Estimating Factors for Edible Food Disposed by Commercial Edible Food Generators

Last updated: April 13, 2023

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CalRecycle has created this document to assist counties, cities, regional agencies, and special districts in meeting capacity planning requirements under SB 1383. This guidance document accompanies the SB 1383 Edible Food Recovery Capacity Planning Calculator (calculator), which helps estimate the amount of edible food disposed by tier one and tier two commercial edible food generators, as defined in the SB 1383 regulations. CalRecycle updated in 2023 to include the 2021 Generator-Based Waste Characterization Study data.

The calculator is designed for the user to input a factor representing the average pounds of edible food disposed per facility per year (Step 3) for each commercial edible food generator type and then input the number of commercial edible food generators by type (Step 4a). These two values are then multiplied to produce an output showing the estimation of edible food disposed by commercial edible food generator type. Users can reference the guidance in this document to generate the factors for Step 3 of the calculator, or they can use factors derived from other sources, including local waste characterization studies. Users can also provide optional information in Step 4b to estimate edible food disposed by food type (e.g., vegetative, packaged non-perishable, etc.).

This document provides guidance on identifying and assessing existing data sources that can be used in Steps 3 and 4b of the calculator, including multiple tables with

existing data sources. The document is organized into four main sections that address the following topics:

1. Data requirements of the calculator to estimate edible food disposed by commercial edible food generators.
2. Selecting edible food conversion factors for step 3 of calculator.
3. Delineating estimate of edible food disposed by food type for optional step 4b.
4. Tables with potential data to use and details of data limitations.

The calculator is designed to estimate edible food disposed by commercial edible food generators using factors that represent the average amount of food waste by commercial edible food generator type, not using facility or site-specific data. The estimates and data provided in this document represent averages across broad industry groups, meaning that the industry group estimate may include data from facilities that are not commercial edible food generators under SB 1383. Additionally, the amount of edible food disposed may vary widely within an industry group based on many factors, including regional infrastructure and the facility size.

When referencing any potential data sources, one must be careful that the units used in the source are consistent with those used in the calculator. The calculator requires a factor for each commercial edible food generator type in the units of pounds of edible disposed per facility per year, except for large events, which should have data input as the average pounds of edible food disposed per large event. External sources of data are often provided in other units. For example, some datasets come in units of pounds of edible food disposed per employee at a facility per year or pounds of total food waste generated per year.

Section 2.2 provides guidance for converting external data sources to the units used in the calculator. This includes factors for converting per-employee estimates to facility-level estimates and conversion factors for estimating what proportion of total food waste is “edible.”

For clarification on requirements, please reference the edible food recovery regulatory language (14 CCR Division 7, Chapter 12, Article 10) and edible food recovery capacity planning requirements (14 CCR Division 7, Chapter 12, Article 11).

The information and data sources identified below are publicly available or are from currently unpublished CalRecycle data from the 2019 and 2021 Generator-Based Waste Characterization Studies, respectively. CalRecycle does not promote or endorse any specific data source. To aid users in the evaluation of the appropriateness of the data sources to their individual goals, CalRecycle has identified the limitations and assumptions inherent to each source. The data for the 2021 study will be published as a final report for that study on the CalRecycle website. The data for the 2019 study will be included as an appendix to the final report for the 2021 study.

Please contact your CalRecycle Local Assistance and Market Development liaison if you have any additional questions or need further assistance.

Contents

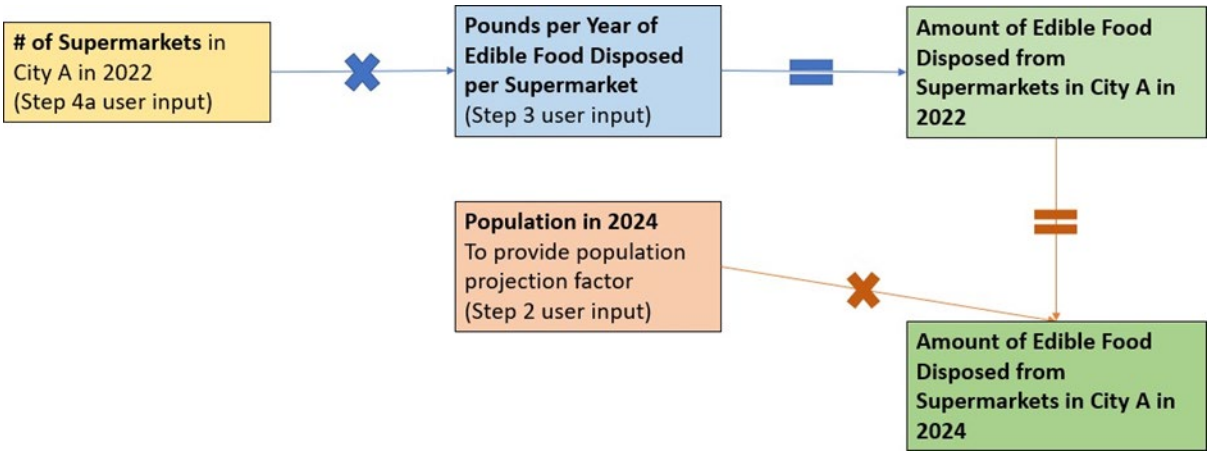
1. Data Requirements of the Calculator

To estimate the annual amount of edible food disposed by commercial edible food generators in a jurisdiction, users of the calculator need to input two key numbers for each type of commercial edible food generator in Steps 3 and 4a:

1) **Step 3**: A factor representing average pounds of edible food disposed per facility per year, by type of commercial edible food generator (e.g., average pounds of edible food disposed per supermarket per year).
2) **Step 4a**: The number of commercial edible food generator facilities of each type in your area (e.g., number of supermarkets in your jurisdiction). (For more information and best management practices for identifying commercial edible food generators, see the guidance document on how to identify tier one and tier two commercial edible food generators.)

The calculator then multiplies these values to estimate the annual amount of edible food disposed by commercial edible food generator type in pounds for the reporting year (see Figure 1 below for an illustration using supermarkets as an example). The calculator will also provide an estimate of edible food disposed in that target year (i.e., the last year of the reporting period) if the user inputs population projections for the target year in Step 2.

Figure 1. Visual Representation of How the Edible Food Recovery Capacity Planning Calculator Works Using the Example of Supermarkets



Large Events

Estimating the amount of edible food disposed by large events in the calculator is slightly different from the other commercial edible food generator types, which use **per facility** inputs. Large events use **per event** inputs, meaning that users should provide a factor for pounds of edible food disposed **per large event** in Step 3 and provide the **number of events** that meet the commercial edible food generator criteria in Step 4a. Events that occur at a large venue should not be considered a large event on their own, because that would result in double counting. Large events should only include events that do not take place at one of the large venues identified as a commercial edible food generator.

2. Selecting Edible Food Disposal Conversion Factors (Step 3 of Calculator)

Users of the calculator can identify appropriate conversion factors to estimate edible food disposed by commercial edible food generator type in Step 3. The focus of this section is to help users identify, select, and modify factors to be used in the calculator.

Users may also opt to utilize factors derived from other sources such as local waste characterization estimates.

The calculator requires a factor for each commercial edible food generator type in the units of **pounds of edible food disposed per facility per year**, except for large events, as described in the previous section. Datasets are often provided in other units (e.g., pounds of food waste per employee per year). Additionally, these estimates may capture more than just edible food disposed (e.g., total food waste generation). The calculator was designed to only input the pounds of edible food disposed per year, per generator type.

The next sub-section (2.1) provides information on existing datasets that can be used to estimate pounds of edible food disposed per facility per year. This includes major limitations to consider when users are deciding which data to use. Sub-sections 2.2 and

2.3 of this document will guide the user through converting that data into the units required for the calculator after the most appropriate data source is selected.

There is no single existing dataset available from CalRecycle or other entities that can provide the disposal information specific to every commercial edible food generator type. As a result, users must decide which data to use and adjust, as necessary, based on which assumptions are most applicable to their capacity planning purposes.

2.1 Available Data by Type of Commercial Edible Food Generator

This section provides information on three available datasets with estimates of food waste for industry groups that include commercial edible food generators (see Table 1). No dataset provides all the necessary estimates. Thus, the user must decide which data points to use by commercial edible food generator type based on the data availability and the main limitations. Additionally, the datasets are limited because they represent broad industry groups that may include facilities that are not considered commercial edible food generators.

Table 1 provides a set of estimates relevant to commercial edible food generator types for each dataset. Each study is limited to one column, while each commercial edible food generator type has its own row to allow for comparison between reported estimates. The main limitations or assumptions have been identified for each source and are presented as footnotes to Table 1. Reference the original dataset (links provided below) for more data and detailed information on the methodologies and limitations.

If usable data for a commercial edible food generator type was not identified within a given study, the corresponding cell has been marked n/a. It should be noted that Table 1 does not provide an exhaustive list of data provided by each dataset. Users of the tool

can choose to use the factors for restaurants or identify another data point that can serve as a proxy. For example, if the main food service providers in your area serve colleges and universities, an estimate for food waste at colleges and universities, such as the one provided in the Natural Resources Defense Council reports, may be applicable.

The remainder of this sub-section provides brief summaries for each of the identified datasets.

Dataset 1: CalRecycle's 2021 Generator-Based Waste Characterization Study

The 2021 CalRecycle Generator-Based Waste Characterization Study provides estimates in the proper units for the calculator (average pounds of edible food disposed per generator per year) for ten commercial edible food generator types. The sample sizes vary among industry groups, from a high of 42 samples from K-12 Schools to a low of 3 from Hospitals. While some sample sizes are small, the estimates were created by direct measurement of food waste as generators within California in 2021, thus the data reflects California-specific generators. Samples were collected on-site from selected industry groups, and food waste was sorted into eight categories based on edibility and type. These categories were consistent with those used in the 2019 study described below. Sampling for this study occurred during the COVID-19 pandemic and some figures, such as those for Supermarkets and Grocery Stores, may have been influenced by conditions unique to these circumstances. For example, a higher percentage of individually packaged foods were prepared and sold by this industry group due to the COVID-19 pandemic, which would be reported as potentially donatable during the sorting process. For more information on how food waste was sorted into categories, see sub-section 2.2.1 or the materials list of the 2018 Disposal Facility-Based Characterization of Solid Waste in California.

Dataset 2: CalRecycle's 2019 Generator-Based Waste Characterization Sub-Study

Like the 2021 study above, the 2019 CalRecycle Generator-Based Waste Characterization sub-study provides estimates in the proper units for the calculator (average pounds of edible food disposed per generator per year) for some commercial edible food generator types. Although these estimates are based on small sample sizes, the estimates were created by direct measurement of food waste at generators across California in 2019, thus the data reflects California-specific generators. Samples were collected on site from a small number of industry groups, and food waste was sorted into eight categories based on edibility and type. For more information on how food waste was sorted into categories, see sub-section 2.2.1 or the materials list of the 2018 Disposal Facility-Based Characterization of Solid Waste in California.

Dataset 3: Reports by the Natural Resources Defense Council (NRDC)

The NRDC released a report entitled "Estimating Quantities and Types of Food Waste at the City Level: Technical Appendices" in 2017. This report provides detailed information on the methodology used to estimate how much food was wasted in three U.S. cities. NRDC provides their own estimates and documents sources of other

estimates from various studies across the United States used in their analysis. The estimates are for food waste generation (or total food waste), not just food that is landfill disposed. The estimates in Table 1 are the amount of food waste per employee, visitor, bed, or sales revenue. Please reference Appendices K and L in the NRDC report for other data and more information on the sources.

The NRDC also released a report entitled "Modeling the Potential to Increase Food Rescue: Denver, New York City, and Nashville" in 2017 which estimated the amount of food recoverable for human consumption in three cities. Some differences exist among various sources in the definition of recoverability as it relates to human consumption as noted in section 2.2. Estimates included in the narrative of the report are used to provide estimates of the amount of total food waste that is recoverable by industry group (see Table 2)

2.2 What is "Edible Food Disposed"? Ensuring Factors Capture the Appropriate Numbers

Under SB 1383, capacity planning for edible food recovery requires counties, cities, regional agencies, and special districts that provide solid waste collection services to estimate the amount of edible food disposed by commercial edible food generators. Per the regulatory definition, food considered "edible" must be intended for human consumption. The regulatory definition also specifies, however, that nothing in the regulations requires or authorizes the recovery of edible food that does not meet the food safety requirements of the California Retail Food Code.

To estimate the amount of edible food disposed by commercial edible food generators, it is important to recognize that "edible food disposed" is a subset of total food waste.

Specifically, factors input into the calculator should only include the **edible portion** of food waste **sent to landfill disposal**, in alignment with SB 1383. Many published estimates include more than the edible portion, including estimates of total food waste that include all food materials that are disposed. Some estimates of edible food wasted may use a definition of "edible food" different from the definition under SB 1383. For example, some definitions of edible food simply indicate whether the food *could have been eaten* and not whether the food could be safely recovered prior to the point of disposal. With this approach, a partially eaten burrito would be considered edible but not recoverable. Additionally, some estimates of food waste include food sent to destinations other than landfill disposal (e.g., composting); thus, estimates may need to be altered to only include landfill disposal.

Users can estimate what proportion is "edible food disposed" from estimates that include other end-of-life destinations or food waste that would not be considered edible and recoverable under SB 1383. The two following sub-sections provide methods to ensure factors input into Step 3 capture "edible food disposed," focusing on edibility and disposal.

2.2.1 Considering Only "Edible" Food: Potentially Donatable and Recoverable Food Waste

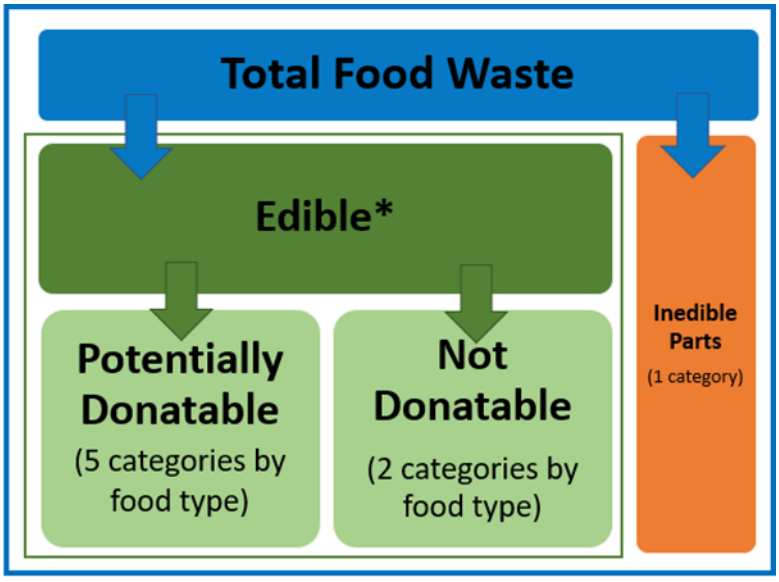
Table 2 provides factors for converting estimates of total food waste only to include the "edible" portion using either CalRecycle or NRDC data. The CalRecycle dataset

provides factors for converting total food waste to “potentially donatable” food waste, while one NRDC report provides a range of estimates of the proportion of food waste that is “recoverable,” meaning that it could have been recovered safely for human consumption.

CalRecycle’s 2018 Disposal Facility-Based Waste Characterization Study first captured the concept of edibility by first delineating between edible food and inedible parts (e.g., banana peels or eggshells) (see Figure 2). The use of this concept is continued in both the 2019 and 2021 Generator-Based Waste Characterization Studies. Within edible food, discarded food is characterized as being “potentially donatable” or “non-donatable” based on whether it was likely that the food could have been safely recovered for human consumption prior to discard. Potentially donatable categories include items discarded whole or in a manner that would have made it potentially recoverable (e.g., discarded in unopened original packaging), in contrast, non-donatable categories include items partially eaten or discarded in open packages.

For the purposes of the calculator, “edible food” is considered food intended for human consumption while acknowledging that commercial edible food generators shall only recover edible food that meets the food safety requirements of the California Retail Food Code, similar to the guidelines for potentially donatable food as defined in the study.

Figure 2. Eight Categories of Food Waste in CalRecycle’s Waste Characterization Studies from 2018 to present, by Edibility and Food Type



*May contain some inedible parts. Specifically, items thrown away whole (e.g., a whole watermelon) would be considered “potentially donatable” but would include some inedible parts (e.g., the watermelon rind).

The NRDC report “Modeling the Potential to Increase Food Rescue: Denver, New York City, and Nashville” provides ranges for the portion of total food waste that is “recoverable,” meaning that it can be safely recovered prior to discard (see Table 2).

Both the NRDC and CalRecycle datasets only include information for some of the commercial edible food generator types defined by SB 1383. If no industry-specific factor is available, users of the calculator tool can use the estimate for the California commercial sector derived from the 2018 Disposal Facility-Based CalRecycle Waste Characterization Study. That study estimated that 22 percent of total food waste disposed in the commercial sector was potentially donatable. Although users could apply this percentage across all commercial edible food generator types (see Example 1 below), this may lead to overestimations of edible food waste as the proportion of total food waste that is recoverable varies significantly by generator type.

Example 1. Converting Total Food Waste to Edible Food Waste

$$\left(\frac{\text{\# pounds of food waste disposed}}{\text{per supermarket per year}}\right)\left(\frac{\text{22\% edible food}}{\text{100\% of food waste disposed}}\right)$$

$$=\left(\frac{\textbf{pounds edible food disposed}}{\textbf{per supermarket per year}}\right)$$

2.2.2 Considering Only Food Waste "Disposed"

Users should only consider food waste that is disposed in a landfill. Food waste sent to composting or other recycling activities should not be included in the calculation. If a user wants to use an estimate for food waste that includes discard destinations other than landfill disposal, they can use a conversion factor that estimates the proportion of total food waste that is disposed to a landfill (see Example 2).

What proportion of total food waste generation is sent to landfill disposal may vary significantly by region or waste management infrastructure. In an area with limited collection of food materials for recycling, total food waste generation may be essentially the same as food waste disposal. In areas with robust collection services, a significant proportion of total generation may go to organics recycling, not disposal. Users should choose a factor that makes sense, given regional infrastructure.

CalRecycle's 2014 Generator-Based Characterization of Commercial Sector Disposal and Diversion in California estimated the recovery rate of many "standard recoverable materials" in commercial curbside collection. It was estimated that 7.5 percent of food waste generated by the commercial sector was recovered through curbside commercial organics collection, meaning that 92.5 percent of the food was disposed (see Example 2). The major limitations of using this estimate are that it represents the entire commercial sector rather than specifically identified commercial edible food generators. Further, the data was estimated in 2014, making it potentially outdated. The 2014 Generator-Based Study also provides some estimates on recovery rate by broad industry groups, such as Medical & Health; and Food & Nondurable Wholesale Manufacturing.

Example 2. Converting Total Food Waste to Food Waste Disposed

$$\left(\frac{\text{\# pounds of food waste generation}}{\text{per supermarket per year}}\right)\left(\frac{\text{92.5\% landfill disposal}}{\text{100\% of food waste generation}}\right)$$

$$=\left(\frac{\textbf{pounds food disposed}}{\textbf{per supermarket per year}}\right)$$

2.3 Converting Data from Amount Per Employee to Edible Food Disposed Per Facility

The calculator requires that users provide factors estimating the average amount of edible food disposed by commercial edible food generator type in the units of **pounds per facility per year**. Some existing data sources, including the NRDC data, provide estimates in other units, such as **pounds per supermarket employee per year**. In this example, food waste estimates are normalized by the number of employees. However, other estimates normalize the estimates by sales (in dollars), square footage, or other factors.

To use a normalized estimate of food waste as a factor in the calculator, the user must first convert the estimate to **pounds per facility per year**. To do this, a conversion factor is needed. Using the example of a per-employee estimate, the conversion factor would transform the estimate from a per-employee number to a per-facility number. In this case, the conversion factor would be the average number of employees per facility. Given that per-employee estimates are the most common type of normalized estimate, CalRecycle provides more detail below on how to convert from a per-employee to a per-facility estimate, including potential sources of data to allow for that conversion (see Table 3).

California's Employment Development Department's (EDD) Quarterly Census of Employment and Wages Data Search Tool provides annual and quarterly information on employment, including the number of establishments and average monthly employment by ownership (e.g., privately owned, government owned). This data is provided at the statewide level and by county. Information and estimates are provided by industry group using the North American Industry Classification System (NAICS) Code, which is a standardized business group classification system. Some NAICS codes encompass industry groups that are broader than the type of commercial edible food generator, thus estimates will also include non-targeted entities.

For example, the NAICS code 445110 is for "Supermarkets & Other Grocery Stores Except Convenience Stores," which includes supermarkets and grocery stores that meet the minimum threshold to be considered a tier one commercial edible food generator as well as grocery stores that do not meet the minimum threshold. Additionally, data from EDD is not available for every type of commercial edible food generator because specific NAICS codes do not exist for every industry group.

See Table 3 for a list of NAICS codes associated with each commercial edible food generator type. The table also includes statewide factors for number of establishments in California and average employees per establishment using 2021 EDD data for

privately owned establishments. For local education agencies, data for both private and local public schools was included.

Data on number of employees and number of establishments is also available for counties and metropolitan areas through EDD. To use this data to determine a factor of average employees per facility, divide the data on number of employees by the number an issue that tends to be magnified for small counties and small industry groups. In this case, users could opt to use the statewide factors provided in Table 3. This issue tends to be magnified for small counties and small industry groups. In this case, users could opt to use the statewide factors provided in Table 3.

In some cases, when data is suppressed by EDD (e.g., warehouse clubs and supercenters with NAICS code 452910), data on the number of establishments and employees in the county and metropolitan area is available from the U.S. Census' Retail Trade information.

Information on the number of employees at state agencies in California can be found in the State Agency Waste Management Annual Reports tracked by the State Agency Reporting Center (SARC). Users can search for state agencies by name, zip code, or city. Each report provides information on the number of employees.

Example 3. Converting Normalized Food Waste Estimates to Per Facility Estimates

$$\left(\frac{\text{\# pounds edible food disposed}}{\text{per supermarket employee per year}}\right)\left(\frac{\text{39 employees}}{\text{per average supermarket}}\right)$$

$$= \left(\frac{\textbf{pounds edible food disposed}}{\textbf{per average supermarket per year}}\right)$$

2.4 Example of the Converting Estimates to Appropriate Units for Calculator

For illustrative purposes, an example is provided below for converting the available data from NRDC to the appropriate units.

The NRDC's report estimates that approximately 3,000 pounds of food waste is generated per supermarket employee per year. To convert to the needed units, first, multiply those 3,000 pounds by the average number of supermarket employees per facility to get an estimate of pounds of food waste generation per supermarket. In this case, statewide EDD data results in an estimate of an average of 39 employees per supermarket in 2021 (see Table 3). Then, to convert from food waste generation to food waste disposed, then 50 percent disposal of food is provided as an estimate, given a robust organics collection system in our hypothetical jurisdiction. Finally, to convert from total food waste disposed to edible food waste disposed, multiply by a conversion factor estimating 29 percent of total food waste disposed was potentially donatable or "edible." That estimate is from the CalRecycle 2019 generator study for supermarkets and grocery stores (see Table 2).

Example 4. Converting NRDC Data to Needed Units and Boundaries

$$\left(\frac{\text{3,000 pounds of food waste generation}}{\text{per supermarket employee per year}}\right)\left(\frac{\text{39 supermarket employees}}{\text{supermarket facility}}\right)$$

$$\left(\frac{\text{50\% food waste disposed}}{\text{100\% of food waste generation}}\right)\left(\frac{\text{29\% edible food}}{\text{100\% of food waste disposed}}\right)$$

$$=\left(\frac{\textbf{16,965 pounds edible food disposed}}{\textbf{per supermarket per year}}\right)$$

3 Delineating Estimate of Edible Food Disposed Further by Food Type (Step 4b - Optional)

Although not required by SB 1383, Step 4b provides an optional function to split the total edible food disposed into food types. This information may be helpful to jurisdictions in assessing edible food recovery capacity needs and planning for food recovery infrastructure. Expanded food recovery capacity could include increasing the number of refrigerated vehicles, cold storage, kitchen space, or staffing.

For the tool to estimate totals by food type, the calculator requires the user to provide information on the percentage of each food type of total edible food disposed. Users should confirm that these percentages sum to 100 percent for each commercial edible food generator type. The food types included in the calculator are defined in CalRecycle's 2018 Disposal Facility-Based Waste Characterization Study and are as follows:

1) Vegetative
2) Meat
3) Eggs, Dairy, and Dairy Alternatives
4) Cooked/Baked/Prepared Perishable Items
5) Packaged Non-Perishable

The 2018 CalRecycle Disposal Facility-Based Waste Characterization Study provides estimates by type on the proportions of potentially donatable food waste disposed in the entire commercial sector, rather than just commercial edible food generators (see Table 4 for statewide commercial sector proportions). These numbers can be used across all commercial edible food generator types. However, the major limitation of this method is that the proportion of total food waste by type can vary significantly by generator type.

The 2019 CalRecycle Generator-Based Waste Characterization Sub-Study also provides estimates on the proportion of potentially donatable food disposed by food type for supermarkets and grocery stores, full-service restaurants, and merchant wholesalers (see Table 5). The 2021 CalRecycle Generator-Based Waste Characterization Study provides this information across ten industry groups (See Table 6).

4 Tables with Potential Data to Use & Details of Data Limitations

Table 1. Estimates for Food Waste from Various Sources (Units of Estimates Vary by Source)

Commercial Edible Food Generator Type	**2021 Generator-Based Waste Characterization Study** (pounds of *potentially donatable* food waste per facility per year)	**2019 Generator-Based Waste Characterization Study** (pounds of *potentially donatable* food waste per facility per year)	**Natural Resources Defense Council** (pounds of food waste per employee/revenue/bed/visitor per year)
Tier one: Supermarkets	33,000 pounds per facility per year (factor for Supermarkets and Grocery Stores)	9,300 pounds per facility per year (factor for Supermarkets and Grocery Stores)	3,000 pounds of food waste **per employee** per year (factor for Grocers & Markets)
Tier one: Grocery stores with a total facility size equal to or greater than 10,000 square feet	33,000 pounds per facility per year (factor for Supermarkets and Grocery Stores)	9,300 pounds per facility per year (factor for Supermarkets and Grocery Stores)	3,000 pounds of food waste **per employee** per year (factor for Grocers & Markets)
Tier one: Food service providers	1,200 pounds per facility per year	n/a	n/a
Tier one: Food distributors	87,000 pounds per facility per year	128,000 pounds per facility per year (factor for Merchant Wholesalers)	0.01 pounds of food waste **per dollar of revenue** per year) (factor for Food Wholesalers & Distributors)
Tier one: Wholesale food vendors	n/a	128,000 pounds per facility per year (factor for Merchant Wholesalers)	0.01 pounds of food waste **per dollar of revenue** per year) (factor for Food Wholesalers & Distributors)
Tier two: Restaurants with 250 or more seats or a total facility size equal to or greater than 5,000 square feet	3,700 pounds per facility per year	1,900 pounds per facility per year (factor for Full-Service Restaurants)	3,000 pounds of food waste **per employee** per year (factor for Food Service Sector)
Tier two: Hotels with an on-site food facility and 200 or more rooms	26,000 pounds per facility per year	n/a	1,984 pounds of food waste **per employee** per year (factor for Hospitality – Hotels)

Commercial Edible Food Generator Type	**2021 Generator-Based Waste Characterization Study** (pounds of *potentially donatable* food waste per facility per year)	**2019 Generator-Based Waste Characterization Study** (pounds of *potentially donatable* food waste per facility per year)	**Natural Resources Defense Council** (pounds of food waste per employee/revenue/bed/visitor per year)
Tier two: Health facilities with an on-site food facility and 100 or more beds	7,800 pounds per facility per year	n/a	3.42 pounds of food waste **per bed** per day (factor for Hospitals) 1.8 pounds of food waste **per bed** per day (factor for Nursing Homes)
Tier two: Large Events	n/a	n/a	0.6 pounds of food waste **per seat** per day OR 0.45 pounds of food waste **per visitor** (factor for Events & Recreation facilities)
Tier two: Large Venues	34,000 pounds per facility per year	n/a	0.6 pounds of food waste **per seat** per day OR 0.45 pounds of food waste **per visitor** (factor for Events & Recreation facilities)
Tier two: State agencies with a cafeteria with 250 or more seats or a total cafeteria size equal to or greater than 5,000 square feet	4,200 pounds per facility per year	n/a	5 to 80 pounds of food waste per corporate/business employee per year (range from directly measured data on Corporate Cafeterias/Breakrooms)
Tier two: Local education agencies with an on-site food facility	32,000 pounds per facility per year	n/a	0.15 tons per employee per year (factor for K-12 Schools)

(1) Data from the 2019 and 2021 Generator-Based Waste Characterization Studies only include potentially donatable food waste, while estimates from the NRDC are for total food waste. (2) The figures for both Grocery Stores and Supermarkets for the 2021 Generator-Based Waste Characterization Study exclude two large outliers. (3) The conversion factors provided in the NRDC's Technical Appendices of the NRDC's Report on Estimating Quantities and Types of Food Waste

are mostly derived from other sources (more information can be found in Appendix L of the report). NRDC also conducted direct measurements of a small number of businesses to estimate food waste (see more information see Appendix K of the report). Due to a lack of data, a range using NRDC data is provided for state agencies based on NRDC measurement. "Food service provider" is a defined tier one Commercial Edible Food Generator under SB 1383. The term "food service sector" is a generic term used to encompass facilities that serve food for immediate consumption, such as restaurants.

Major Data Limitations: (1) The CalRecycle 2021 and 2019 Generator-Based Waste Characterization Studies had small sample sizes; (2) These sources provide estimates for broad industry groups that may include facilities that do not fit the definition of a tier one or tier two Commercial Edible Food Generator – see the description of the industry group in parentheses after each estimate; (3) Data from NRDC is not specific to California; (4) Due to lack of data that distinguishes by commercial edible food generator type, multiple commercial edible food generator types use the same factors for food waste estimates. Supermarkets and grocery stores that meet the tier one requirements use the same factor, and food distributors and wholesale food vendors are assumed to have the same factor; (5) The CalRecycle estimate for food distributors and merchant wholesale food vendors is based on sampling from facilities that vary widely in size, including large facilities that increased the average estimate significantly. Excluding the largest facility decreases the estimate to 47,000 pounds per facility per year. Consider using that estimate if your area has smaller facilities.

Table 2. Conversion Factors for Converting Total Food Waste to Edible, Recoverable, or Potentially Donatable Food Waste

Commercial Edible Food Generator Type	CalRecycle 2021 Generator Study	CalRecycle 2019 Generator Study	Natural Resources Defense Council (NRDC)
Tier one: Supermarkets	45% of total food waste was potentially donatable	29% of total supermarket/grocery store food waste was potentially donatable	More than 1/3 of total food waste may be recoverable (factor for Grocery)
Tier one: Grocery stores with a total facility size equal to or greater than 10,000 square feet	45% of total food waste was potentially donatable	29% of total supermarket/grocery store food waste was potentially donatable	More than 1/3 of total food waste may be recoverable (factor for Grocery)
Tier one: Food service providers	5% of total food waste was potentially donatable	n/a	n/a
Tier one: Food distributors	68% of total food waste was potentially donatable	n/a	n/a
Tier one: Wholesale food vendors	n/a	73% of total merchant wholesaler food waste was potentially donatable	n/a
Tier two: Restaurants with 250 or more seats or a total facility size equal to or greater than 5,000 square feet	9% of total food waste was potentially donatable	6% of total full-service restaurant food waste was potentially donatable	1 to 3% of total food waste may be recoverable (factor for restaurants)
Tier two: Hotels with an on-site food facility and 200 or more rooms	28% of total food waste was potentially donatable	n/a	5 to 10% of total food waste may be recoverable (factor for Hospitality and Healthcare)
Tier two: Health facilities with an on-site food facility and 100 or more beds	26% of total food waste was potentially donatable	n/a	5 to 10% of total food waste may be recoverable (factor for

Commercial Edible Food Generator Type	CalRecycle 2021 Generator Study	CalRecycle 2019 Generator Study	Natural Resources Defense Council (NRDC)
			Hospitality and Healthcare)
Tier two: Large Events	n/a	n/a	n/a
Tier two: Large Venues	22% of total food waste was potentially donatable	n/a	n/a
Tier two: State agencies with a cafeteria with 250 or more seats or a total cafeteria size equal to or greater than 5,000 square feet	10% of total food waste was potentially donatable	n/a	n/a
Tier two: Local education agencies with an on- site food facility	48% of total food waste was potentially donatable	n/a	Up to 16% of total food waste is recoverable (factor for K-12 Schools)

Major Data Limitations: (1) Both the CalRecycle 2019 and 2021 Generator-Based Waste Characterization Studies data rely upon small sample sizes and are not representative of the entire industry group in California; (2) All three sources provide estimates for broad industry groups that may include facilities that do not fit the definition of a tier one or tier two commercial edible food generator; and (3) Data from NRDC is not specific to California and was found in the narrative of the report entitled "Modeling the Potential to Increase Food Rescue: Denver, New York City, and Nashville."

Table 3. NAICS Codes and 2021 Statewide Factor for Employees Per Establishment from EDD

Commercial Edible Food Generator Type	Associated NAICS Code	2021 Statewide Number of Establishments by NAICS Code	2021 Average Statewide Factors for Employees Per Establishment by NAICS Code
Tier one: Supermarkets	445110 (Supermarkets & Other Grocery Stores Except Convenience Stores) and 452311 (Warehouse Clubs and Supercenters)	For 44510: 7,737 establishments For 452311: 460 establishments	For 44510: 39 employees/establishment For 452311: 240 employees/establishment
Tier one: Grocery stores with a total facility size equal to or greater than 10,000 square feet	445110 (Supermarkets & Other Grocery Stores Except Convenience Stores)	7,737 establishments	39 employees/ establishment
Tier one: Food service providers	722310 (Food Service Contractors)	2,037 establishments	16 employees/ establishment
Tier one: Food distributors	4244 (Grocery and Related Product Merchant Wholesalers)	6,145 establishments	17 employees/ establishment
Tier one: Wholesale food vendors	4244 (Grocery and Related Product Merchant Wholesalers)	6,145 establishments	17 employees/ establishment
Tier two: Restaurants with 250 or more seats or a total facility size equal to or greater than 5,000 square feet	722511 (Full-service Restaurants), 722513 (Limited-service Restaurants), and 722514 (Cafeterias, Grill Buffets, and Buffets)	For 722511: 30,140 establishments For 722513: 31,214 establishments For 722514: 599 establishments	For 722511: 17 employees/ establishment For 722513: 17 employees/ establishment For 722514: 10 employees/ establishment
Tier two: Hotels with an on-site food facility and 200 or more beds	72111 (Hotels and Motels except casino hotels)	6,038 establishments	24 employees/ establishment

Commercial Edible Food Generator Type	Associated NAICS Code	2021 Statewide Number of Establishments by NAICS Code	2021 Average Statewide Factors for Employees Per Establishment by NAICS Code
Tier two: Health facilities with an on- site food facility and 100 or more rooms	6221 (General Medical and Surgical Hospitals)	554 establishments	676 employees/ establishment
Tier two: Large Events	n/a	n/a	n/a
Tier two: Large Venues	n/a	n/a	n/a
Tier two: State agencies with a cafeteria with 250 or more seats or a total cafeteria size equal to or greater than 5,000 square feet	n/a	n/a	n/a
Tier two: Local education agencies with an on-site food facility	611110 (Elementary and Secondary Schools)	15,922 establishments	52 employees/ establishment

Using 2021 EDD statewide data on number of employees and number of establishments. Data is also available for counties and metropolitan areas. Data provided in this table is for the private sector, excluding government-owned establishments, except for local education agencies. The estimate for local education agencies includes establishments that are privately owned and local government- owned. Major Limitations: (1) NAICS codes are not specifically available for every type of commercial edible food generator; and (2) Some NAICS codes include facilities that are not considered commercial edible food generators.

Table 4. Breakdown of Potentially Donated Food Waste Disposed by Food Type for the Commercial Sector from 2018 and 2021 Disposal-Facility-Based Waste Characterization Study

Potentially Donatable Food Type	Percent of All Potentially Donatable Food Waste Disposed to Landfill by Food Type in 2021	Percent of All Potentially Donatable Food Waste Disposed to Landfill by Food Type in 2018
Vegetative	39%	54%
Meat	8%	8%
Eggs, Dairy, and Dairy Alternatives	8%	6%
Cooked/Baked/Prepared Perishable Items	7%	11%
Packaged Non-Perishable	39%	21%

The data above is from the 2018 Disposal Facility-Based Characterization of Solid Waste in California and the 2021 Disposal-Facility-Based Characterization of Solid Waste in California for the commercial sector. The major limitation with using this data in Step 4b is that it does not delineate by commercial edible food generator type. There are likely large differences in the composition of food waste, depending on commercial edible food generator type.

Table 5. Breakdown of Total Potentially Donatable Food Waste Disposed by Food Type from 2019 Generator-Based Waste Characterization Sub-Study for Commercial Edible Food Generator Types included in That Study.

Potentially Donatable Food Type	Percent of All Potentially Donatable Food Waste Disposed to Landfill by Food Type for Supermarkets and Other Grocery Stores	Percent of All Potentially Donatable Food Waste Disposed to Landfill by Food Type for Merchant Wholesalers	Percent of All Potentially Donatable Food Waste Disposed to Landfill by Food Type for Full-Service Restaurants
Vegetative	61%	77%	45%
Meat	8%	0%	33%
Eggs, Dairy, and Dairy Alternatives	7%	6%	0%
Cooked/Baked/Prepared Perishable Items	18%	9%	14%
Packaged Non-Perishable	6%	9%	8%

Major Data Limitations: (1) The CalRecycle 2019 Generator-Based Waste Characterization Study data relies upon small sample sizes and is not representative of the entire industry group in California.

Percent of All Potentially Donatable Food Waste Disposed to Landfill by Food Type for:	Vegetative	Eggs, Dairy, and Dairy Alternatives	Meat	Cooked/Baked/ Prepared Perishable Items	Packaged Non-Perishable
Tier one: Food distributors	50%	1%	< 1%	1%	< 1%
Tier one: Food service providers	< 1%	1%	0%	< 1%	< 1%
Tier one: Supermarkets	7%	4%	2%	6%	2%
Tier two: Health facilities with an on-site food facility and 100 or more beds	< 1%	4%	0%	2%	< 1%
Tier two: Hotels with an on-site food facility and 200 or more rooms	1%	1%	< 1%	9%	< 1%
Tier two: Large venues	< 1%	2%	< 1%	2%	1%
Tier two: Local education agencies with an on-site food facility.	6%	10%	< 1%	8%	4%
Tier two: Restaurants with 250 or more seats or a total facility size equal to or greater than 5,000 square feet	1%	< 1%	< 1%	< 1%	1%

Percent of All Potentially Donatable Food Waste Disposed to Landfill by Food Type for:	Vegetative	Eggs, Dairy, and Dairy Alternatives	Meat	Cooked/Baked/ Prepared Perishable Items	Packaged Non-Perishable
Tier two: State agencies with a cafeteria with 250 or more seats or a total cafeteria size equal to or greater than 5,000 square feet	2%	< 1%	< 1%	1%	1%

Major Data Limitations: (1) The CalRecycle 2021 Generator-Based Waste Characterization Study data relies upon small sample sizes and is not representative of the entire industry group in California.