

MARYLAND DEPARTMENT OF THE ENVIRONMENT

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Maryland Food Residual Generation Factor Estimates by Industry Sector

The following was developed by the Maryland Department of the Environment (Department) as a guide to support a variety of industry sectors in the determination of whether a facility has generated food residuals that meet the thresholds identified [2021 House Bill HB264/Senate Bill 483 – Organics Diversion - Food Residuals](#). If a facility meets the thresholds, they may be required to divert food residuals if they also meet the other criteria listed in the law. The methodologies in this guide are based on published research and conversion factors from other federal and state agencies, which are referenced in [Appendix A](#).

Categories are broken down by industry sector type, this document includes:

[Manufacturing and Processing](#)
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Manufacturing and Processing

This methodology is for facilities in the food and beverage manufacturing and processing sectors. NAICS codes 311XXX *Food Manufacturing* and 3121XX *Beverage*, excluding animal food manufacturing.

Value	Generation Factor	Measurement	Source
<i>Total yearly sales in \$</i>	0.095	lbs/sales \$/yr*	EPA

*to convert to ton/week

total yearly sales in dollars x (0.095 ÷ 2000 ÷ 52) = _____ **ton/week**

Utilizing the waste generation factor provided by the EPA's 2020 Wasted food measurement methodology scoping memo, the Department identifies that if a facility under this section has:

- total yearly sales of \$2.2 million or greater, meet the January 1, 2023 threshold of 2 tons/week of food residuals
- total yearly sales of \$1.1 million or greater, meet the January 1, 2024 threshold of 1 ton/week of food residuals

Supermarket, Mini-Mart, Bodega, Grocery Store

This methodology is for facilities in the *Supermarket* (SIC 5411-0100, 0101, 0103, 9901) and *Grocery Store* (SIC 5411-0000, 9902, 9904, 9905) sectors

Value	Generation Factor	Measurement	Source
<i># of full-time employees, annually</i> [^]	3,000	lbs/employee/yr*	Massachusetts

*to convert to ton/week

$$\# \text{ of full-time employees, annually}^{\wedge} \times (3000 \div 2000 \div 52) = \text{_____ ton/week}$$

- 70, or more, full-time employed (annually), meet the January 1, 2023 threshold of 2 tons/week of food residuals
- 35, or more, full-time employees (annually), meet the January 1, 2024 threshold of 1 ton/week of food residuals
- [^] note: every 2 part-time employees are equivalent to 1 full-time employee

Supercenters

This methodology is for facilities in the NAICS code of 452311, including *superstores*, *supercenters*, and *warehouse clubs*.

Value	Generation Factor	Measurement	Source
<i># employed each week (sum: part- and full-time)</i>	19.23	lbs/employee/wk*	New York

*to convert to ton/week

$$\# \text{ employed each week (sum: part- and full-time)} \times (19.23 \div 2000) = \text{_____ ton/week}$$

- 208 employees or more (annually, including part- and full-time), meet the January 1, 2023 threshold of 2 tons/week of food residuals
- 104 employees or more (annually, including part- and full-time), meet the January 1, 2024 threshold of 1 ton/week of food residuals

Food Wholesale & Distribution

This methodology is for facilities under the NAICS code of 4244XX *Grocery and Related Product Merchant Wholesalers* and the like.

Value	Generation Factor	Measurement	Source
<i># employees on-site each week</i>	430	lbs/employee/wk*	New York

*to convert to ton/week

$$\# \text{ employees on-site each week} \times (430 \div 2000) = \text{_____ ton/week}$$

- 10 employees or more on-site each week, meet the January 1, 2023 threshold of 2 tons/week of food residuals
- 5 employees or more on-site each week, meet the January 1, 2024 threshold of 1 ton/week of food residuals.

Hotel/Motel

This methodology is for facilities under the NAICS code of 721110 *Hotels and Motels* and 721120 *Casino Hotel*. Hospitality is an industry sector where the waste generation rates will depend significantly on the types of on-site facilities and accommodations that are included with the hotel, e.g. a restaurant, conference and event spaces, etc. The Department recommends those within this industry category that typically have events or offer casino space to calculate waste totals by the number of visitors per day. For those that do not host outside events, we recommend using the number of guest rooms, on average occupied each week. For those with a combination of facilities, the number of employees on site each week may be the better estimator. Individual facilities should select the one that is most applicable to them..

Value	Generation Factor	Measurement	Source
# of guest rooms	6.63	lb/room/wk*	New York
# of visitors per day	1	lb/person/day*	Massachusetts
number of employees on site each week (PT/FT)	38.13	lbs/employee/wk*	New York

*to convert to ton/week,

$$\begin{aligned} & \# \text{ guest rooms} \times (6.63 \div 2000) = \text{_____ ton/week} + \\ & \# \text{ of visitors per day} \times (1 \times 7 \div 2000) = \text{_____ ton/week} + \\ & \# \text{ employees on site each week (PT/FT)} \times (38.13 \div 2000) = \text{_____ ton/week} \end{aligned}$$

- To meet the January 1, 2023 threshold of 2 tons/week of food residuals
 - 604 guest rooms, or more, occupied each week
 - 572 visitors, or more, visiting per day
 - 105 employees, or more, each week both full and part-time
- To meet the January 1, 2024 threshold of 1 ton/week of food residuals
 - 302 guest rooms, or more, occupied each week
 - 286 visitors, or more, visiting per day
 - 53 employees, or more, each week both full and part-time

Resorts, Conference Centers, Venues & Events

Resorts and conference center properties are typically best aligned with evaluating the number of seats or meals served. Large venues and events include convention centers, stadiums, theme parks, performing art centers, movie theaters, fairgrounds, special event sites (e.g., parades, sporting events, festivals), and miscellaneous venues (e.g., museums, zoos). Contingent upon the facilities' primary activity, there are a few generation factors which can be used to estimate food residuals generated from facilities in this industry sector. While capacity is a readily available statistic, it doesn't always correlate with the number of visitors, so a facility should make estimates based on this consideration. Individual facilities should select the factor below that is most relevant to them.

Value	Generation Factor	Measurement	Source
# of seats at the venue	0.6	lbs/seat/day*	Massachusetts
# of meals served each week	1	lb/meal*	Massachusetts
For sporting venues, average sum of visitors a week attendance	0.45	lbs/visitor/wk*	Massachusetts

*to convert to ton/week

$$\begin{aligned} \# \text{ of seats at the venue} \times (0.6 \times 7 \div 2000) &= \text{_____ ton/week} \\ \# \text{ of meals served each week} \times (1 \div 2000) &= \text{_____ ton/week} \\ \text{Average sum of visitors a week in attendance} \times (0.45 \div 2000) &= \text{_____ ton/week} \end{aligned}$$

- To meet the January 1, 2023 threshold of 2 tons/week of food residuals
 - 953 seats, or more, at the venue
 - 4,000 meals each week, or more, served
 - 8,887 visitors, or more, each week in attendance
- To meet the January 1, 2024 threshold of 1 ton/week of food residuals
 - 476 seats, or more, at the venue
 - 2,000 meals each week, or more, served
 - 4,443 visitors, or more, each week in attendance

Hospitals

This methodology is for facilities under the NAICS code of 622XX including *General Medical and Surgical Hospitals, Psychiatric and Substance Abuse Hospitals and Specialty (except Psychiatric and Abuse) Hospitals*. There are several possible generation factors that can be used; individuals facilities should select the one that is most applicable to them.

Value	Generation Factor	Measurement	Source
<i>Total meals served weekly</i>	0.6	lbs/meal*	Massachusetts
<i># of beds occupied each week (*acute care)</i>	23.94	lb/bed/wk*	New York
<i># of employees staffed yearly</i>	290	lb/employee/yr*	Massachusetts

*to convert to ton/week

$$\begin{aligned} \# \text{ total meals served weekly} \times (0.6 \div 2000) &= \text{_____ ton/week} \\ \# \text{ of beds occupied each week (*acute care)} \times (23.94 \div 2000) &= \text{_____ ton/week} \\ \# \text{ of employees staffed yearly} \times (290 \div 2000 \div 52) &= \text{_____ ton/week} \end{aligned}$$

- To meet the January 1, 2023 threshold of 2 tons/week of food residuals
 - 6,665 meals served, or more, weekly
 - 168 acute care beds, or more, occupied each week
 - 718 employees, or more, staffed each year
- To meet the January 1, 2024 threshold of 1 ton/week of food residuals
 - 3,332 meals served, or more, weekly
 - 84 acute care beds, or more, occupied each week
 - 359 employees, or more, staffed each year

Nursing Homes/Assisted Living

This methodology is for facilities under the NAICS code of 623XX including *Nursing Care Facilities, Residential Intellectual and Developmental Disability Facilities, Residential Mental Health and Substance Abuse Facilities, Continuing Care Retirement Communities, Assisted Living Facilities for the Elderly, and other Residential Care Facilities*. There are several possible generation factors that can be used; individual facilities should select the one that is most applicable to them.

Value	Generation Factor	Measurement	Source
<i># beds are occupied each week</i>	12.6	lb/bed/wk*	New York
<i># meals served each week</i>	0.6	lbs/meal*	Massachusetts
<i># employees staffed yearly</i>	475	lbs/employee/yr*	Massachusetts

*to convert to ton/week

$$\begin{aligned} \text{\# of beds occupied each week} \times (12.6 \div 2000) &= \text{______ ton/week} \\ \text{\# meals served weekly} \times (0.6 \div 2000) &= \text{______ ton/week} \\ \text{\# of employees staffed yearly} \times (475 \div 2000 \div 52) &= \text{______ ton/week} \end{aligned}$$

- To meet the January 1, 2023 threshold of 2 tons/week of food residuals
 - 318 beds, or more, occupied each week
 - 6,666 meals served, or more, weekly
 - 439 employees, or more, staffed each year
- To meet the January 1, 2024 threshold of 1 tons/week of food residuals
 - 159 beds, or more, occupied each week
 - 3,333 meals served, or more, weekly
 - 219 employees, or more, staffed each year

Military Installations

This methodology is for facilities identified as a military installation.

Value	Generation Factor	Measurement	Source
<i># people employed on-site yearly (including military, civilian and contractor)</i>	105.27	lb/person/yr	EPA

*to convert to ton/week

$$\text{\# people employed on-site yearly} \times (105.27 \div 2000 \div 52) = \text{______ ton/week}$$

- 1,976 people, or more, employed on-site yearly (*including military, civilian and contractors*), meet the January 1, 2023 threshold of 2 tons/week of food residuals
- 988 people, or more, employed on-site yearly (*including military, civilian and contractors*), meet the January 1, 2024 threshold of 1 ton/week of food residuals

Office Buildings and Corporate Cafeterias

This methodology is for facilities identified as being supplied by NAICS 722310 *Cafeteria food services contractors* such as those at office cafeterias, hospital cafeterias and school cafeterias. This also includes any state operated facilities with cafeterias.

Value	Generation Factor	Measurement	Source
<i># of meals served each week</i>	0.625	lbs/meal	Massachusetts

*to convert to ton/week

$$\underline{\# \text{ of meals served each week}} \times (0.625 \div 2000) = \underline{\hspace{2cm}} \text{ ton/week}$$

- 6,400 meals, or more, served each week, meet the January 1, 2023 threshold of 2 tons/week of food residuals
- 3,200 meals, or more, served each week, meet the January 1, 2024 threshold of 1 ton/week of food residuals

Correctional Facilities

This methodology is for facilities under the NAICS code of 922140 which encompasses: *correctional boot camps, correctional institutions, detention centers, honor camps (correctional), houses of correction, jails, penitentiaries, prison farms, prisons and reformatories*. There are two generator factors that may be used depending upon the operating entity.

Value	Generation Factor	Measurement	Source
<i># inmates at a state owned facility</i>	4.55	lb/inmate/wk*	New York
<i># inmates at a county/local facility</i>	7	lb/inmate/wk*	New York

*to convert to ton/week

$$\underline{\# \text{ inmates at a state owned facility}} \times (4.55 \div 2000) = \underline{\hspace{2cm}} \text{ ton/week}$$

$$\underline{\# \text{ inmates at a county/local owned facility}} \times (7 \div 2000) = \underline{\hspace{2cm}} \text{ ton/week}$$

- As of January 1, 2023 meet thresholds of 2 tons/week of food residuals if:
 - 879 inmates, or more, at a state-owned facility each week
 - 572 inmates, or more, at a county/local owned facility each week
- As of January 1, 2024 meet thresholds of 1 ton/week of food residuals if:
 - 440 inmates, or more, at a state-owned facility each week
 - 286 inmates, or more, at a county/local owned facility each week

Schools – Primary and Secondary

This methodology is for facilities under the NAICS code of 611110 Elementary and Secondary Schools. A school may estimate the food residuals by either the number of meals served each week or based on the school’s student populations each week. School categories are comprised of Elementary (K-5), Middle (6-8), and High (9-12). If a facility were to have a combination of those grades, the estimates should contain an aggregate of both student body levels accordingly.

Value	Generation Factor	Measurement	Source
<i># meals served each week at the school</i>	0.43	lb/meal*	New York
<i># of students at an elementary school</i>	1.13	lbs/student/wk*	New York
<i># of students at a middle school</i>	0.73	lbs/student/wk*	New York
<i># of students at a high school</i>	0.35	lbs/student/wk*	New York

*to convert to ton/week

of meals served each week at the school x (0.43 ÷ 2000) = _____ **ton/week**

of students at the elementary school, each week x (1.13 ÷ 2000) = _____ **ton/week**

of students at the middle school, each week x (0.73 ÷ 2000) = _____ **ton/week**

of students at the high school, each week x (0.35 ÷ 2000) = _____ **ton/week**

- As of January 1, 2023 meet threshold of 2 tons/week of food residuals if:
 - 9,300 meals served, or more, each week
 - 3,539 students, or more, at the elementary school each week
 - 5,479 students, or more, at the middle school each week
 - 11,426 students, or more, at the high school each week
- As of January 1, 2024 meet threshold of 1 ton/week of food residuals if:
 - 4,649 meals served, or more, each week
 - 1,770 students, or more, at the elementary school each week
 - 2,739 students, or more, at the middle school each week
 - 5,712 students, or more, at the high school each week

Colleges and Universities

This methodology is for facilities under the NAICS code of 611210 *Junior Colleges*, 611310 *Colleges, Universities, and Professional Schools*, and 611519 *Other Technical and Trade Schools (i.e., Bartending, Cooking, and culinary arts schools)*. The weight of food residuals may be calculated based on either the number of meals served per week, or the number of on-campus students and the number of off-campus students each year. On-campus students are assumed to eat 405 meals on campus per year, while off-campus students are assumed to eat 108 meals on campus per year. Additionally, the estimates based on numbers of students assume a 30-weeks of food consumption on campus per year. If there is a significant difference at your location, estimates would need to be modified to address this difference.

Value	Generation Factor	Measurement	Source
<i># meals served per week</i>	0.35	lb/meal*	Massachusetts
<i># of on-campus students</i>	141.75	lb/student/yr*	Massachusetts
<i># of off campus students</i>	37.8	lb/student/yr*	Massachusetts

*to convert to ton/week, either by (a) or by (b)+(c)

$$(a) = \# \text{ meals served per week} \times (0.35 \div 2000) = \underline{\hspace{2cm}} \text{ ton/week}$$

-or-

$$(b) = \# \text{ of on-campus students per year} \times (141.75 \div 2000 \div 52) = \underline{\hspace{1cm}} \text{ ton/week} +$$

$$(c) = \# \text{ of off-campus students per year} \times (37.8 \div 2000 \div 52) = \underline{\hspace{1cm}} \text{ ton/week} = \underline{\hspace{1cm}} \text{ ? ton/week}$$

- To meet the January 1, 2023 threshold of 2 ton/week
 - (a) 11,426 meals, or more, served each week
 - An example for (b) + (c), where: (b) 721 on-campus students, or more, per year + 2,800 off-campus students, or more, per year
 - *Note, if only on-campus housing was an option, the threshold would be met if there were 1,468 on-campus, or more, students per year. And, if only off-campus housing was an option, the threshold would be met if there were 5,502 off-campus students, or more per year.*
- To meet the January 1, 2024 threshold of 1 ton/week
 - (a) 5,713 meals, or more, served each week
 - An example for (b) + (c), where: (b) 360 on-campus students, or more, per year + 1,400 off-campus students, or more, per year
 - *Note, if only on-campus housing was an option, the threshold would be met if there were 734 on-campus, or more, students per year. And, if only off-campus housing was an option, the threshold would be met if there were 2,751 off-campus students, or more per year.*

Appendix A: References to Methodologies

1. EPA Office of Resource Conservation Recovery, Wasted Food Measurement Methodology Scoping Memo (2016), page 6, Table 1. Average Food Waste and Excess Food Generation Factors https://www.epa.gov/sites/default/files/2020-06/documents/food_measurement_methodology_scoping_memo-6-18-20.pdf
2. Massachusetts Recycling Works Food Waste Estimator Guide (2018-2020) <https://recyclingworksma.com/food-waste-estimation-guide/>
3. New York State Pollution Prevention Institute and Rochester Institute of Technology Food Waste Estimator <https://www.rit.edu/affiliate/nysp2i/food-waste-estimator> developed to streamline the information provided in New York State Department of Conservation Guidance for Waste Estimation of Food Scraps Generators (2021) https://www.rit.edu/affiliate/nysp2i/sites/rit.edu.affiliate.nysp2i/files/docs/resources/NYSP2I_Food_Scraps_Waste_Estimation_Methodology_Guidance.pdf