²	153,853	151,217	158,533	162,376	163,724
Multi Family with 5 or more units ²	104,628	114,987	124,977	131,782	139,833
Average Household Size	2.180	2.153	2.147	2.146	2.161

¹Source: Puget Sound Regional Council 2011

²Source: SPU Accounts

According to the American Community Survey 2009, 79% of Seattle's population speaks English only. About 6% are "linguistically isolated," which means they feel proficient only in a language that is not English.

2.2.2 EMPLOYMENT

Employment forecasts show Seattle employment rising through the year 2020 (Table 2-2). The numbers of employees in each type of sector factor into the volumes and types of waste generated from businesses. The office sector employs more than twice as many people as the next highest sector, health and education. The third highest sector is services. All employment sectors are forecast to rise except manufacturing.

**Table 2-2
Seattle Employment Trends by Sector through 2020**

Year	2000	2005	2010	2015	2020
Manufacturing	45,195	37,646	36,973	37,693	36,053
Wholesale and Retailer	54,544	49,219	47,522	51,852	53,871
Food Services and Drinking Places	27,682	26,865	25,939	29,429	32,531
Services	59,062	55,264	58,479	76,657	91,025
Office	187,663	174,895	177,473	181,314	191,925
Health and Education	81,211	76,758	78,809	89,412	98,836
Food and Beverage Stores	9,644	8,984	8,675	9,842	10,879
Transportation, Hotels and Construction	52,200	46,668	46,470	52,723	58,279
Total	517,201	476,299	480,340	528,922	573,399

Sources: SPU estimates; Washington State Employment Security Dept. data; and SPU forecast model (updated March 2, 2011)

Waste generation directly correlates with economic cycles. MSW generation (garbage plus recycling and organics) dropped with the recession after the economic high of 2007. SPU expects total generation to rise again as the economy recovers, minus the effects of waste prevention programs.

2.3 WASTE DEFINITIONS

Terminology for waste can be confusing. The following section describes key terms applied to categories of solid waste.

2.3.1 WASTE CATEGORIES

There are several categories of wastes (discarded materials) generated in Seattle.

Municipal Solid Waste — MSW includes all the garbage, recycling, and organics (yard and food waste) collected from within Seattle and hauled to the city's recycling and disposal (transfer) stations. It also includes some construction and demolition (C&D) wastes that are disposed at city transfer stations or placed in residential or business garbage containers. See Chapter 4, Seattle's MSW System: Managing Discards.

Construction, Demolition and Land-clearing Debris — This category is called construction and demolition or C&D. C&D includes wood waste, metals, asphalt roofing, gypsum, and other materials generated by construction activities that is not disposed at city-owned transfer stations or mixed with MSW garbage. It is managed separately from MSW for recycling and disposal. See Chapter 5, Other Solid Waste Programs, section 5.1 for detail on C&D.

Moderate Risk Waste — MRW includes household hazardous waste (HHW) and small quantity generator waste (SQGW). Seattle manages its MRW through a joint program supported and implemented by the City of Seattle, King County, Public Health - Seattle & King County, and the Suburban Cities Association. The joint program, the Local Hazardous Waste Management Plan, guides MRW management. See Chapter 5, Other Seattle Solid Waste Programs, section 5.4 for information on MRW.

Other Special Categories of Waste — These are wastes not allowed in the MSW. They require special handling and disposal due to regulatory requirements or other reasons such as toxicity, volumes, or particular handling issues. Examples include biomedical, asbestos, biosolids, and dangerous wastes. See Chapter 5, Other Seattle Solid Waste Programs, section 5.5 for detail on this category.

2.3.2 RECYCLING AND DISPOSAL DEFINITIONS

Recycling and disposal are categorized into many modes and methods.

Waste Prevention — Used interchangeably with "waste reduction," and sometimes called "pre-cycling." This is the practice of minimizing waste through responsible purchasing and consumerism. Essentially, this practice removes waste from the waste stream by not creating it in the first place.

Recycling — Recycling remanufactures or transforms waste materials into usable or marketable materials, including organics (food and yard debris) into compost.

Disposal — When Seattle disposes waste, the waste materials are permanently placed in a landfill. Seattle counts beneficial use, alternative daily cover (ADC) and industrial waste stabilizer (IWS) as disposal for the MSW recycling rate calculation.

Beneficial Use — Neither recycled nor reused, the waste materials are used for some other purpose like industrial boiler fuel.

Alternative Daily Cover (ADC) and Industrial Waste Stabilizer (IWS) — ADC refers to materials used to cover the active face of a landfill instead of soil. IWS includes waste materials deposited to provide structure in specialized landfills.

Diversion — This term includes recycling and beneficial use. SPU calculates diversion for the C&D stream.

2.3.3 MSW SECTOR DEFINITIONS

Seattle's MSW waste is generated by four sectors.

- **Residential – Single-Family.** This sector includes waste picked up from homes that have cans or carts picked up at the curb. These are typically single-family homes, up to and including four-plexes.
- **Residential – Multi-Family.** The multi-family sector is for waste picked up from residential buildings or complexes that have dumpster or detachable container service. Typically, these buildings have five or more housing units.
- **Commercial.** This sector includes businesses. Typically, dumpsters are picked up as needed by the account that serves these commercial buildings.
- **Self-Haul.** The self-haul sector is that part of our system where residents and businesses bring various materials for drop-off at city-owned transfer stations.

See Chapter 4, Seattle's MSW System: Managing Discards, section 4.3 for information about the MSW sectors.

2.4 MSW RECYCLING MEASUREMENT

Existing programs are measured by a variety of means depending on the program. SPU's core measurement and reporting is done by MSW sector. We also measure waste prevention to the extent possible. The primary vehicle for reporting recycling progress is the City of Seattle Annual Recycling Report. C&D measurement is not included in the annual calculations of Seattle's progress towards its MSW 60% recycling goal. See Chapter 5, Other Seattle Solid Waste Programs, section 5.1 for information about C&D trends.

2.4.1 RESIDENTIAL DATA

SPU's residential data come from reporting requirements built into our collection contracts. We have data for each truck trip through a Seattle neighborhood to a processing center. Weekly trip data include the total of all materials collected as garbage, recycling, and organics. SPU summarizes the data quarterly (showing monthly data) and posts the summaries on the SPU website.

SPU also conducts periodic studies where materials put out for collection are sorted and measured to determine what is in the collected material. These periodic sorts are called *composition studies*.

The organics collection program is similar in that SPU receives data at the truck trip level from the residential collection contractors. The composition of the organics container (how much is

food waste versus how much is yard waste) is estimated using the [Seattle Discards Model](#), a statistical model that separates out the tons based on historical data relationships.

The oil and electronics collected curbside are tracked via monthly reports from the contractors.

SPU measures onsite (home) organics programs using a variety of information sources. The most important information is that from the Home Organics Survey. SPU conducts this survey every 5 years to update our understanding of home organics practices. Information on how many households compost and grass cycle is combined with other data on average amounts of yard and food waste per household. SPU uses all of these data to estimate the number of tons diverted through the home organics programs. Since we do the Home Organics Survey only every 5 years, estimates for tons diverted remain constant for 5 years until SPU has new data to re-estimate the tons diverted.

2.4.2 SELF-HAUL DATA

Recycling in this sector consists of 1) self-hauled organics (for composting), and 2) a variety of other recyclable materials placed in drop boxes.

SPU uses scale house data (weight and trip) as customers enter the station to measure tons brought into transfer stations for compost. SPU also has data on how much compost material we haul from the stations to processing facilities. Having both sets of data serves as a check on the total tons of compost material. Compost tons are reported quarterly (monthly data) in the Residential Organics Report.

Drop-box recycling tons are weighed when SPU hauls the material to the various processors. Typically, customers who bring in material to recycle do not weigh in their vehicles. Instead, the data source is outbound weight reports from the trucks that haul recyclables away from the stations.

In addition to reporting these data annually as part of the Annual Recycling Report, SPU is required to report the data to the Washington State Department of Ecology.

2.4.3 COMMERCIAL DATA

The primary source of information for the commercial sector comes from annual reports required from recyclers and processors. Recyclers who operate in Seattle must submit the reports as part of their City of Seattle Recyclers Business License. Specifically, recycling businesses must report annual tons recycled, by material, and disposition of the material. Once SPU receives the reports, we analyze them at length to make sure we do not double count tons. (It is common for one recycler to collect material and then transfer it to another processor). The City of Seattle mails a form to recyclers in February with a completion deadline of March 31. For the 2010 report, SPU mailed forms to more than 150 companies.

In addition to the recyclers' reports, SPU receives detailed trip level data for compost and recycling tons collected under our collection contracts. These tons are currently combined with the information from the recyclers' reports and reported in the Annual Recycling Report.

2.4.4 WASTE PREVENTION DATA

SPU's waste prevention programs reduce the amount and toxicity of material entering Seattle's waste system. For the annual recycling rate, we estimate the tons of prevented waste and count them as recycling.

Other than for the home organics programs, SPU tracks waste prevention on a program-by-program basis. We use a variety of methods to measure tons not generated. These methods include the following: self-weighing; pre- and post-intervention surveys (attitudes, behaviors, participation rates); collection data; composition studies; and estimation (modeling). The best approach is to build evaluation methodology into new waste prevention programs and campaigns.

Less waste generated per person would seem to imply more waste prevention. However, it is very difficult to separate the effects of the waste prevention program from other variables like changes in household size, the economy, types of businesses in Seattle, and products.

2.4.5 WASTE COMPOSITION DATA

Waste composition—what mix of materials is going to disposal—is assessed every 4 years, on staggered cycles by sector. These studies sort and weigh the disposed materials into dozens of categories. The studies are available on [SPU's website](#).

The studies contribute key data for the Recycling Potential Assessment (RPA) modeling described in Chapter 4, Seattle's MSW System: Managing Discards, section 4.3. See also Appendix D, Recycling Potential Assessment Model for more RPA detail.

2.4.6 SEATTLE DISCARDS MODEL

The Seattle Discards Model (SDM) is a tool SPU uses to analyze recycling performance. The SDM establishes a relationship between garbage, recycling, and organics (food and yard debris) monthly collection quantities, and the factors that affect (or “explain”) these discards amounts. For instance, one equation in the model estimates the impacts of increased household size or additional household income on the amount of discards that households place in the curbside recycling stream. Another part of the equation estimates the impacts on residential garbage from similar changes.

The SDM contains a set of equations to calculate expected garbage, recycling, and organics discard quantities depending on factors such as:

- Unemployment rate
- Housing prices
- Household size
- Actual status of household income
- Average and marginal fees for collection
- Other factors such as temperature and precipitation

If a new factor (or a shock to the system) emerges, such as the introduction of a disposal ban, the SDM can isolate the tonnage impact of the ban from the other factors that are also affecting waste tonnage.

The SDM includes equations for residential garbage, residential recycling, residential organics, self-haul garbage, and commercial garbage. Each equation has its own set of factors, which explain the various garbage and recycling streams. Variables in the equations have changed over time, but the overall methodology is the same.¹

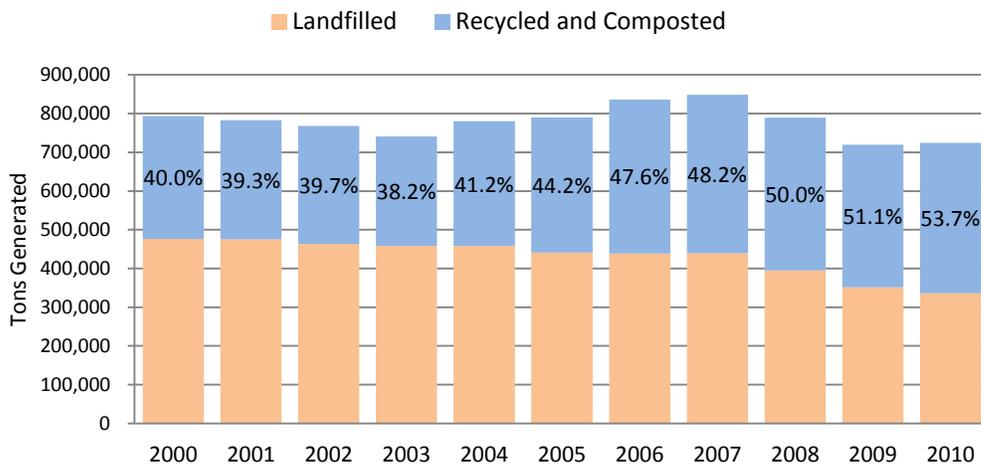
2.5 WASTE & RECYCLING TRENDS

This section describes year-over-year waste and recycling trends in Seattle.

2.5.1 OVERALL MSW TRENDS

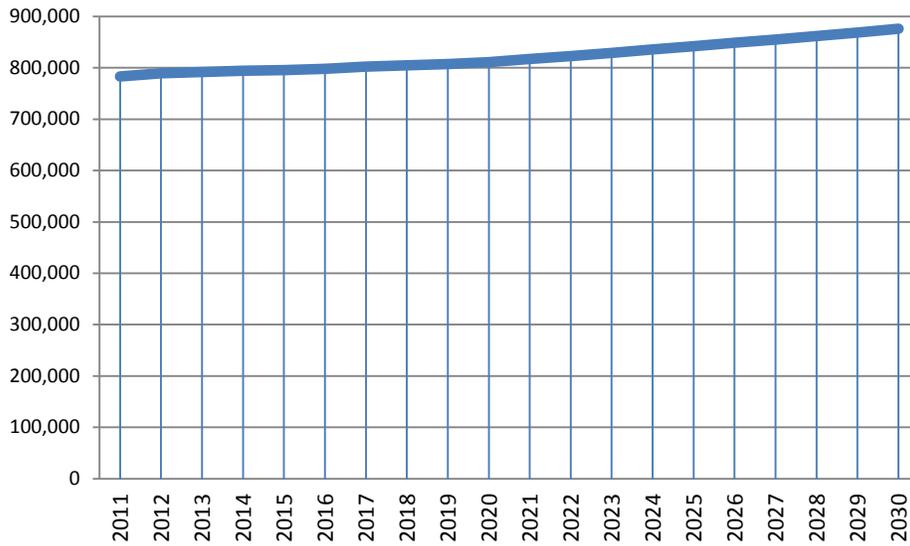
Seattle's overall MSW generation has generally followed economic trends, even as population has steadily increased in our city (Figure 2-1). The overall recycling rate declined the first few years of the past decade then has steadily climbed since 2003. SPU expects overall waste generation to increase gradually over the planning horizon of this Plan (Figure 2-2).

Figure 2-1
Seattle Overall MSW Tons Generated and Recycling Rate



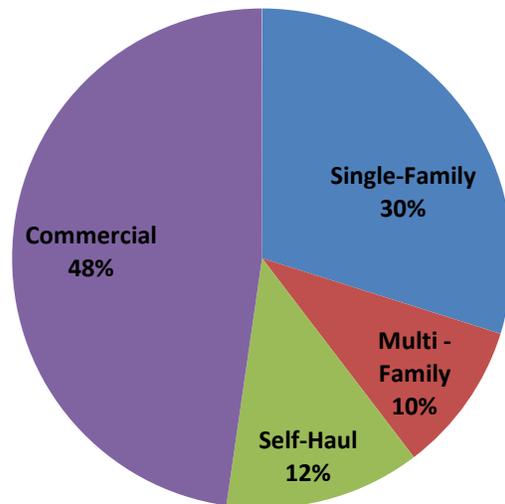
¹A complete technical explanation of the model can be found in “The Seattle Discards Model: An explanatory Model for Garbage, Recycling and Yard Debris Collection and Self Haul Quantities,” SPU, December 2005.

Figure 2-2
Seattle MSW Generation Forecast through 2030



Overall generation is the sum of each sector's share of all discards. Proportionally, shares shift a bit over time. Figure 2-3 shows shares from 2010 and illustrates that the commercial sector generated almost half of Seattle's discards. The single-family sector contributed almost one-third of Seattle's MSW.

Figure 2-3
Total Seattle MSW Generation by Sector for 2010



2.5.2 SECTOR MSW TRENDS

As described in this chapter, SPU [tracks MSW and recycling performance trends](#) by each of the four MSW sectors. The following figures illustrate trends for material amounts entering each sector and recycling performance (Figures 2-4 through 2-7).

Figure 2-4
Single-Family Waste Generated, Recycled, Disposed in Seattle 2000-2010

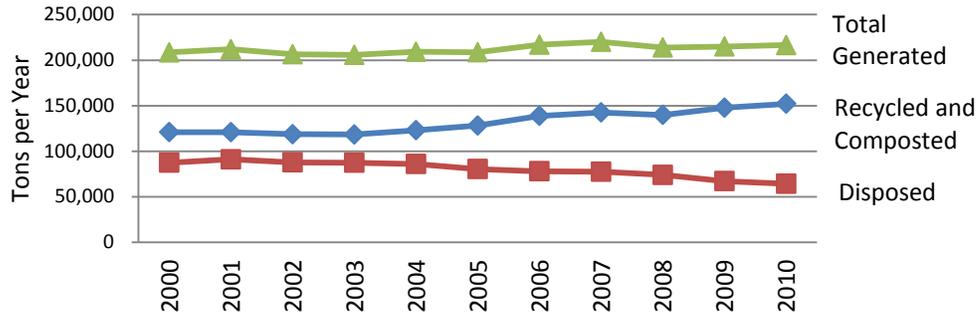


Figure 2-5
Multi-Family Waste Generated, Recycled, Disposed in Seattle 2000-2010

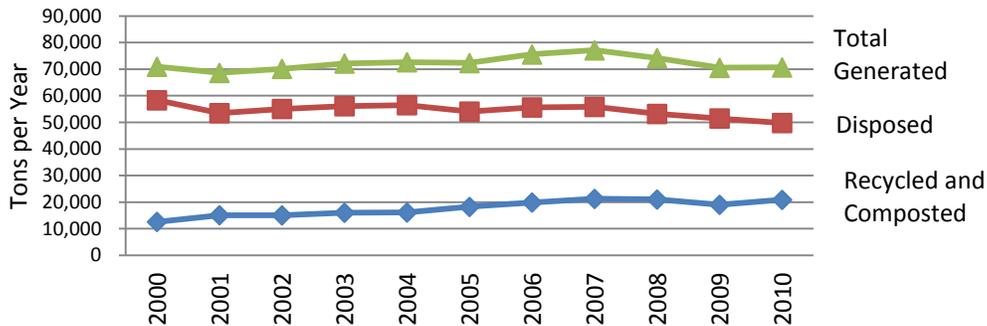


Figure 2-6
Self-Haul Waste Generated, Recycled, Disposed in Seattle 2000-2010

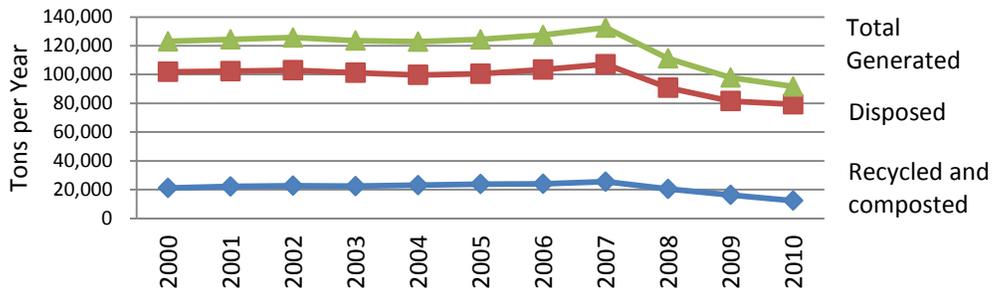
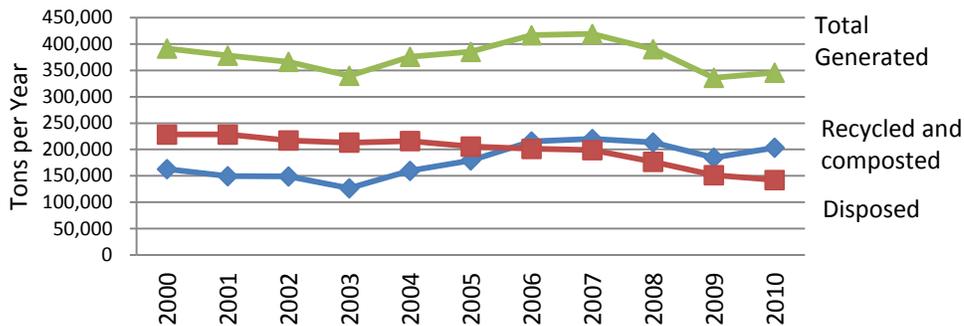


Figure 2-7
Commercial Waste Generated, Recycled, Disposed in Seattle 2000-2010



2.5.3 SECTOR RECYCLING GOAL PROGRESS

Seattle has made substantial progress toward the recycling goals set in the 2004 Amendment. The overall goal was a 60% recycling rate. Within that goal, each sector had its own target (Table 2-3) and varying success toward reaching the target.

Table 2-3
Seattle Recycling Goal Progress 2010

Sector	2000	2002	2004	2006	2008	2010	Goal set 2004
Single-Family	58.0%	57.5%	58.9%	64.0%	65.4%	70.3%	70.0%
Multi-Family	17.8%	21.5%	22.2%	26.3%	28.3%	29.6%	37.0%
Self-Haul	17.2%	18.1%	18.8%	18.8%	18.4%	13.5%	39.0%
Commercial	41.6%	40.7%	42.5%	51.7%	54.7%	58.9%	63.0%
Combined - All Sectors	40.0%	39.7%	41.2%	47.6%	50.0%	53.7%	60.0%

More needs to be done to increase Seattle’s recycling rate. The recycling recommendations in Chapter 4, Seattle’s MSW System: Managing Discards, section 4.3 contain a variety of initiatives to increase recycling in all sectors.