2021

Hotel Waste Measurement Methodology

v1.0

GREENVIEW

WWF

A NOTE FROM THE SUSTAINABLE HOSPITALITY ALLIANCE

Waste is a leading sustainability issue that's relevant across the entire global hospitality industry. While it is a challenge that's being recognised by the industry, there so far hasn't been a common approach to support hotels to measure and reduce the impact of their operations. This methodology enables hotels – from major brands to individual properties – to set meaningful waste reduction goals and, crucially, track their progress.

The Hotel Waste Measurement Methodology is a valuable addition to a suite of industry measurement methodologies including **Hotel Carbon Measurement Initiative** and **Hotel Water Measurement Initiative**. All of these initiatives have been developed through industry collaboration to create resources that are built from industry expertise and specifically designed for the hospitality context.

As the Sustainable Development Goals demonstrate, a successful development agenda requires partnerships – at global, regional, national and local levels – placing people and planet at the center.

As an organization that drives collaborative action to enable the hospitality industry to have a lasting positive impact, the Sustainable Hospitality Alliance supports this latest example of the industry working together to create a practical resource. Please visit **www.sustainablehospitalityalliance.org** for further free tools and resources to enable every hotel to operate responsibly and grow sustainably.

Sustainable Hospitality Alliance

WWF would like to thank:

Industry reviewers: Caesars Entertainment, Dorint Hotels & Resorts, Four Seasons Hotels and Resorts, Radisson Hotel Group, Soneva, and Wyndham Hotels & Resorts.

Working Group Members: Accor, Hilton, Hyatt, IHG Hotels & Resorts, Marriott International

ACCOR Hilton HYATT IHG HOTELS & RESORTS Marriott INTERNATIONAL

ABOUT
WORLD WILDLIFE FUND (WWF)

WWF is one of the world's leading conservation organizations, working for 60 years in nearly 100 countries to help people and nature thrive. With more than 5 million supporters worldwide, WWF is dedicated to delivering science-based solutions to preserve the diversity and abundance of life on Earth, halt the degradation of the environment, and combat the climate crisis. Visit worldwildlife.org to learn more; follow @WWFNews on Twitter to keep up with the latest conservation news; and sign up for our newsletter and news alerts here.

World Wildlife Fund oversees the HotelKitchen.org platform of guidance for the hotel sector to prevent and manage food waste.

ABOUT
GREENVIEW

Greenview is the world's leading provider of sustainability programs and data management for the hospitality and tourism sector. Greenview supports dozens of companies to design, implement, and monitor their corporate responsibility and sustainability platforms to drive profitability, streamline data, keep ahead of trends, and provide effective communication for stakeholders.

The Greenview Portal offers an off-the-shelf solution for hotels and hotel companies who wish to collect sustainability data, track performance and progress over time, report activities in a transparent way, and ultimately improve their sustainability performance.

Headquartered in Singapore, with a global team of experts located in 7 countries, we manage the hospitality sector's largest collaborative sustainability initiatives, including the Cornell Hotel Sustainability Benchmarking Index and Green Lodging Trends Report, and have been instrumental in the development of existing industry-wide methodologies for measuring carbon, water, waste and net-zero.

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This Hotel Waste Measurement Methodology has been developed jointly by World Wildlife Fund (WWF) and Greenview, supported by an industry working group from leading hotel brands.

Members of the Working Group:
Delphine Stroh, Accor
Caitrin O'Brien, Hilton
Marie Fukudome, Hyatt
Amber Beard, IHG Hotels & Resorts
Amy Bourne, Marriott International

Authors:
Eric Ricaurte, CEO, Greenview
Olivia Ruggles-Brise, Director, Greenview
Sahil Aggarwal, Senior Analyst, Greenview
Monica McBride, WWF

INTRODUCTION

WHY IS THIS METHODOLOGY NEEDED?

The hospitality industry has been making great strides to prevent, donate, and divert waste, both organic (i.e., food waste) and solid waste streams, from their operations. Multiple hotel companies have committed to reduce both their organic and inorganic waste by upwards of 50% in some instances since 2018. However, unlike electricity and water data that can be tied to consumption and therefore tracked more easily using utility bills, waste data are notoriously spotty, inaccurate, and challenging to obtain. This inability to have a good understanding of a baseline generation volume has made setting robust goals and tracking progress against them challenging, if not impossible.

Through World Wildlife Fund (WWF)'s work with the industry to develop food waste prevention tools and training materials, hotel companies also expressed a need to develop a standard measurement methodology that brands and/or individual properties could use to confidently track their waste and diversion rates, set goals, and track progress against those goals.

This methodology, developed as part of an industry collaborative effort jointly led by WWF and Greenview with participation from leading brands in the industry including Accor, Hilton, Hyatt, IHG Hotels & Resorts, and Marriott International, aims to provide a consistent framework the industry can use to track waste, fill in data gaps, and report annual progress against goals. It will also facilitate public reporting and industry benchmarking, supporting organizations to make progress towards best practice.

This document is intended to be a first iteration of the methodology which, for the first time, compiles together all the common definitions and approaches required for a hotel company to calculate and report its waste and food waste data robustly. Updates and improvements will be made as more data becomes available and following feedback from companies using the methodology.

WHAT ARE THE OBJECTIVES OF THIS METHODOLOGY?

Due to its expansive footprint and potential for impact, the private sector plays a key role in achieving the United Nations Sustainable Development Goals (SDGs) and companies are increasingly aligning their corporate strategies to these goals. Specifically, goal 12.3 to reduce food waste by 50% by 2030 and goal 12.5 to substantially reduce waste generation through prevention, reduction, recycling, and reuse.

Hotel companies that are looking to set goals aligned to the SDGs and publicly report on company-wide progress often face two main challenges: data gaps across their global portfolios and lack of clarity in definitions.

This methodology is intended to address the two challenges by accomplishing the following objectives:

- Develop a common set of waste metrics and waste factors, including food waste, by hotel type and geography;
- Normalize how companies set boundaries and quantify all waste, leading to consistent practices across the industry;
- Prepare brands and independent operators to confidently and consistently report weights for their overall and food-specific wastes, which will help to address data gaps over time;
- Empower the hotel industry to set waste goals against which they can track progress;
- Set a framework that will support industry-level benchmarking.

This methodology should be seen as the most basic adequate approach for measuring and reporting hotel waste, companies who are able to go above and beyond should look to do so. Comparable measures, i.e. those which should be used for benchmarking and cross-industry comparison, are put forth in this methodology as the minimum requirement for reporting and tracking and are used to calculate metrics that brands can use for filling data gaps and extrapolation. In addition, the methodology provides additional measures that exemplify how users can go deeper to develop more advanced estimations within their own portfolio and segmentation characteristics.

Following the steps set out in this document, users will be able to consistently measure and track the following metrics for a hotel or portfolio:

1. Total waste, including total food waste, generated (metric tons)
2. Total waste, including total food waste, per square meter[1] (kilograms)
3. Diversion rate (waste and food waste) (%)

Additionally, other metrics can be integrated with this methodology in order to fulfill additional internal management and reporting requirements.

1 Please see Appendix F for discussion on the use of floor area as the standard denominator for intensity metrics

WHO SHOULD USE THIS METHODOLOGY?

This methodology has been developed primarily to help hotel companies quantify waste across their portfolio(s) to establish a baseline, properly characterize it, and track progress towards waste reduction goals over time. While the primary audience for this methodology is manager of a portfolio of hotels, the waste boundaries and definitions set out should also be deployed at property level to provide a consistent framework for reporting, which can then be rolled up to portfolio level.

HOW DOES THIS METHODOLOGY RELATE TO EXISTING STANDARDS AND PROTOCOLS?

As it pertains to food waste, this methodology closely aligns with the reporting requirements and definitions included in the Food Loss and Waste Accounting and Reporting Standard (FLWS) . This methodology should be viewed as a more detailed companion to FLWS[2] as it provides more specific recommendations using the terminology and metrics unique to the hotel industry. Quantifying annual food waste using this approach will allow for greater consistency when publicly reporting through the Food Loss and Waste Protocol, if desired.

A more detailed explanation of how this guidance compares with the FLW Protocol is provided in Appendix G.

This methodology is also developed to align with the existing Hotel Carbon Measurement Initiative (HCMI)[3] and Hotel Water Measurement Initiative (HWMI), both of which exist in order to provide a common methodology and metrics for measuring carbon and water in the hotel industry.

WHAT IS CONTAINED WITHIN THIS DOCUMENT?

This document contains a step-by-step approach to the process of collecting, reporting, and validating waste and food waste data at the portfolio and hotel level. It also contains appendices with further information including:

1. Detailed guidance on how to convert volumetric waste data into gravimetric (weight-based);
2. Industry coefficients for (1) waste and food waste per square meter, (2) waste diversion rate, and (3) food waste as a proportion of total waste, along with the methodology used to calculate all three indicators;
3. A list of common waste data collection challenges and proposed solutions; and
4. Limitations of the methodology and areas where further work is needed.

HOW SHOULD THIS DOCUMENT BE USED?

This document is broken down into five consecutive sections, each with a series of steps to guide the user through the methodology. At the end of each section, there is a recommendation on how to document the decisions and calculations made throughout the process.

1 ESTABLISHING THE BOUNDARIES OF THE INVENTORY
This section outlines the necessary definitions to align the inventory with industry standards.

2 IDENTIFYING MEASUREMENT METRICS
This includes common comparable metrics and additional metrics which may be used if required.

3 GATHERING DATA AND EXTRAPOLATING FOR YOUR PORTFOLIO, AS NECESSARY
This section details the procedures to collect data and fill data gaps that will inevitably exist after gathering all primary property level data.

4 VERIFYING AND AUDITING RESULTS
This section sets out the best practices for verifying data and auditing results.

5 REPORTING INVENTORY RESULTS
This section outlines the inventory requirements for transparent, standardized waste and food waste reporting.

2 The Food Loss & Waste Protocol is a multi-stakeholder partnership, which has developed the global Food Loss and Waste Accounting and Reporting Standard – also known simply as the FLW Standard. For more information visit www.flwprotocol.org

3 For more information on HCMI and HWMI please visit https://sustainablehospitalityalliance.org/resources

01 SETTING BOUNDARIES AND DEFINITIONS

PURPOSE | **IDENTIFY THE TEMPORAL, ORGANIZATIONAL, AND WASTE DEFINITION BOUNDARIES THAT APPLY TO YOUR DATA COLLECTION TO ENSURE THAT DATA ARE CONSISTENT AND COMPARABLE.**

Before calculating the waste and/or food waste of a property or portfolio, it is necessary to define the boundaries of the dataset intended to be collected. This means defining what is included and what is not included, so that it is clear what the data represents, which is important when it comes to comparisons between properties or companies.

There are four boundaries to be considered:

1. **Temporal boundary:** what is the timeframe the data will cover?
2. **Organizational boundary:** how much of the organisation's operations are included in the data?
3. **Waste boundary:** what types of waste/food waste are included or excluded in the measurement?
4. **Waste destination boundary:** what destination are included and excluded from diversion?
5. **Floor area boundary:** what is included in the floor area calculation?

Here we set out the approaches agreed by the members of the Working Group. A company may set their own boundaries, but in that case, data will not be comparable with other companies following this guidance for benchmarking purposes.

01.01 SETTING THE TEMPORAL BOUNDARY

This methodology has been designed to help with quantifying, reporting, and comparing annual waste levels. Therefore, each measurement interval should be for a 12-month period for which the data are collected and reported, preferably on a monthly basis, from January through December to enable consistent comparison.

Some organizations may require different 12-month periods to align with other reported sustainability indicators. The time period should be indicated in public reporting.

01.02 SETTING THE ORGANIZATIONAL BOUNDARY

The organizational boundary for a waste inventory can be at many different levels. This methodology is primarily focused on portfolio level but can be modified to fit a single property or one geographic location depending on the goals and structure of the organization.

For both a single property or a full portfolio, answer the following questions to implement the measurement boundaries and report accordingly. Please note that questions one through three may be determined depending on the requirements of each company, whereas the four exclusions listed in question four should be followed as is.

1. What types of business operations are included? For example, if a company has investments in a non-hospitality business/es, this/these can be excluded, any other affiliated companies, subsidiaries, franchises etc.
2. Are there any geographical boundaries to your data? For example, only properties in a certain country or region may be covered.
3. Are there any boundaries relating to property type (i.e., full service, limited service)? For example, some property types may not have been included due to insufficient data or inability to capture it.
4. Have any areas of operation or business units been excluded? For example, corporate offices, vacation rentals, etc. may be excluded, or there may be specific areas not yet incorporated, such as an acquisition that has not yet been finalized.

This guidance stipulates the following exclusions:

i. Properties entering the portfolio within the current or preceding calendar year reporting period.

ii. Properties exiting the portfolio within the current reporting calendar year period.

iii. Properties undergoing major renovation or closure within the current or preceding reporting period.

Once the boundaries have been set, data should be collected accordingly.

Seasonal Resorts

For seasonal resorts that are only open for certain months of the year, collect data for all open months and pro-rate the floor area according to the number of open months for which waste was generated in order to calculate intensity metrics.

For example: If a resort with a floor area of 100,000 Sq. Ft. was operational for only 6 months in a calendar year, the intensity metric of the pro-rated floor area would be:

= (100,000/12) * 6

= 50,000 Sq. Ft.

01.03 SETTING THE WASTE BOUNDARY BY TYPE OR COMMON GROUPING OF WASTE TYPES

Since each hotel may have different waste generation sources and types, this methodology sets out common waste categories that can be applied across the board. This is important in order to apply the methodology uniformly and consistently across portfolios and the industry, and for setting a common scope for waste metric accounting and reporting.

This section provides the sources of waste that should be included within a total waste and food waste boundary.

Hotels should group their waste types into common waste categories using Table 1 below, which is the industry-agreed approach. This aims to normalize waste streams, especially when reporting on waste by category.

The sources and categories of waste provided in the table are representative of the common waste types or groupings of waste used by waste haulers, donation partners, or internal hotel documentation. Note that certain categories overlap but are included as the available list of terms used to harmonize data collection and reporting.

The *food waste boundary* encompasses the waste sources to be included in the food waste metrics. The total waste boundary encompasses all types of waste found within property operations that will be included in the total waste metrics.

TABLE 1 *Waste and Food Waste Boundaries*

Waste Grouping	Single Waste Type	Food Waste Boundary	Total Waste Boundary	Comments
Universal Waste[4]	Batteries	Excluded	**Included**	When batteries are tracked separately, otherwise they may be covered as a specific hazardous waste under the Universal Waste Grouping
	Light Bulbs	Excluded	**Included**	When light bulbs are tracked separately, otherwise they may be covered as a specific hazardous waste under the Universal Waste Grouping
Hazardous Waste	Hazardous Waste	Excluded	**Included**	Waste containing spent oil, spent acid, solvents, lubricants, printer toners, etc. commonly found to be tracked as "Hazardous Waste, "therefore the waste grouping name is the same as single waste type
Toiletry Donations	Bottled Amenities	Excluded	**Included**	Bottled amenities include shampoo bottles, liquid soap bottles, body wash bottles, and other toiletry bottles that are diverted
	Soap Bars	Excluded	**Included**	Commonly donated
	Bottled Amenities & Soap Bars	Excluded	**Included**	Sometones 'Bottled Amenities' and 'Soap Bars' are tracked together as single waste type that are diverted
Commingled Recyclables	Bottles & Cans	Excluded	**Included**	When 'Bottles and Cans' are tracked and hauled as a subset of commingled recuclables, including glass jars/bottles, metal cans, and plastic bottles.[5]
Paper & Cardboard	Cardboard	Excluded	**Included**	
	Paper	Excluded	**Included**	
Mixed Glass	Mixed Glass	Excluded	**Included**	Constitutes all types of glass items, including glass bottles
Mixed Metals	Mixed Metals	Excluded	**Included**	Constitutes all types of metals, including metal cans
Plastic	Plastic	Excluded	**Included**	Constitutes all types of plastic bottles, containers, films, packaging, etc.
Mixed Waste	Landfilled Waste	Excluded	**Included**	Also referred to as 'general waste' or Municipal Solid Waste (MSW); includes material not separated by waste type and is sent to landfull or incineration
	Solid Food Waste	**Included**	**Included**	Food waste that is disposed of via the same bins as general or mixed waste to landfill; should be included in the food waste boundary and attempts to measure should be made
Mixed Organic[6]	Garden Waste	Excluded	**Included**	Encompasses all other types of organic waste, such as landscaping waste and cut flowers
	Solid Food Waste	**Included**	**Included**	Organic waste, which could include food waste. If food waste sources are found in the total mixed organic waste, then include it in food waste boundary
Durable Goods	Palattes and Crates	Excluded	**Potentially Included**	Durable goods, either tracked collectively or by item, are waste sources found within properties that are often not routinely disposed of, such as FF&E[7] items, and not considered ongoing consumable waste. These may be included if they represent a genreally stable waste stream that will not skew the performance metrics over different time boundaries.
	E-waste	Excluded	**Potentially Included**	
	Durable Goods	Excluded	**Potentially Included**	
Food Packaging	Food Packaging	Excluded	**Included**	Include food packaging if it is tracked separately. Otherwise it may be covered in other existing waste sources such as plastic, paper, cardboard, metal cans, etc.
Food Waste	Solid Food Waste	**Included**	**Included**	This may also include 'wet waste' (see Appendix H)
	Leftover Food	**Included**	**Included**	Includes trimmed food and cooked leftovers that have been prepared but not served and are able to be donated for himan consumption. Also includes, food tracked separately, usually for donation to external parties.
	Inedible Parts	**Included**	**Included**	Include if inedible parts are tracked separately, otherwise these can be covered within the "solid food waste" category
Repurposed Food	Repurposed Food	Excluded	Excluded	Food repurposed for other internal use such as staff canteen
Liquid food waste	Liquid food waste	Excluded	Excluded[8]	Liquid waste discarded direcly via sewer or land applied without prior collection or treatment
Kitchen Grease[9]	Kitchen Grease	Excluded	**Included**	

4 Although Universal Waste and other types of Hazardous Waste may require separate disposal by law and not possible to send to landfill, they are included in the total waste boundary as the overall intention of this methodology is to reduce overall waste generated in any form.

5 Note that this refers to recyclable materials that are picked up by haulers, even if questions are raised about the ultimate destination.

6 Wet weight: Report where waste is dehydrated, and where possible, measure and report non-dehydrated waste for consistency.

7 Furniture, fixtures and equipment

01.04 SETTING THE WASTE DESTINATION BOUNDARY

Diversion (actions such as recycling or composting so that waste does not end up in landfills or incinerators) is a key element of most hotels' waste and food waste goals. One of the aims of this guidance is to normalize how the industry performs diversion calculations. Table 2 below outlines what is and is not considered diversion when measuring and reporting diversion metrics. These categories are representative of the common primary destinations of waste, as observed in the hotel industry .

Of the destinations in Table 2, the only intermediate process included is an onsite biodigester. For the purposes of this guidance, it is considered a form of onsite waste treatment that reduces waste sent to landfill, hence is considered diversion.

The waste diversion boundary encompasses the waste sources to be included in related metrics of diverted waste. The total waste boundary encompasses all destinations of waste that will be used to quantify the property's waste diversion metrics.

TABLE 2 ***Waste Destination Boundaries***

Destinations of Waste	Diversion from Landfill/Incineration Boundary	Total Waste Boundary	Observations
Donation (of leftover food)	Included	Included	
Donation (of other ongoing consumables)	Included	Included	
Donation (of durable goods)	Potentially Included	Potentially Included	If included in the waste types (see note in table 1), then include in diversion and total waste boundary. Otherwise, exclude.
Animal feed	Included	Included	Organic waste sent offsite for animal feed
Onsite biodigester	Included	Included	Onsite bio-digestion for subsequent sewer effluent discharge, or organic material for onsite soil use. Does not include a water extractor or waste pulper.
Composting - offsite	Included	Included	Organic waste sent offsite for composting (both anaerobic and aerobic methods of composting)
Composting – onsite	Included	Included	Organic waste composted within hotel's boundary (both anaerobic and aerobic methods of composting)
Onsite Controlled Combustion	Included	Included	Waste used by a property directly onsite for energy recovery such as biogas and biomass
Recycling (of ongoing consumables, to MRF, transfer facility, or direct recycling facility)	Included	Included	Waste hauled offsite for eventual recycling downstream, which may pass through transfer facilities or other holders before eventual recycling does or does not occur. It is not within the methodology scope to verify that the materials hauled are actually recycled.
Waste to Energy	Excluded	Included	Combustion of waste with energy recovery[11]
Incineration	Excluded	Included	Uncontrolled combustion of waste at high temperature for the primary purpose of waste destruction/treatment
Landfill	Excluded	Included	
Direct to sewer / Wastewater treatment	Excluded	Excluded	

8 Note that this differs from the Food Loss and Waste Protocol, but it has been excluded due to the significant challenge in measuring liquid food waste in the hotel scenario.

9 See note on page 47 regarding the exclusion of kitchen grease from the food waste boundary

10 Note that this methodology does not account for diversion boundaries per different country's local regulations/policies.

11 This table currently contains common diversion methods. However, as more methods emerge that exceed the boundaries of these categories, such as bioconversion using Black Soldier Flies, the table will be reviewed in future iterations to better capture the available methods.

01.05 SETTING THE FLOOR AREA BOUNDARY FOR INTENSITY METRICS

A common denominator used for environmental intensity metrics is floor area. When done consistently, this can enable more transparent benchmarking across entities. Hotel floor areas vary significantly; therefore, dividing the absolute value of waste generation (or diversion) by floor area helps in normalizing the waste metrics and facilitates easier and fair comparison among hotels. The floor area is also a common denominator that is in line with several other global programs and initiatives for hotels, such as the Hotel Carbon Measurement Initiative (HCMI) or the Hotel Water Measurement Initiative (HWMI) .

Generally, the floor area boundary used will be the Gross Floor Area (GFA) which is further defined in Table 3, based on the BOMA Gross Areas of a Building Standard, as is commonly used in the hotel industry.

TABLE 3 *Floor Area Boundaries*[13]

Included in Area Boundary	Excluded from Area Boundary
Rooms Square Footage	Structured balcony/ covered area
Conditioned Guest Corridor (Square Footage / m2)	Structured open deck/ parking area
Un-Conditioned Guest Corridor (Square Footage / m2)	Structured planters area
Above Ground Meeting Space (Square Footage / m2)	Structured outdoor pool area
Above Ground Pre-Function (Square Footage / m2)	Pool bar area
Below Ground Meeting Space (Square Footage / m2)	Skylight area
Below Ground Pre-Function (Square Footage / m2)	
Above Ground Public Space (Square Footage / m2)	
Below Ground Public Space (Square Footage / m2)	
Above Ground F&B (Square Footage / m2)	
Below Ground F&B (Square Footage / m2)	
Above Ground Office Building / Leased Spaces	
Below Ground Office Building / Leased Spaces	
Above Ground Fitness (Square Footage / m2)	
Below Ground Fitness (Square Footage / m2)	
Above Ground Spa (Square Footage / m2)	
Below Ground Spa (Square Footage / m2)	
Above Ground Ceiling Space (Square Footage / m2)	
Below Ground Ceiling Space (Square Footage / m2)	
Structured Parking	
Basement Parking	
Above Ground Back of House (Square Footage / m2)	
Below Ground Back of House (Square Footage / m2)	

DOCUMENTING DECISIONS AND RESULTS

The following checklist is a quick reference to capture key methodology components in this section:

CHECKLIST 1 *Setting Boundaries and Definitions*

Boundaries	Description	Information Input
Temporal Boundary	• Timeframe (e.g. 12 months) • Months (e.g. Jan – Dec) • Year (e.g. 2019)	
Organizational Boundary	• Operations/business units excluded • Specific business units excluded • Geography • Property type • Any other exclusions	
Waste Types	• Any deviation from recommended approach	
Waste Destinations	• Any deviations from recommended approach	
Floor Area	• Total floor area in square meters • Any deviations from recommended approach	

12 Note that companies that have already calculated their waste diversion to include WTE should report two diversion rates, one with and one without WTE, and identify accordingly. The boundary of diversion in this methodology is aligned with the United States Environmental Protection Agency's State Data Measurement Program wording of diversion, defined as "activities surrounding the handling of recovered resources such that they are not disposed of in landfills, waste piles, surface impoundments, land application units on a permanent or long-term temporary basis; and are not incinerated or converted to fuel energy, or base chemicals through combustion, pyrolysis, gasification, or other conversion technologies." Diversion can be attributed to several processes where materials are systematically redirected from disposal: Recycling, Reuse, Beneficial Use, and Composting. For more details see https://www.epa.gov/smm/resources-participating-us-state-data-measurement-sharing-program

13 For further information on HCMI and HMWI and to download the respective methodologies, please visit Appendix J or https://sustainablehospitalityalliance.org/resources/

14 The current recommendation is to use the 'total conditioned space' definition of Gross Floor Area to ensure alignment with USALI (Uniform System of Accounts for the Lodging Industry https://www.hftp.org/hospitality_resources/usali_guide/) and HCMI, however this remains under review and will be updated as necessary in further iterations of the methodology guidance.

02 IDENTIFYING METRICS

PURPOSE | **IDENTIFY THE APPROPRIATE MEASUREMENT METRICS AND ENSURE THAT DATA REQUIREMENTS ARE INCORPORATED INTO THE DATA COLLECTION PROCESS.**

02.01 COMPARABLE METRICS FOR EXTERNAL BENCHMARKING

One aim of this methodology is to establish a common industry approach to set consistent and comparable waste metrics to enable internal and external comparisons using consistently quantified and eventually reported data. As such, there are three common metrics to implement across all properties and companies:

1. Total waste and food waste generated (metric tons);
2. Total waste and food waste per square meter (kilograms); and
3. Waste and food waste diversion rate (%).

Note that companies may use additional metrics to help with internal benchmarking and reporting purposes.

The list of comparable metrics is contained in Table 4a.

TABLE 4A ***Comparable Absolute and Intensity Measures***

No.	Measure or Metric	Type	Unit of Measurement
1	**Total Waste Generated**	Comparable Absolute Measure	Metric Tons
2	**Total Food Waste Generated**	Comparable Absolute Measure	Metric Tons
3	**Total Waste Per Square Meter**	Comparable Intensity Metric	Kilograms
4	**Food Waste Per Square Meter**	Comparable Intensity Metric	Kilograms
5	**Waste Diversion Rate**	Comparable Intensity Metric	Percentage
6	**Food Waste Diversion Rate**	Comparable Intensity Metric	Percentage

02.02 ADDITIONAL METRICS

An individual property or company may require additional metrics for specific needs, such as using a different unit of weight or reporting per revenue dollar rather than square meter. If this is the case, identify these additional metrics at the outset and collect data appropriately. For example, if a company requires waste measurement per customer, then customer or cover data will also need to be collected and recorded.

A list of additional metrics is contained in Table 4b.

This methodology is designed to measure both absolute waste and food waste, as well as intensity of waste and food waste.

Absolute Measures – such as total waste and food waste generated (or waste diverted), allow a company to report on the total amount of waste generated across a property or portfolio and can be used to compare annually, or against peers of a similar size and scope.

Intensity Metrics – such as total waste and food waste (or waste diverted) per square meter, allow a company to compare common waste generation or diversion values against peers of any size or over time, and can indicate performance changes regardless of changes in size or scope of the portfolio.

TABLE 4B *Additional Absolute and Intensity Measures*

No.	Measure or Metric	Type	Unit of Measurement
7	**Total Waste Generated**	Additional Absolute Measure	Units other than Metric Tons
8	**Total Food Waste Generated**	Additional Absolute Measure	Units other than Metric Tons
9	**Total Diverted Food Waste**	Additional Absolute Measure	Any unit of weight, preferably Metric Tons
10	**Total Diverted Waste**	Additional Absolute Measure	Any unit of weight, preferably Metric Tons
11	**Total Non-diverted Waste**	Additional Absolute Measure	Any unit of weight, preferably Metric Tons
12	**Total Energy Recovery Waste**	Additional Absolute Measure	Any unit of weight, preferably Metric Tons
13	**Total Waste Per Square Meter**	Additional Intensity Metric	Units other than kilograms
14	**Total Waste Per Square Foot**	Additional Intensity Metric	Any unit of weight, preferably kilogram
15	**Total Waste Per Occupied Room**	Additional Intensity Metric	Any unit of weight, preferably kilogram
16	**Total Waste Per Revenue Dollar**	Additional Intensity Metric	Any unit of weight, preferably kilogram per US Dollar
17	**Total Waste Per Guest Night**	Additional Intensity Metric	Any unit of weight, preferably kilogram
18	**Food Waste Per Square Meter**	Additional Intensity Metric	Units other than kilograms
19	**Food Waste Per Square Foot**	Additional Intensity Metric	Any unit of weight, preferably kilogram
20	**Food Waste Per Occupied Room**	Additional Intensity Metric	Any unit of weight, preferably kilogram
21	**Food Waste Per Customer**[14]	Additional Intensity Metric	Any unit of weight, preferably kilogram
22	**Food Waste Per Revenue Dollar**	Additional Intensity Metric	Any unit of weight, preferably kilogram per US Dollar
23	**Food Waste per Total Food Handled**	Additional Intensity Metric	Any unit of weight, preferably Metric Ton
24	**Food Waste per Meal**	Additional Intensity Metric	Any unit of weight, preferably kilogram per meal
25	**Diverted Waste Per Square Meter**	Additional Intensity Metric	Any unit of weight, preferably kilogram
26	**Diverted Waste Per Square Foot**	Additional Intensity Metric	Any unit of weight, preferably kilogram
27	**Diverted Waste Per Occupied Room**	Additional Intensity Metric	Any unit of weight, preferably kilogram
28	**Diverted Waste Per Revenue Dollar**	Additional Intensity Metric	Any unit of weight, preferably kilogram per US Dollar
29	**Non-diverted Waste Per Square Meter**	Additional Intensity Metric	Any unit of weight, preferably kilogram
30	**Non-diverted Waste Per Square Foot**	Additional Intensity Metric	Any unit of weight, preferably kilogram
31	**Non-diverted Waste Per Occupied Room**	Additional Intensity Metric	Any unit of weight, preferably kilogram
32	**Non-diverted Waste Per Revenue Dollar**	Additional Intensity Metric	Any unit of weight, preferably kilogram per US Dollar

DOCUMENTING DECISIONS AND RESULTS

The following checklist is a quick reference to capture key methodology components in this section:

CHECKLIST 2 *Identifying Metrics*

Metrics	Description	Information input
Comparable Measures	• Confirm comparable calculation measures and necessary data collection needs	
Additional Measures	• Identify additional calculation measures and necessary data collection needs (e.g. revenue or customer numbers)	

15 Please see Appendix H for definition of 'customer'

03 DATA COLLECTION AND EXTRAPOLATION

PURPOSE | **COLLECT DATA ACROSS PROPERTIES, IDENTIFY AND FILL DATA GAPS, AND EXTRAPOLATE DATA WHEN NECESSARY.**

The data collection and quantification process will be dictated by the boundaries set in the first step. Once the applicable boundaries and intensity metrics are understood, they will be used to guide the data collection process.

The data collection process will include gathering basic property level information (e.g., square footage, property type), detailed waste data[16] (e.g., compactor weights, compost data, onsite digestor data), and finally destination data (e.g., landfill, compost, animal feed). With these key pieces of data in hand, the next step will be filling the data gaps.

This section provides a common process for filling data gaps, as well as providing a standard coefficient that can be applied, if needed. It is important to note that actual data are always preferable to extrapolated data, and where actual data exists and has been internally validated, it should always be used.

There are three stages to the data collection and extrapolation process:

1. Collect primary data (property information, waste and diversion/destination data)
2. Identify and fill data gaps where possible to establish the 'Base Data Boundary'
3. Extrapolate for the properties which do not fall within the 'Base Data Boundary'

Available Boundary, Base Data Boundary, and Extrapolated Boundary

In Section 1, the **'Available Boundary'** is established by the organization as the framework of data relevant to the measurement activity. As the data collection proceeds, the **'Base Data Boundary,'** will be defined as the proportion of the properties/ portfolio for which 'base data' is available. 'Base data' is data that has been collected from primary sources; in places where data gaps exist, the base data are supplemented by estimates using the coefficients available in this methodology. Any properties for which primary data are non-existent, or not robust enough to be estimated, fall into the **'Extrapolated Boundary.'** Guidance is available to estimate waste and food waste for these properties.

03.01 COLLECTING PRIMARY DATA

Once the boundaries have been set, the primary data collection can begin. For each property, the following data will need to be collected:

1. Property information (location, floor area, number of rooms, etc.)
2. Waste data (how much of each type of waste is discarded at the property.)
3. Destination data (how much waste goes to landfill, compost, recycling, etc.)

The Base Waste Data Hierarchy (right) details various tactics to collect waste data and ranks them in order of preference in a 'hierarchy' from most accurate to least accurate. Collect waste data at the highest possible level of the accuracy hierarchy.

Appendix A includes the standard units of measurement to report each data point and provides information on how to convert from alternative measurement units.

Ideally, hotel chains would have primary data for all properties and waste types. Realistically however, waste data can be difficult to measure, validate, and standardize in format and unit. The hierarchy of preferences in terms of data collected is set out in Base Data Portfolio Comparable Waste Measurement Hierarchy (right).

Once as much data as possible has been collected, use the process outlined in the next section to identify gaps and how to fill them.

Base Waste Data Hierarchy

In order of preference, the base data collected by waste category or category grouping is as follows (1 being most preferable 3 being least preferable):

1. Data obtained from a scale or meter weights either on-site, by hauler, or recipient.
2. Data based on invoices in volume converted to mass (see Appendix A – Volume to weight conversion guidance).
3. Data based on invoices or logs in waste bin pulls converted to estimated mass (See Appendix A – Volume to weight conversion guidance).

Base Data Portfolio Comparable Waste Measurement Hierarchy

In order of preference, the waste measurements and corresponding metrics for a property within the "Base Data Portfolio" should be as follows (1 being most preferable and 3 being least preferable), with each property included in the boundary having at least some actual data and designated 1-3 accordingly:

1. Actual and complete property total waste data and food waste data.
2. Actual data for some streams, partial data for others.
3. Actual data for some streams, missing data for others.

16 Please note that only data pertaining to waste diversion/disposal should be used when calculating waste generated. Data from purchases or other general weighting processes are not considered valid for this methodology.

03.02 IDENTIFYING AND FILLING DATA GAPS

Once data has been collected, review and identify if and where gaps exist using the following process:

1. Record for each hotel the combination of total waste, diverted non-food waste, total food waste, and diverted food waste data that have been collected based on what is complete, partial or missing.
2. For partial data, use the Exercise to Address Partial Data (right) to determine whether data should be averaged and aggregated to full data and marked as 'complete', marked as 'missing,' or kept as 'partial'.
3. Using the Data Scenario and Action Tool (Appendix B) input the combination for each property and follow the appropriate next step per the tool's instructions to estimate based on the available data.
4. If necessary, estimate data using the Industry-agreed Coefficients (Appendix D) for waste (kg/sqm), food waste (kg/sqm) and waste or food waste diversion (% of total).
5. Document assumptions and calculations for each property.

Data Scenario and Action Tool

The Data Scenario and Action Tool (Appendix B) is an excel spreadsheet designed to provide specific instructions on how to fill data gaps at the property level, depending on what data are missing or partial.

Exercise to Address Partial Data

Completing the steps above results in the 'Base Data Portfolio' defined as the properties for which there is sufficient primary data. For properties that are not included in the 'Base Data Portfolio' due to very little or no data availability, extrapolated data based on available data will be required.

When gathering actual data from properties, it is important to calendarize (i.e., use January to December time frame), clean, and harmonize the data followed by sense checking and validity testing to identify outliers in the data that may have resulted from errors in data collection. Check all identified outliers and variances with the property in order to ensure the greatest level of accuracy possible. If data cannot be corrected due to lack of additional information or because the data are confirmed, but the property should be included in the boundary, then the property's data may be substituted by extrapolation methods as it is not considered "actual." Section 03.03 provides the extrapolation methodology.

12 Note that companies that have already calculated their waste diversion to include WTE should report two diversion rates, one with and one without WTE, and identify accordingly. The boundary of diversion in this methodology is aligned with the United States Environmental Protection Agency's State Data Measurement Program wording of diversion, defined as "activities surrounding the handling of recovered resources such that they are not disposed of in landfills, waste piles, surface impoundments, land application units on a permanent or long-term temporary basis; and are not incinerated or converted to fuel energy, or base chemicals through combustion, pyrolysis, gasification, or other conversion technologies." Diversion can be attributed to several processes where materials are systematically redirected from disposal: Recycling, Reuse, Beneficial Use, and Composting. For more details see https://www.epa.gov/smm/resources-participating-us-state-data-measurement-sharing-program

13 For further information on HCMI and HMWI and to download the respective methodologies, please visit Appendix J or https://sustainablehospitalityalliance.org/resources/

14 The current recommendation is to use the 'total conditioned space' definition of Gross Floor Area to ensure alignment with USALI (Uniform System of Accounts for the Lodging Industry https://www.hftp.org/hospitality_resources/usali_guide/) and HCMI, however this remains under review and will be updated as necessary in further iterations of the methodology guidance.

03.03 PORTFOLIO EXTRAPOLATION[17]

The following process details the steps to complete the remaining Extrapolated Portfolio, which will result in the 3 comparable indicators for the entire portfolio.

Ideally, a bespoke portfolio extrapolation should be created based on the composition of property segmentation, geographic segmentation, and internally derived coefficients from actual data. This is outlined in the process below. However, where a representative data set from which to extrapolate data are not available or properties are in a location with extremely limited waste data, then use the industry coefficients outlined in Appendix D.

The full step-by-step process for this extrapolation is outlined below.

1. Place similar hotels within the Base Data Portfolio of the company into groups according to location and segment, as available.
2. Calculate the average waste intensity metrics of those groups. Should the groups be insufficiently representative of the hotel's missing data (as listed in Table 5), use the coefficients derived from industry benchmarking in Appendix D[18] to best fit the geographic segmentation and property type segmentation.
3. Extrapolate for hotel's missing data by matching each hotel to the corresponding best available group, then multiply the groups' metrics by the hotel's floor area to arrive at the comparable waste estimate.
4. Calculate the full company's footprint by summing the Base Data Portfolio + Extrapolated Portfolio.

STEP 1A DEFINE THE BEST AVAILABLE DATA SET FOR ACTUAL PROPERTIES

The first step is to categorize the properties within the Base Data Portfolio into similar groups and segments by factors such as F&B Service Scale, STR chain scale segment,[19] restaurant customers or area, type of hotel, ratio of revenue, etc. Below, Table 5 outlines the groupings from 1 to 4 based on geography and factors determined by the hotel. Fill the first groupings with all applicable hotels based on the listed qualification criteria before moving on to each subsequent group, as necessary.

TABLE 5

Group Type	Definition	Qualification
1	Groups of hotels within the same metro area, and further broken down into groupings and segmentations (such as F&B Service Scale, STR chain scale segment, restaurant covers or area, type of hotel etc.) determined by the hotel	A minimum of 5 properties within the same metro area, groupings, and segmentation as the hotel for which data are being extrapolated OR A minimum of 50% of properties in portfolio within the same metro area, groups, and segmentation as the hotel for which data are being extrapolated.
2	Groups of hotels within the same country area, and further broken down into groupings and segmentations (such as F&B Service Scale, STR chain scale segment, restaurant covers or area, type of hotel etc.) determined by the hotel	The properties will not have been able to be categorized within Grouping Type 1, and a minimum of 10 properties within the same country, groupings, and segmentation as the hotel for which data are being extrapolated OR A minimum of 65% of properties in portfolio within the same country, groupings, and segmentation as the hotel for which data are being extrapolated
3	Groups of hotels portfolio-wide, and further broken down into groupings and segmentations (such as F&B Service Scale, STR chain scale segment, restaurant covers or area, type of hotel etc.) determined by the hotel	The properties will not have been able to be categorized within Grouping Type 1 or Type 2, and a minimum of 20 properties within the groupings and segmentation as the hotel for which data are being extrapolated OR A minimum of 75% of properties in portfolio within same groupings and segmentation as the hotel for which data are being extrapolated
4	All other hotels	The properties will not have been able to be categorized within any of the 3 groupings OR 100% of properties in portfolio

17 Please note that extrapolation should only take place when the objective is to fill data gaps for company level reporting. If the methodology is used to estimate waste/food waste data for individual hotels, it should be clearly stated when providing data for purposes such as responding to RFPs.

18 Appendix D provides a range of coefficients including lower, median, and upper data points. As a default, the 'median' figure should be used. However, if internal data suggests that the lower or upper figure should be used in a particular case, then the most appropriate coefficient should be chosen and appropriately reported with the rationale.

19 https://str.com/data-insights/resources/documents

STEP 1B LIST EACH CATEGORY GROUPING BASED ON GEOGRAPHIC AND HOTEL-SPECIFIC SEGMENTATION

Depending on the size of the portfolio, this process may result in several dozen grouping categories. They may be designated as 1A, 1B, 1C, 2A, 2B, 3A, 3B, etc. These groupings should be listed out, each with corresponding identifiers of location and segment so they may be mapped against the default coefficients.

Example:
*A hotel company **ABC Hotels & Resorts Ltd.** has a portfolio of 80 hotels located in US, India, Singapore, and Thailand. Out of the 80 hotels, the company has actual waste diversion data for 50 hotels and no/missing waste diversion data for 30 hotels.*
An extrapolation of the remaining 30 hotels can be done using the steps below:

Total Portfolio of ABC Hotels & Resorts Ltd.

Country	Number of Hotels	Total Floor Area (Sq. M.)
US	32	10,000,000
India	10	2,000,000
Singapore	22	8,000,000
Thailand	16	5,000,000
Total	**80**	**25,000,000**

ABC Hotels & Resorts Ltd. has 50 hotels for which it has actual waste diversion data. The geographic and segmentation break-up of these 50 hotels is shown below:

Country	Metro Area	STR Segment	F&B Service Scale	Total Number of Hotels	Total Floor Area (Sq. M.)
US	Syracuse, NY	Upscale	Limited F&B	10	2,000,000
US	Las-Vegas Paradise, NV	Luxury	Multiple F&B	12	5,000,000
India	Delhi	Upper Upscale	Multiple F&B	5	1,000,000
Singapore	Singapore	Luxury	Multiple F&B	6	3,000,000
Singapore	Singapore	Upscale	Limited F&B	6	1,000,000
Thailand	Bangkok	Upper Upscale	Full-service F&B	11	3,000,000
		Total		**50**	**15,000,000**

STEP 2 DEFINE THE INTERNAL DEFAULT COEFFICIENTS FOR EACH CATEGORY GROUPING

The internal default coefficients for each grouping category can be defined by calculating the average within each grouping category for each of the 3 comparable intensity metrics: total waste per square meter, total food waste per square meter, and waste diversion rate.

ABC Hotels & Resorts Ltd. has 50 hotels for which it has actual waste diversion data. The geographic and segmentation break-up of these 50 hotels is shown below:

Metro Area	STR Segment	F&B Service Scale	Total number of hotels	Total Floor Area	Total Waste (kg)	Total Food Waste (kg)	Total Diverted Waste (kg)	Waste PSM (kg)	Food Waste PSM (kg)	Waste Diversion Rate (%)
								Total Waste /Total floor area	Total food waste/ total floor area	Total diverted waste/ total waste *100
Syracuse, NY	Upscale	Limited F&B	10	2,000,000	13,960,000	5,000,000	3,055,844	6.98	2.5	22%
Las-Vegas Paradise, NV	Luxury	Multiple F&B	12	5,000,000	56,500,000	16,000,000	10,311,250	11.3	3.2	18%
Delhi	Upper Upscale	Multiple F&B	5	1,000,000	12,500,000	5,400,000	6,602,500	12.5	5.4	53%
Singapore	Luxury	Multiple F&B	6	3,000,000	25,200,000	8,700,000	16,380,000	8.4	2.9	65%
Singapore	Upscale	Limited F&B	6	1,000,000	7,600,000	2,400,000	4,560,000	7.6	2.4	60%
Bangkok	Upper Upscale	Full-service F&B	11	3,000,000	27,300,000	11,100,000	13,221,390	9.1	3.7	48%
			50	**15,000,000**	**143,060,000**	**48,600,000**	**54,130,984**			

STEP 3A MAP THE PROPERTIES FOR WHICH DATA ARE BEING EXTRAPOLATED TO CORRESPONDING GROUPING TYPE

Each of the hotels for which data are being extrapolated should be mapped to the corresponding grouping type based on market location and segment. If properties are not mappable, designate as Grouping 4.

For the remaining 30 hotels that have no data and for which the waste diversion needs to be extrapolated, group these hotels according to grouping category in Step 2:

Country	Metro Area	STR Segment	F&B Service Scale	Total number of hotels to be extrapolated for	Total Floor Area (Sq.M.)
US	Syracuse, NY	Upscale	Limited F&B	6	1,000,000
US	Las-Vegas Paradise, NV	Luxury	Multiple F&B	4	2,000,000
India	Delhi	Upper Upscale	Multiple F&B	5	1,000,000
Singapore	Singapore	Luxury	Multiple F&B	7	3,000,000
Singapore	Singapore	Upscale	Limited F&B	3	1,000,000
Thailand	Bangkok	Upper Upscale	Full-service F&B	5	2,000,000
Total				**30**	**10,000,000**

STEP 3B EXTRAPOLATE THE TOTAL MEASURES FOR EACH PROPERTY

Then, the respective intensity metric (as calculated in step 2, above) should be multiplied by the property's floor area to arrive at the extrapolated value for each property:

a. **TOTAL WASTE** Multiply the property's square meters by the category grouping's average total waste per square meter.

b. **FOOD WASTE** Multiply the property's square meters by the category grouping's average total food waste per square meter.

c. **TOTAL DIVERTED WASTE** Multiply the property's extrapolated total waste by the category grouping's average diversion rate.

d. **TOTAL DIVERTED FOOD WASTE** Multiply the property's extrapolated diverted waste by the category grouping's average diverted food waste percentage of total diverted waste.

Using the average coefficients determined in Step 2, use the same coefficients for the 3 waste intensity metrics for each grouping for the hotels (Step 3a) for which data needs to be extrapolated and calculate the absolute metrics.

Country	Metro Area	STR Segment	F&B Service Scale	Total number of hotels	Total Floor Area (Sq. M.) (A)	Waste PSM (kg) (B)	Total Waste (kg) (A*B)	Food Waste PSM (kg) (C)	Total Food Waste (kg) (A*C)	Waste Diversion Rate (%) (D)	Total Diverted Waste (kg) ((A*B)*D)
US	Syracuse, NY	Upscale	Limited F&B	6	1,000,000	6.98	6,980,000	2.5	2,500,000	22%	1,527,922
US	Las-Vegas Paradise, NV	Luxury	Multiple F&B	4	2,000,000	11.3	22,600,000	3.2	6,400,000	18%	4,124,500
India	Delhi	Upper Upscale	Multiple F&B	5	1,000,000	12.5	12,500,000	5.4	5,400,000	53%	6,602,500
Singapore	Singapore	Luxury	Multiple F&B	7	3,000,000	8.4	25,200,000	2.9	8,700,000	65%	16,380,000
Singapore	Singapore	Upscale	Limited F&B	3	1,000,000	7.6	7,600,000	2.4	2,400,000	60%	4,560,000
Thailand	Bangkok	Upper Upscale	Full-service F&B	5	2,000,000	9.1	18,200,000	3.7	7,400,000	48%	8,814,260
Total				**30**	**10,000,000**		93,080,000		32,800,000		42,009,182

STEP 4 AGGREGATE THE EXTRAPOLATED PORTFOLIO DATA SET AND THE BASE DATA PORTFOLIO DATA SET

In order to generate portfolio-wide indicators, integrate the extrapolated portfolios into the final data set. This is done by:

1. Adding the totals in each reported waste category to calculate absolute waste/food waste totals.
2. Dividing the absolute waste/food waste totals by portfolio-wide floor area to calculate intensity metrics.
3. Adding any additional measures or intensity metrics, along with any company-specific segmentation.

The aggregate waste diversion data for ABC Hotels & Resorts Ltd is as shown below:

Metro Area	STR Segment	F&B Service Scale	Total Number of Hotels	Total Floor Area (Sq.M.)	Total Waste (kg)	Total Food Waste (kg)	Total Diverted Waste (kg)	Waste PSM (kg)	Food Waste PSM (kg)	Waste Diversion Rate (%)
Syracuse, NY	Upscale	Limited F&B	16	3,000,000	20,940,000	7,500,000	4,583,766	6.98	2.50	22%
Las-Vegas Paradise, NV	Luxury	Multiple F&B	16	7,000,000	79,100,000	22,400,000	14,435,750	11.30	3.20	18%
Delhi	Upper Upscale	Multiple F&B	10	2,000,000	25,000,000	10,800,000	13,205,000	12.50	5.40	53%
Singapore	Luxury	Multiple F&B	13	6,000,000	50,400,000	17,400,000	32,760,000	8.40	2.90	65%
Singapore	Upscale	Limited F&B	9	2,000,000	15,200,000	4,800,000	9,120,000	7.60	2.40	60%
Bangkok	Upper Upscale	Full-service F&B	16	5,000,000	45,500,000	18,500,000	22,035,650	9.10	3.70	48%
			80	**25,000,000**	**236,140,000**	**81,400,000**	**96,140,166**	**9.4**	**3.3**	**41%**

Based on the above information, the average portfolio-wide waste metrics are shown and calculated as below:
** **Waste PSM (kg):** Total Waste / Total Floor Area = 236,140,000 / 25,000,000 = 9.4*
*** **Food Waste PSM (kg):** Total Food Waste / Total Floor Area = 81,400,000 / 25,000,000 = 3.3*
**** **Average Waste Diversion Rate (%):** (Total Diverted Waste / Total Waste) * 100 = (96,140,166 / 236,140,000) * 100 = 41%*

To calculate the waste diversion rate for the portfolio, multiply the number of hotels in each group by the average waste diversion rate for that group. Then sum the totals and divide by the total number of hotels in the portfolio.

DOCUMENTING DECISIONS AND RESULTS

The following checklist is a quick reference to capture key methodology components in this section:

CHECKLIST 3 ***Data Collection and Extrapolation***

Item	Description	Information Input
Data and Assumptions		
Available Portfolio	*• By floor area / rooms / properties* *• Include exclusions*	
Base Data Portfolio	*• By floor area / rooms / properties (%)*	
Extrapolated Portfolio	*• By floor area / rooms / properties (%)*	
Extrapolation Assumptions	*For each grouping type:* *• Grouping name and definition* *• Number of properties in grouping* *• Internal default coefficient* *• Number of properties to be extrapolated for*	
Portfolio Waste Data		
Base Data Portfolio Absolute	*• Total waste/food waste (metric tons)*	
Extrapolated Portfolio Absolute	*• Total waste/food waste (metric tons)*	
Total Portfolio Absolute	*• Total waste/food waste (metric tons)*	
Total Portfolio Intensity	*• Total waste/food waste (kg/sq meter)*	
Total Portfolio Diversion	*• % of total*	

04 AUDITING AND VERIFICATION

PURPOSE | **CLARIFY WHY VERIFICATION IS IMPORTANT AND HOW COMPANIES CAN AUDIT AND VERIFY WASTE DATA.**

Despite the challenges with collecting waste data in an accurate and timely manner, it is important to undertake routine data verification to ensure accuracy of both actual and estimated data that are communicated to stakeholders.

This section gives an overview of the common approaches to verification and various options available, guidance on proper public disclosure of verification, and finally, the necessary steps for companies and/or properties to officially validate the verification process.

The focus of this section is on company-level reporting and refers to hotel waste audits where applicable.[20]

It should be noted that external verification or auditing is not a pre-requisite for public disclosure of data.

04.01 OVERVIEW OF VERIFICATION

Verification is the process of establishing the accuracy or validity of data. This section offers an overview of various waste data verification methods, the specific components that require verification, and a list of suggested verifiers.

A. Types of Verification

It is important to ensure that verification of waste data are undertaken across the different stages of the waste process and calculations. This includes:

1. Physical audit and inspection of waste sources and weights on property to ensure that the different types of waste are identified and measured correctly, and
2. Desktop audit of calculations, assumptions, boundaries, and source data corresponding to publicly reported figures.

This section outlines the method for verifying data and including the level of verification in your reporting. This section does not discuss methods for conducting the physical audit and inspection, other than guidance for frequency and representative sampling of physical audits, by rather provides guidance on the proof and documentation of physical audits and inspections needed to support the data, assumptions, and coefficients being reported.

Beyond these types of verifications, hotels should review the actual treatment of the waste disposals with their waste haulers to ensure haulers' claims are consistent with their practices.

B. Components of Verification

There are several components of the waste data collection and calculation process that need to be verified for accuracy. This includes checking that:

- Actual data are correctly categorized into the appropriate type of waste and method of disposal, are in alignment with this guidance, and are accurately reported by waste type and destination type.
- Actual data have been correctly transferred from their source (i.e., invoice, meter weighing log) for conversion calculations.
- Actual data have been correctly converted into harmonized units of measure.
- Coefficients used for estimated data are representative of the property or company's actual data within reason and in alignment with this guidance. This would include cross-checking coefficients against actual data to identify any significant differences and ensuring that calculations are completed in alignment with this methodology.
- Boundaries and related assumptions used for waste calculations are accurate, reasonable, and in alignment with this guidance, and documented accordingly for reference.
- Formulas used to perform calculations are accurate and free of errors.
- Final data reported externally is consistent with internal calculations and the reporting guidance in Section 5.

20 External verification or auditing is not a pre-requisite for public disclosure of data, but rather a recommendation as best practice.

04.01 OVERVIEW OF VERIFICATION CONTINUED

C. Approved Verifiers

Approved verifiers are categorized into four broad groups: two internal and two external to the company. While all are valid, the further removed the verification party is from the company, the more robust the process will be perceived.

Verification by the four groups occurs as follows:

- Internally by staff that work directly or indirectly with the waste data or calculations at the property or company.
- Internally by a separate team, such as internal auditing.
- Externally by a consultancy that is not independent of the property or company in preparation of related data e.g., a retained sustainability or waste consultant.
- Externally by a third party that is independent of the preparation of related data i.e., an independent audit company paid specifically for this purpose.

At the time of this guidance's publication, no specific, publicly available, and industry-developed hotel waste data auditing protocol or standard exists, or a protocol for certifying an auditor's ability to perform this type of audit. In general, an external audit should be performed by a credible firm with experience in other similar environmental performance data auditing services, such as the Greenhouse Gas Emissions Inventory, and the protocol should likewise follow a proximate one such as ISO 14064:2018 or ISO 14001.

04.02 VERIFICATION INFORMATION TO INCLUDE IN PUBLIC DISCLOSURE

Companies are at different stages of readiness to adhere to all verification best practices but are encouraged to take steps to advance the robustness of verification and provide transparency to all published data. Public disclosure of waste figures should include the following information regarding verification, with report sample statements provided:

- Type(s) of verification undertaken.
- Whether or not third-party assurances have been made on data, and if so, level of assurance made with corresponding statement and named verifier.
- Indication of data figures that have been verified or assured, and boundaries of coverage for inclusion/exclusion.
- Date of last updating of default coefficients (industry or company level) used in quantification of estimated data.

04.03 PERFORMING VERIFICATION

The key steps in conducting a typical verification are:

1. **Planning and Scoping** Together the company or individual hotel and the verifier should prepare a strategic verification plan to ensure that all risks (misstatements, material errors, etc.) are identified, and correct strategies are deployed to detect future risks. The verification plan should also consist of the scope of verification, such as what boundaries to verify, what geographic locations to cover, and upon which methodology the verification will be conducted.
2. **Understanding the Methodology** Before conducting the verification, the verifier must understand the methodology upon which the verification is to be conducted. In particular, it is important to identify within the methodology the facets that require verification, including key data sources, the calculation process, assumptions, and required reporting elements within the waste inventory. Complete the Report Template in Section 5 to ensure clear comprehension of the methodology.
3. **Performing the Verification Process** The key activities within the verification process include:
   - Cross-checking with any onsite audit information (if any have taken place in individual hotels),
   - Understanding operations and systems in individual hotels and across the portfolio,
   - Understanding data tracking files, software, and systems,
   - Understanding the boundary, assumptions, and coefficients used in the calculations,
   - Requesting and reviewing relevant waste data,
   - Cross-checking from source data files (inventory reports, purchase receipts, software inputs, primary data samples, invoices, etc.),
   - Spot checking inventory data gaps, variances, errors, and assumptions,
   - Engaging with relevant stakeholders, and
   - Documenting preliminary results and findings.
4. **Determining and Evaluating the Results** The verifiers should document and evaluate the results in line with the principles of this methodology. This may require the hotel to adjust any material errors or provide explanations.
5. **Reporting the Conclusions** Once all gaps and material errors are resolved, the verifier should provide an opinion on the reported information. The verifier should also issue a verification report containing recommendations for future improvements. The process of verification should be viewed as a valuable input to the process of continual improvement, and a plan should be established to increase the amount of actual data collected in future years.

04.04 CRITERIA FOR VERIFYING AGAINST THIS METHODOLOGY

While we recognize that not all companies seek to present their data as verified on all occasions, hotels and chains can present that their data were verified if they undertake the following steps:

- **For a single hotel property (as a single entity using the methodology – see below for property-level audits as they relate to company reporting)**
  - Physical auditing of all facility waste streams is included in the boundary. The recommended best practice is every 3 to 5 years, with a follow up after 1 year if material errors are identified.
  - Full data auditing to ensure correct transference of source data figures, harmonization of waste types (correct grouping as per the definitions set out in this methodology), and conversion among units for external verification. This should be completed internally on an annual basis with a third-party audit every three years.
  - Full data auditing for third-party external verification of all calculations and assumptions and final data reported externally, in accordance with the stated plan (as outlined per Reporting Section 5)
  - Options for claims to include alongside reported information, depending on path completed:
    - This hotel-level data follows the Hotel Waste Measurement Methodology and was reviewed internally.
    - This hotel-level data follows the Hotel Waste Measurement Methodology and was reviewed internally. The most recent onsite waste audit took place YYYY MM.
    - This hotel-level data follows the Hotel Waste Management Methodology and was reviewed by a third party.
    - This hotel-level data follows the Hotel Waste Management Methodology and was reviewed by a third party. The most recent onsite waste audit took place [YYYY MM].
- **For portfolios**
  - Physical auditing should take place annually with a sample of hotels in the portfolio based on:[21]
    - A sample size equal to the square root of the total number of properties (rounded up to the nearest whole number).
    - At least 25% of the sample should be selected at random, the remainder should be based on representative hotels from each significant market and asset class within the portfolio.
  - Limited data auditing to ensure correct transference of source data figures, harmonization of waste types, and conversion among units for external verification; sampling based on significance (i.e., importance of the group / property to the overall data set.)
  - Full data auditing for third-party external verification of all calculations and assumptions and final data reported externally, in accordance with the company's stated plan.
  - Options for claims to include alongside reported information, depending on path completed:
    - The company-level data follows the Hotel Waste Measurement Methodology and was reviewed internally.
    - The company-level data follows the Hotel Waste Measurement Methodology and was reviewed internally. It includes the onsite audits of sample hotels specified by the methodology.
    - The company-level data follows the Hotel Waste Measurement Methodology and received third party assurance.
    - The company-level data follows the Hotel Waste Measurement Methodology and received third party assurance. It includes the onsite audits of sample hotels specified by the methodology.

DOCUMENTING DECISIONS AND RESULTS

The following checklist is a quick reference to capture key methodology components in this section:

CHECKLIST 5 ***Auditing and Verification***

Item	Description	Information input
Types of Verification		
Physical Audit of Waste Sources	• % of portfolio or list properties • Name of person/entity undertaking audit • Date of audit • Audit outcome	
Physical Audit of Waste Destinations	• % of portfolio or list properties • Name of person/entity undertaking audit • Date of audit • Audit outcome	
Desk Audit of Data	• % of portfolio or list properties • Name of person/entity undertaking audit • Date of audit • Audit outcome	

21 Based on criteria set out by the IAF Mandatory Document for the Audit and Certification of a Management System Operated by a Multi-Site Organization https://www.iaf.nu/upFiles/MD1Issue2Jan2018Pub29012018.pdf

05 REPORTING

PURPOSE | PROVIDE A TEMPLATE FOR DOCUMENTING AND REPORTING ASSUMPTIONS, CALCULATIONS, AND RESULTS.

In each chapter of this methodology there is a section that outlines a template for documenting the steps taken to calculate the waste and food waste data at property and portfolio level. The template in this section is the combination of these individual sections into one full reporting template.

The template is deliberately top level with the assumption that each company will have their own processes and documents to use in coordination. The purpose of this template is to track that the methodology is followed and to note any deviations or exceptions that may be relevant to the comparable metrics, therefore highlighting any differences across companies and ensuring that comparison is clear and fair.

Item	Description	Information input
General Information		
Name of company		
Contact Information		
Date		
Link/name of previous		
Boundaries		
Temporal boundary	• Timeframe (eg 12 months) • Months (eg. Jan – Dec) • Year (eg. 2019)	
Organizational boundary	• Operations/business units excluded • Specific business units excluded • Geography • Property type • Any other exclusions	
Waste types	• Any deviations from recommended approach	
Waste destinations	• Any deviations from recommended approach	
Floor area	• Total floor area in square meters • Any deviations from recommended approach	
Metrics		
Comparable measures	• Confirm comparable measures to be calculated and necessary data to be collected	
Additional measures	• Identify additional measures to be calculated and necessary data to be collected (e.g., revenue or customer numbers)	
Data and assumptions		
Property information	• Total floor area	
Available portfolio	• By floor area / rooms / properties • Include exclusions	
Base data portfolio	• By floor area / rooms / properties (%)	
Extrapolated portfolio	• By floor area / rooms / properties (%)	

Extrapolation assumptions	For each grouping type: • Grouping name and definition • Number of properties in grouping • Internal default coefficient • Number of properties to be extrapolated for	
Portfolio waste data		
Actual portfolio absolute	• Total waste and/or food waste (metric tons)	
Extrapolated portfolio absolute	• Total waste and/or food waste (metric tons)	
Total portfolio absolute	• Total waste and/or food waste (metric tons)	
Total portfolio intensity	• Waste and/or food waste (kg/sq meter)	
Total portfolio diversion	• % of total	
Verification		
Physical audit of waste sources	• % of portfolio or list properties • Name of person/entity undertaking audit • Date of audit • Audit outcome	
Physical audit of waste destinations	• % of portfolio or list properties • Name of person/entity undertaking audit • Date of audit • Audit outcome	
Desk audit of data	• % of portfolio or list properties • Name of person/entity undertaking audit • Date of audit • Audit outcome	
Progress and Targets (if applicable)		
Baseline year	• Year	
Target year	• Year	
Target	• % reduction target • % diversion rate to be achieved	
Progress	• % reduction achieved • % target achieved	

A APPENDICES

A.01 VOLUME TO WEIGHT CONVERSION GUIDANCE

The Hotel Waste Measurement Methodology requires waste to be reported in weight. However, weight data may not be readily available. Where that is the case, hotels will need to measure waste volumetrically (using the volume of waste within the hauling bins) and then convert those measurements into weights.

Converting volume to weight metrics can present challenges. For example:

- unavailability of conversion factors,
- limited knowledge on how to apply the conversion factors, and/or
- limited guidance on the conversion methodology

This appendix provides step-by-step guidance on volume-to-weight conversion that is relevant, uniform, and consistent across the hotel industry. The appendix also contains:

i) volume and type of common waste bins (section A.2),

ii) a comprehensive list of default volume to weight conversion factors for several waste types (Section A.3), and

iii) common volume unit conversions (section A.4).

The steps involved in a typical volume to weight conversion are:

1 DETERMINE THE VOLUME OF YOUR WASTE BIN

For each waste stream, determine the volume of the bin in which the waste is being hauled. One of the following methods may be used to determine the volume of the waste bin for each waste type:

1. Request the volume information of the bin from the waste contractor or vendor,
2. Record the volume labeled directly on the bin, or
3. Estimate the volume of the bin using Section A.2 which provides the types and volumes of common waste bins.

2 DETERMINE THE NUMBER OF BINS HAULED PER MONTH FOR EACH WASTE STREAM

Record the total number of bins for each waste stream emptied by your waste contractor or vendor. The approach to determine the number of bins emptied each month is:

1. Determine the number of bins hauled per month using bills/invoices generated by your waste contractor/vendor,
2. Determine the number of bins emptied each month using internal records or database, or
3. If the number of bins emptied on a weekly basis is known, multiply by 52 and divide by 12 for the monthly average.

For example:

If you have three 360-liter bins for bottles and cans and two 360-liter bins for mixed paper and cardboard emptied on a weekly basis, then the total number of bins emptied in one month is equivalent to 13 and 8.7 respectively.

Number of bins hauled each month = *(Number of bins hauled weekly X 52) / 12*

Waste Type	Volume of bin (liters)	Frequency of bin emptied weekly	Bins hauled in one year	Bins hauled each month	Total Volume per month (Liters)
Bottles and Cans	360	3	3*52 = 156	156 / 12 = 13	4,680
Mixed paper and cardboard	360	2	2*52 = 104	104 / 12 = 8.7	3,132

A.01 VOLUME TO WEIGHT CONVERSION GUIDANCE CONTINUED

3 ESTIMATE THE LEVEL OF BIN FILL

Bin fill level (%) indicates how full the bin is to give an accurate quantity of waste generated or recycled. The three options to determine bin fill level are:

1. Request information on bin fill level from the waste vendor/contractor,
2. Estimate the average bin fill level by general observations, or
3. If none of the above two options are available, you may use between 80-90%[22] as the default average bin full level.

Note that it is possible for a bin to be filled above 100% if it is routinely overflowing past the top opening when picked up.

4 IDENTIFY RELEVANT VOLUME TO WASTE CONVERSION FACTOR

Based on section A.3, identify the most relevant volume to weight default conversion factor that is applicable for each waste stream, material type, and waste format (i.e., whether the waste is compacted, baled, or loose, etc.).

How to determine weight given as a range in Section A.3

There are various waste streams for which the volume to weight conversion factor is given as a range. For such waste streams, determining the exact weight factor may be challenging. In that instance, there is no definite approach to determine the weight and it depends on the property to adopt the most relevant method to determine exact weight within that range. Some key points to consider are:

- **How densely packed is the material?**
  Weight and density have a direct relationship in that an increase in density increases the weight of the material. Two different waste materials that occupy the same volume may differ in their weights depending on their density. Thus, for a material that is densely packed, it should take the higher end of the range, while the same material that is loosely packed should take the lower end of the range.
- **What type of material is the waste made of?**
  As materials differ in density and therefore in weight, appropriate estimations should be made considering the material of the waste.

5 HARMONIZE VOLUME-TO-VOLUME UNIT

A volume-to-volume unit conversion may be required if the volume in Step 1 is different from the default volume unit given in Section A.3. Therefore, a volume-to-volume conversion will be required to harmonize units and correctly implement the volume-to-weight conversion factors. Section A.4 provides common volume-to-volume unit conversions as a reference. Other appropriate publicly available conversion sources can also be used as reference.

For example:

1. If in Step 1 the volume of a waste bin is measured in cubic feet yet the volume unit is in cubic yards in the volume-to-weight conversion table (Section A.3), a volume-to-volume conversion from cubic feet to cubic yards is required.
2. If the volume of a waste bin is measured in cubic yards and the default volume-to-weight coefficient in Section A.3 is also given in cubic yards, then simply multiply by 1.

Waste Type	Volume of waste bin (i)	Default Volume unit (ii)	Weight Equivalent to default volume unit - lbs (iii)	Volume to volume unit conversion (iv)	Weight Equivalent to Volume of waste bin in lbs - (iv X iii)
Food Waste	3 Cubic Feet	1 Cubic Yard	463	0.111 Cubic Yard*	51.393
Mixed Paper	1 Cubic Yard	1 Cubic Yard	323	1 Cubic Yard**	323

**1 cubic foot = 0.037 Cubic Yard, so 3 cubic feet is equivalent to 0.111 cubic yard.*
*** since both volume of waste bin and default volume unit are in cubic yard therefore remains same as 1 cubic yard.*

22 The range of 80-90% is a reasonable range based on commonly observed industry work and in consultation with the Working Group. This range will be updated in the forthcoming versions of the methodology as more physical auditing data are available.

A.01 VOLUME TO WEIGHT CONVERSION GUIDANCE CONTINUED

6 CALCULATE FINAL WEIGHT

For each waste stream, calculate the total weight of the waste for each month using the formula below (the step number is given in parentheses):

Weight per Month (6) = *Volume of Waste Bin (1) X Number of Dumpsters Emptied Each Month (2) X Bin Fill Level (3) X Identify Volume to Weight Coefficient (4) X Harmonize Volume to Volume Unit (5)*

Note: The examples shown in the table below are shown as an illustrative example and the actual figures for Step 1, 2, and 3 may differ in real life and may vary from hotel to hotel.

Waste Category	Volume of waste bin (Step 1)	Number of bins emptied per month (Step 2)	Bin Fill Level (%) (Step 3)	Conversion Factor				Volume to Volume Unit (Step 5)	Weight per Month (lbs) (Step 6)
				Default Volume	Volume Unit	Weight Equivalent (lbs) (Step 4)	Source		
Commingled Recyclables (Mixed Containers)	1 cubic yard	4	80%	1	Cubic Yard	111	US EPA	1*	355.2
Mixed Food Waste	4 cubic yards	2	70%	1	Cubic Yard	463	US EPA	1*	2,592.8
MSW – Landfill	10 cubic yards	3	80%	1	Cubic Yard	1700	US EPA	1*	40,800
Mixed Yard Waste – Uncompacted	3 cubic meters	1	80%	1	Cubic Yard	250	US EPA	1.31 Cubic Yards**	786
Mixed Paper	2 cubic feet	1	80%	1	Cubic Yard	323	US EPA	0.04 Cubic Yards**	20.7
Total WASTE per month (lbs)									**44,554.7**

** No Volume-to-Volume unit conversion is required in this example as both units of waste bins and default factor are in cubic yards therefore multiplied by 1.*

*** In both cases, the volume unit of the waste bin is different from the volume unit given in the default factor (i.e., in cubic yard), therefore a volume-to-volume standardization is needed. 1 Cubic Meter = 1.31 Cubic Yards and 1 Cubic Foot = 0.04 Cubic Yards.*

A.02 COMMON BIN TYPES AND VOLUME

FRONT-OF-HOUSE BINS

1. GEOCUBE RECYCLING STATION

Product Dimensions	Volume	Use
15” x 15” x 36”	0.17 cubic yards	Mixed Recycling
0.381 m x 0.381 m x 0.91 m	0.13 cubic meters	

Source: GeoCube Recycling Station. www.RecycleAway.com

2. SPECTRUM RECYCLING STATION

Product Dimension	Volume	Use
15.75” x 15.75” x 30.37”	0.12 cubic yards	Multipurpose Recycling and Waste Disposal
0.40m x 0.40m x 0.77m	0.09 cubic meters	

Source: Spectrum Recycling Station. www.RecycleAway.com

3. GLARO RECYCLE PRO LARGE CAPACITY

Product Dimensions	Volume	Use
28.5" x 24" x 12"	0.14 cubic yards	Multipurpose
0.72m x 0.60m x 0.30 m	0.11 cubic meters	

Source: Glaro Recycle Pro Large Capacity. www.RecycleAway.com

3. KEENE RECYCLE BINS

Product Dimensions	Volume	Use
58” × 21” × 38”	0.39 cubic yards	Multipurpose
1.47 m x 0.53m x 0.96 m	0.30 cubic meters	

Source: Keene Recycle Bins. www.RecycleAway.com

A.02 COMMON BIN TYPES AND VOLUME CONTINUED

BACK-OF-HOUSE BINS

80 L 150 L 500 L

VARIOUS TYPES OF WASTE SACKS/BAGS

Volume (m3): 0.08, 0.15, and 0.5

Volume (yd3): 0.10, 0.196, and 0.65

Source: www.recycleaway.com

360 L 240 L 120 L

2-WHEELED WASTE BINS

Volume (m3): 0.120, 0.24, and 0.36

Volume (yd3): 0.157, 0.31, and 0.47

Source: https://mgplastics.com.au/2-wheel-plastic-bins-wheelie-bin-supplier

660 L 1,100 L

4-WHEELED WASTE BINS

Volume (m3): 0.66 and 1.1

Volume: (yd3): 0.86 and 1.4

Source: https://www.w-weber.com/en/mobile-waste-containers/mobile-waste-containers-1100-l-rl-lil.html

TRASH SKIPS

Volume (m3): 3 - 9

Volume (yd3): 3.9 - 11.8

Source: https://www.komwag.cz/en/waste/types-of-container

A.02 COMMON BIN TYPES AND VOLUME CONTINUED

COMPACTORS

CRAM-A-LOT SELF-CONTAINED TRASH COMPACTORS

Volume (m3): 0.76 – 1.91

Volume (yd3): 1 – 2.5

Source: https://www.cram-a-lot.com/self-contained-compactors

CRAM-A-LOT STATIONARY TRASH COMPACTORS

Volume (m3): 1.53 (small) – 9.17 (large)

Volume (yd3): 2 (small) – 12 (Large)

Source: https://www.cram-a-lot.com/large-compactors

CRAM-A-LOT PRE-CRUSHER TRASH COMPACTORS

Volume (m3): 2.29 – 5.35

Volume (yd3): 3 – 7

Source: https://www.cram-a-lot.com/pre-crushers

CRAM-A-LOT FRONT LOAD APARTMENT COMPACTORS

Volume (m3): 1.53 – 2.29

Volume (yd3): 2 – 3

Source: https://www.cram-a-lot.com/apartment-compactors

A.03 STANDARD VOLUME TO WEIGHT COEFFICIENTS US EPA

Waste Category	Waste Type	Volume (Imperial System)	Estimated Weight (lbs)	Volume (Metric system)	Estimated Weight (kgs)
Hazardous Waste	**Lead-Acid Battery**				
	Auto	one unit	36	one unit	16
	Truck	one unit	47	one unit	21
	Other				
	Fluorescent bulbs (4ft)	one	0.625	one	0.28
	Pencil cells/household batteries	gallon	10.909	liter	1.31
Carpeting	**Carpet**				
	Carpet	cubic yard	147	cubic meter	87
	Carpet Padding	cubic yard	62	cubic meter	37
Commingled Recyclable Materials	**Containers (Plastic bottles, Aluminium cans, Steel cans, Glass bottles) and Paper**				
	Commingled Recyclables	cubic yard	262	cubic meter	156
	Containers (Plastic bottles, Aluminium cans, Steel cans, Glass bottles), Corrugated Containers and Paper				
	Campus Recyclables	cubic yard	92	cubic meter	55
	Commingled Recyclables	cubic yard	111	cubic meter	66
	Containers (Plastic bottles, Aluminium cans, Steel cans, Glass bottles) – No paper				
	Campus Recyclables	cubic yard	70	cubic meter	42
	Commingled Recyclables	cubic yard	67	cubic meter	40
	Commercial Recyclables	cubic yard	113	cubic meter	67
	Containers (Cans, Plastic) - No glass				
	Campus Recyclables	cubic yard	32	cubic meter	19
	Containers (Cans, Plastic) and Paper - No glass				
	Residential Recyclables	cubic yard	260	cubic meter	154
	Containers (Food/beverage, Glass) Corrugated Containers and Paper				
	Commercial Recyclables	cubic yard	88	cubic meter	52
	Commercial Recyclables	cubic yard	58	cubic meter	34
	Multifamily Recyclables	cubic yard	96	cubic meter	57
	Multifamily Recyclables	cubic yard	51	cubic meter	30
	Single family Recyclables	cubic yard	126	cubic meter	75
	Containers (Food/beverage, Glass) Corrugated Containers and Paper- No glass				
	Campus Recyclables	cubic yard	139	cubic meter	82
	Commercial Recyclables	cubic yard	155	cubic meter	92
Electronics	**Mixed Electronics**				
	Brown Goods	cubic yard	343	cubic meter	203
	Computer-related Electronics	cubic yard	354	cubic meter	210
	Other Small Consumer Electronics	cubic yard	438	cubic meter	260

A.03 STANDARD VOLUME TO WEIGHT COEFFICIENTS CONTINUED

Waste Category	Waste Type	Volume (Imperial System)	Estimated Weight (lbs)	Volume (Metric system)	Estimated Weight (kgs)
Food	Fats, Oils, Grease	55-gallon Drum	412	208.2-liters Drum	187
	Organics - commercial	cubic yard	135	cubic meter	80
	Source Separated Organics - commercial	cubic yard	1000	cubic meter	593
	Food Waste - restaurants	cubic yard	396	cubic meter	235
	Food Waste	cubic yard	463	cubic meter	275
	Food Waste	cubic foot	22-45	cubic meter	352 - 751
	Food waste - university	gallon	3.8	Liter	0.455
	Food Waste	64-gallon toter	150	242.7-liters toter	68
	Food waste	2 cubic yards full towable	2736	1.53 cubic meters full towable	1241
Glass	**Bottles**				
	Loose	cubic yard	380	cubic meter	225
	Broken Glass	cubic foot	90	cubic meter	1441
Metals	**Aluminium Cans**				
	Uncompacted	cubic yard	46	cubic meter	27
	Uncompacted	case = 24 cans	0.7	case = 24 cans	0.32
	Baled	cubic yard	250-500	cubic meter	148-297
	Steel Cans				
	Whole	cubic yard	50-175	cubic meter	30-104
	Baled	cubic yard	700-1,000	cubic meter	415-593
	Steel Cans - Institution				
	Whole	can	0.09	can	0.041
	Whole	cubic yard	136	cubic meter	81
Paper	**Newsprint**				
	Loose	cubic yard	360-800	cubic meter	214-475
	Baled	cubic yard	750-1,000	cubic meter	445-593
	Books - paperback, loose	cubic yard	428	cubic meter	254
	Old Corrugated Containers				
	Flattened	cubic yard	106	cubic meter	63
	Baled	cubic yard	700-1,100	cubic meter	415 - 653
	Old Corrugated Containers and Chip Board				
	Uncompacted	cubic yard	74.54	cubic meter	44
	Office Computer Paper				
	Loose	cubic yard	375-465	cubic meter	222-276
	Compacted/Baled	cubic yard	755-925	cubic meter	448-549
	Mixed Paper				
	Loose	cubic yard	110-380	cubic meter	65 – 225
	Loose	cubic yard	323	cubic meter	192
	Compacted	cubic yard	610-755	cubic meter	362-448
	Shredded	cubic yard	128	cubic meter	76
	Mixed Baled	cubic yard	1,000-1,200	cubic meter	593-712

A.03 STANDARD VOLUME TO WEIGHT COEFFICIENTS CONTINUED

Waste Category	Waste Type	Volume (Imperial System)	Estimated Weight (lbs)	Volume (Metric system)	Estimated Weight (kgs)
Paper	**Corrugated Paper**				
	Corrugated paper (compacted)	cubic yard	400	cubic meter	237
	Corrugated paper (uncompacted)	cubic yard	74.54	cubic meter	44
	Miscellaneous				
	Cartons (milk and juice) uncrushed	cubic yard	50	cubic meter	30
Plastic	**PET**				
	PET Bottles - baled	30"x42"x 48"	525-630	0.76mx1.07mx 1.22m	238-286
	PET Thermoform - baled	30"x42"x 48"	525-595	0.76mx1.07mx 1.22m	238-270
	HDPE				
	HDPE Dairy - baled	30"x42"x 48"	525-700	0.76mx1.07mx 1.22m	238-318
	HDPE Mixed - baled	30"x42"x 48"	525-700	0.76mx1.07mx 1.22m	238-318
	Mixed PET and HDPE				
	Loose	cubic yard	32	cubic meter	19
	Mixed Bottles/Containers #1 - #7				
	Loose	cubic yard	40.4	cubic meter	24
	Film				
	LDPE, loose	cubic yard	35	cubic meter	21
	LDPE, compacted	cubic yard	150	cubic meter	89
	LDPE, baled	30" x 42" x 48"	1100	0.76mx1.07mx 1.22m	499
	Miscellaneous				
	Trash Bags	cubic yard	35	cubic meter	21
	Grocery/Merchandise Bags	cubic yard	35	cubic meter	21
	Expanded Polystyrene Packaging/Insulation	cubic yard	32	cubic meter	19
Textiles	**Mixed Textiles**				
	Loose	cubic yard	125-175	cubic meter	74-104
	Baled	cubic yard	600-750	cubic meter	356-445
Wood	**Wood**				
	Wood Chips, green	cubic yard	473	cubic meter	281
	Wood Chips, dry	cubic yard	243	cubic meter	144
	Saw Dust, wet	cubic yard	530	cubic meter	314
	Saw Dust, dry	cubic yard	275	cubic meter	163
	Pallets	one	25	One	11
	Pallets and Crates	cubic yard	169	cubic meter	100
	Christmas Trees, loose	cubic yard	30	cubic meter	18

A.03 STANDARD VOLUME TO WEIGHT COEFFICIENTS CONTINUED

Waste Category	Waste Type	Volume (Imperial System)	Estimated Weight (lbs)	Volume (Metric system)	Estimated Weight (kgs)
Yard Waste	**Yard Trimmings**				
	Leaves	cubic yard	250-500	cubic meter	148-297
	Leaves (Minnesota)	cubic yard	300 - 383	cubic meter	178-227
	Mixed Yard Waste				
	Uncompacted	cubic yard	250	cubic meter	148
	Compacted	cubic yard	640	cubic meter	380
	Prunings & Trimmings	cubic yard	127	cubic meter	75
	Branches & Stumps	cubic yard	127	cubic meter	75
Municipal Solid Waste	**MSW – Commercial**				
	Commercial - dry waste	cubic yard	56-73	cubic meter	33-43
	Commercial - all waste, uncompacted	cubic yard	138	cubic meter	82
	Mixed MSW - Residential, Institutional, Commercial				
	Uncompacted	cubic yard	250-300	cubic meter	148-178
	Compacted	cubic yard	400-700	cubic meter	237-415
	Mixed MSW - Multifamily uncompacted	cubic yard	95	cubic meter	56
	MSW – Landfill				
	Compacted - MSW Small Landfill with Best Management Practices	cubic yard	1,200-1,700	cubic meter	712-1009
	Compacted - MSW Large Landfill with Best Management Practices	cubic yard	1,700-2,000	cubic meter	1009-1187
	Compacted - MSW Very Large Landfill with Best Management and Cover Practices, Combined MMSW/Industrial/and other solid waste, or/and Leachate Recirculation	cubic yard	>2,000	cubic meter	>1186

A DRAFT 16 UK WASTE CLASSIFICATION SCHEME, DEPARTMENT FOR ENERGY, FOOD AND RURAL AFFAIRS

Type of waste	Conversion factor (CF)	
	Metric System (Tonne[23] per cubic meter)	Imperial System (Ton[24] per cubic yard)
Rock and stone	1.2	1.42
Glass (cullet)	0.75	0.89
Concrete and/or mortar	1.3	1.54
Mixed construction and demolition	1.2	1.42
Plaster	1	1.19
Paper and/or card	0.6	0.71
Wood	0.7	0.83
Vegetable matter including food and bark	0.75	0.89
Household	0.27	0.32
Street sweepings and litter	0.2	0.24
Sewage	1	1.19
Healthcare sharps	0.2	0.24

A.04 COMMON VOLUME CONVERSIONS

Unit	liter (L)	cubic meter (m^3)	cubic foot/feet (ft^3)	gallon (gal) [US liquid]	Cubic yard (yd^3)
1 liter (L)	1	0.001	0.03531	0.26417	0.00131
1 cubic meter (m^3)	1000	1	35.31467	264.17205	1.30795
1 cubic foot/feet (ft^3)	28.31685	0.02832	1	7.48052	0.03704
1 gallon (gal) [US liquid]	3.78541	0.00379	0.13368	1	0.00495
1 cubic yard (yd^3)	764.55486	0.76455	27	201.974	1

23 The UK Metric unit of mass i.e., 1 Tonne = 1000 kgs

24 The US Short Ton i.e., 1 Ton = 907.18 kgs

B DATA SCENARIO AND ACTION TOOL

The aim of this tool is to provide appropriate data actions and guidance depending on the kind of data available for each property for total waste, diverted waste, total food waste, and diverted food waste. The type of data could be:

- Complete - When the selected waste data are complete for full 12 months and all measured waste types at the hotel are included,
- Partial - When not all measured waste types at the hotel are included, or
- Missing - When the corresponding data are not measured at the hotel even though it exists.

For each combination of data available, a specific instruction is given in terms of how to address gaps. Users should input the combination according to the details relevant by property, and document the specific actions taken. This may involve no action, extrapolation, and/or use of industry coefficients depending on the data type(s) missing.

Please find the excel spreadsheet here.

C SCENARIOS OF PROPERTY WASTE DATA COLLECTION CHALLENGES

This section lists common challenges when collecting waste data and a proposed solution to each.

- We do not have waste disposal/destination data but have data based on purchases or other general weighting.
  - ***Approach: Use the property estimations matrix to determine the best method for estimating with what is available. Waste data should not be determined based on purchases, but instead on disposal amounts.***
- We send waste to recycling/compost but we don't know whether recycling/composting streams are actually diverted once picked up.
  - ***Approach: If you are notified by the hauler regarding certain pulls that were contaminated and discarded, then those values should be considered waste to landfill. Otherwise, the current methodology considers that 100% of the material hauled to those destinations has been diverted.***
- Our hauler sometimes brings us different sized bins for our recyclables, so we don't have a consistent bin to estimate volume-to-weight.
  - ***Approach: Request that the hauler provides consistent bins as part of the contract or request that the hauler provides actual weight data per lift. In the interim, identify and calculate the volume-to-weight conversion of each bin type that is provided, and either tally or estimate the number or % of each bin that was hauled within the period to arrive at the final amount.***
- Some of our landfilled waste is compacted, but other waste within the same stream is not.
  - ***Approach: If you need to convert from volume to weight, then choose the appropriate coefficient in Appendix A for each. If you can receive the data in weight, then the difference in compacted and uncompacted waste will not be an issue.***
- We had to throw out some durable goods, but the total amount was small and it was added to the compactor. Should that be separately noted?
  - ***Approach: You do not need to subtract out durable goods from the total amount as they can be included per this methodology. However, separate hauling of durable goods should be measured and logged when it occurs.***
- A supplier has agreed to take back some of the packaging, but we do not know if it is being recycled, discarded, or reused.
  - ***Approach: Ask the supplier about how the packaging is handled. Unless they indicate that they are discarding it to landfill, consider it diverted and request volumes or amounts as available.***
- Our compost bin sometimes becomes contaminated with other forms of waste, but the hauler does not tell us the difference between what was removed vs. composted, or if the bin was too contaminated and thrown out altogether.
  - ***Approach: If you are notified by the hauler regarding certain pulls that were contaminated and discarded, then those values should be considered waste to landfill. Otherwise, the current methodology considers that 100% of the material hauled to compost has been diverted.***
- We had a catered event where many beverages were served in glass bottles. The bottles were recycled but now the diversion rate and total waste per square meter is not within a normal range for that month.
  - ***Approach: The figures should still be included and not otherwise normalized. Record this information as the driver for the anomaly spike in figures from one month to the next within the upcoming and final reports. Note that the data would not be representative if used for any estimation or gap filling needs.***

D SINGLE PROPERTY FOOD WASTE AND TOTAL WASTE ESTIMATION COEFFICIENTS

Excel spreadsheet with industry coefficients can be found here.

This file contains industry wide waste coefficients for four comparable intensity metrics denoted by the measures below across different hotel segmentation types (F&B, STR chain scale and Stars):

- M1: Waste per square meter (Waste PSM)
- M3: Food waste per square meter (Food waste PSM)
- M9: Waste diversion rate (%)
- M10*: Food Waste Ratio (%)
- M11**: Food waste diversion rate (%)

* Total food waste / Total waste

**Please note that food waste diversion rate coefficients have not been included due to limited data on food waste diversion. However, the prevalence of food waste diversion data have been given by the partners, it was just not extensive enough to develop these coefficients.

E DEFINING DEFAULT COEFFICIENTS

Industry-wide default coefficients have been calculated to support hotel companies in estimating waste data where certain data are incomplete or missing. Waste data for the calendar year of 2018 were received from more than 13,000 hotels across the brands represented in the industry working group and analyzed according to the following methodology in order to calculate the default coefficients:

1. Waste intensity (kg per square meter),
2. Food waste intensity (kg per square meter),
3. Waste diversion rate (%), and
4. Food waste as a proportion of total waste (%).

Due to lack of data, it was not possible to calculate a default coefficient for Food Waste Diversion, and this will be addressed in further work and updates of this methodology guidance.

The methodology follows the same approach as the Cornel Hotel Sustainability Benchmarking (CHSB) Index, on which further details can be found here.

Steps to output default coefficients include:

1. Harmonization of monthly waste data according to the waste types outlined in Table 1, Section 1 of this guidance document.
2. List floor area and monthly occupied rooms for each property.
3. Map each property for each of the following geographic boundaries, using a harmonization method of city and country names:
   a. Metro area (Metropolitan Statistical Area in the US, or greater metro area, national capital region, etc.) based on street address
   b. Country
4. Map each property for its segmentation by:
   a. Hotel type or location segment
   b. STR chain scale segment
   c. Limited service or full service
   d. F&B Service Scale:
      i. Hotel has no F&B (default categorization 1-star economy hotel)
      ii. Hotel's F&B is limited to a breakfast buffet, and/or lobby café/bar (default categorization a limited-service hotel)
      iii. Hotel has a full-service restaurant serving at least 2 meals daily, banquet F&B catering for function space, and room service (default categorization a 3 or 4-star full-service hotel)
      iv. Hotel has multiple restaurant outlets with breakfast, lunch, dinner, banquet F&B catering for various functions and events, and room service (default categorization a resort, a 5-star hotel or a hotel with over 500 rooms)
5. Validity test to flag referential data set for discards:
   a. Incomplete occupancy data or levels
   b. Incomplete monthly waste data
   c. High and low thresholds of waste diversion rates
   d. High and low thresholds of ratio of food waste to total waste
   e. High and low outliers using histogram distribution and manual setting of floors and ceilings based on data observation, adjusted from a default of the top 5% and bottom 5% of the data set for waste intensity per square meter and per occupied room within the respective segmentation of asset class and F&B service scale (whether full or limited service),
6. Output the following comparable intensity metrics for each property, as available:[25]
   a. Total waste per square meter
   b. Total food waste per square meter
   c. Waste diversion rate
7. Output benchmarks as available per geography and segment, with a minimum of 8 properties in each geography and respective segment to produce a benchmark that can be used as a default metric. Additionally, a global default was generated for all data received in each intensity metric. Please see tables in the coefficient spreadsheet for details on hotel number counts for each metric.

25 Due to limited data on food waste, food waste diversion rate coefficients have not been output. However, the prevalence of food waste diversion across different geographies have been given as reference.

F LIMITATIONS AND METHODOLOGY IMPROVEMENT

Several issues and challenges arose as the methodology was developed, requiring further research and data to fully address. Updates will be made as appropriate in subsequent iterations. If you have any data or information that may help to address these limitations, please connect with the Greenview Team by sending an email to info@greenview.sg

1. The Challenge of Normalizing Waste Intensity Metrics

Intensity metrics are commonly used to enable comparison of performance across all types of hotels. For energy, the commonly used denominator to derive intensity is floor area, as energy usage tends to increase in some proportion the floor area that is lit and conditioned. For water usage, either occupied rooms or guest nights are used, as the primary driver of water usage is the use of guest bathrooms and washing of guestroom linen.

Several comments were received in the external consultation feedback for developing this methodology, to use occupied rooms, guest nights, or food covers instead of floor area as the comparable metric. While this methodology recognizes that floor area is not necessarily an adequate measure for deriving waste and food waste intensity, there is limited availability of a better option. Food covers are a straightforward driver of food waste for restaurant operations; yet hotels potentially have a much more complex range of sources of waste and food waste, and no definitive data set or study has transparently provided rationale for using only one driver or a combination of several drivers. Furthermore, the business model of hotels and their incorporation of food and beverage operations is shifting, which has increased and will continue to evolve with the COVID-19 pandemic.

The approach for this methodology has been to use floor area in the short term with the understanding that additional data made available through this methodology will allow for improved development of intensity metrics going forward. Alternatively, if food covers, guest nights, or another occupancy metric were used as the standard in this methodology, there would have been an increased risk of solidifying the use of an inadequate intensity metric within the industry.

As a similar example, hotel financial performance was insufficiently compared with just an occupancy rate or average daily rate (ADR), which led to the blended metric of Revenue per Available Room (RevPAR) as an industry standard that defines the boundaries of what and how to include as revenue, an available room, and an occupied room.

In order to develop an appropriate and tested metric or set of metrics for waste and food waste, the following potential drivers of waste will need to be studied and defined for their boundaries and their respective weighting needs in a final, blended, RevPAR-esque metric that addresses three key challenges further elaborated on below:

1. Defining a "cover" in the hotel context, as different types of covers will generate different amounts of waste, and may or may not be guests (or a guest may be multiple covers in one overnight);
2. Addressing the range of kitchen operations in a hotel that will carry different amounts of waste based on the business model; and
3. Addressing other facility amenities that will generate waste but are not related to food covers or overnight guests.

Defining a "cover"

- Restaurant covers, which may or may not be overnight guests, or partially overnight and partially not overnight at the same table
- Room service orders where the number of covers is uncertain
- Banquet/meeting attendees that have meal covers, but may not be hotel guests
- Boardroom and other meetings that have coffee breaks only, some of which are shared among meetings, who may not be hotel guests
- Meetings that have cocktails and hors d'oeuvres, who may not be hotel guests
- Bar covers with no food other than bar snacks and condiments
- Staff canteen meals, which do not include guests or covers, but may be a significant driver of waste and food waste
- Hotels that incorporate an in-house co-working space that may have some food and beverage operation, or generate additional but uncertain numbers of covers due to day guests

Range of restaurant models generating covers

- Continental breakfast buffet covers at limited-service properties where food is pre-packaged or prepared from vendors offsite, which generates onsite food waste but no prep waste
- Pre-packaged food sold in the reception area at limited-service properties, which generates some small amount of food waste but no prep waste
- Onsite outsourced coffee shops that have no segregated waste streams from the rest of the hotel, and a potentially high number of covers that also may be unknown
- The growing trend of ordering food delivery from a local restaurant directly or via a company, which generates food and packaging waste from guest ordering outside the hotel, but the hotel will not have cover counts

F LIMITATIONS AND METHODOLOGY IMPROVEMENT CONTINUED

- Hotels that offer delivery service for in-house restaurants or host kitchens for separately branded restaurant concepts, which generate prep waste within the hotel facility, but not leftover food waste or packaging waste for the offsite deliveries
- Consolidation of hotel kitchens across a portfolio, where one hotel operates a host kitchen that services several other hotels in the immediate vicinity, generating disproportionate amounts of prep waste and leftover food/packaging waste

Additional amenities to define as a guest for other types of waste

- Spa covers, which may or may not be overnight guests
- Fitness center users, which may or may not be overnight guests, and may have monthly membership access for residents
- Day use guests for resorts, who are not overnight guests
- Landscaping/garden waste that is driven by size of landscaped area and not correlated guests

Further engagement and analysis can be done for the next version of this method to define a standard industry metric for waste and food waste that is representative of a hotel's structure and operation and enables fair comparison in commonly defining boundaries and weighting.

2. Definition of floor space / conditioned space

There are challenges around the definition of floor space and whether it includes total conditioned space or total square footage. The agreement for the purposes of this version of the methodology was to use 'total conditioned space' which is in line with USALI and HCMI. However, this will require further review in subsequent updates of the methodology.

3. Hazardous waste

Further work needs to be done to determine how diversion rates should be calculated when incorporating hazardous wase or universal waste, which by law cannot be sent to landfill or incineration, and thus limit the total amount of potential diversion of waste.

4. Kitchen grease

For the purposes of this first iteration, kitchen grease (from cooking oil or food byproduct) is not included in the food waste boundary. At a high level, this is because it is the aim of WWF in producing this guidance is to drive a reduction in overall food waste across the hotel industry. Given the weight and quantity of kitchen grease that is captured in a grease trap and then recycled, there is a risk that it would skew diversion rate data if it were included in the food waste boundary. Thus taking focus away from addressing other food waste streams, as recycling kitchen grease alone would show a significant diversion from landfill. On a practical level 1) the liquid element of kitchen grease is hard to quantify, and in a similar vein all liquid food waste is not included in the food waste boundary and 2) insufficient data are available on kitchen grease to identify it as a distinct waste type to include in the food waste boundary for the calculation of the industry coefficients. As more disaggregated data becomes available and it becomes possible to quantify and track kitchen grease separately so that the impact on overall performance is better understood, this will be reviewed.

5. Bin fill level

Due to lack of data it was not possible to determine a precise average bin fill level (see page 31). A range from 80%-90% has been agreed for the purposes of this version of the methodology. This will be updated when more data are available, and companies share additional information from hauler companies.

6. Food waste fraction

It has not been possible at this stage to identify a 'food waste fraction', namely the proportion of non-diverted waste that is food waste. When further data are available in this area, further calculations can be done to identify such a fraction.

7. Coefficient of food diversion rate

Related to the point above (food waste fraction), and as a result of the lack of available data, it has not been possible to determine industry coefficients of food diversion. When more data are available, this will be revisited.

8. Property level guidance and tool for methodology

During the consultation phase the need for a user-friendly property level guidance that is supported by a calculation tool was identified. Although this is outside the scope of this methodology, it would be a valuable addition in the future.

G METHODOLOGICAL DIFFERENCES IN FOOD WASTE COMPARED TO THE FLW STANDARD (FLWS)

Item	FLWS	Hotel Waste Measurement Methodology
Geographic Boundary	The FLWS mandates to disclose the geographic borders within which reported food waste occurs.	The geographic boundary is encompassed within the organizational boundary as given in section 2.2.
Industry Applicability	The FLWS provides requirements and guidance for all governments, businesses, and other entities.	This methodology is only applicable for hotels companies and brands, and provides them with guidance to quantify and report their entire waste footprint.
Material Type	The FLWS is applicable to any food and/or inedible parts removed from the food supply chain. Material type in the FLWS refers to "the materials that are included in the inventory (food only, inedible parts only, or both)."	This methodology is applicable to food and inedible parts as outlined in Section 1.3 with respect to food, but also includes other non-food types of waste categories outlined in section 2.3.
Inedible Parts	The FLWS recommends separately reporting the amount of food wasted from its associated inedible parts, where possible. This improves the ability of an entity to make targeted decisions about how to reduce the various types of food waste.	The Hotel Waste Measurement Methodology does breakout food from inedible parts in the food waste boundary as it is not tracked separately within most hotel operations.
Destination of waste	The FLWS has set a list of 10 destinations based on three paths i.e., onsite removal, collection by other entity, and other informal paths.	This methodology makes use of practical situations that are specific and relevant to hotel industries and the end-of-life destinations of food waste/waste generated in hotels.
Dehydrated Waste	The FLWS requires users to report the weight of food waste to reflect the state in which the food waste was generated (i.e., before water was added, or before the intrinsic water weight of the food waste was reduced).	This methodology excludes any such requirement as set forth in FLWS, considering its relevance to hotels, but suggests that where waste is dehydrated this is reported as such and where possible non-dehydrated waste be measured and reported for consistency.
Food Waste Diversion	The FLWS does not include guidance on this topic as it relates to a company / organization's overall inventory, and therefore focuses on the volumes going to each destination and not classifying those locations into a diversion bucket.	This methodology provides guidance on how to classify food waste diversion destinations.

H GLOSSARY

Term	Definition	Source
Aerobic digestion	Breaking down material via bacteria in the absence of oxygen. The process generates biogas and nutrient-rich matter.	FLW Protocol
Animal feed	Diverting material from the food supply chain (directly or after processing) to animals.	FLW Protocol
Biodigester	A mechanized decomposition system that breaks down organic material via bacteria in the absence of oxygen.	
Biogas	Type of nutrient rich biofuel that is naturally produced from the decomposition of organic waste.	
Commingled waste	Differing waste materials that have been recycled and hauled through a single stream or mixed stream.	
Composting	Organic process that breaks down material via bacteria in oxygen-rich environments. Composting refers to the production of organic material (via aerobic processes) that can be used as a soil amendment.	FLW Protocol
Controlled combustion	Sending material to a facility that is specifically designed for combustion in a controlled manner. Note that for the purpose of this document, controlled combustion applies to onsite use within a property only.	FLW Protocol
Customer (formerly "cover")	Total number of customers who are served in a food and beverage venue or function space. (The term "cover" has been replaced with the term "customer" to reflect the number of people served.)	USALI
Dehydrated waste	Waste that has had the intrinsic content of water and moisture removed through dehydrators which use heat to evaporate moisture.	
Diverted waste	Waste that is diverted away from landfills or incineration.	
Durable goods	Goods that do not wear out quickly and that are not routinely disposed, such as FF&E items.	
Energy recovery	A waste treatment process that generates energy in the form of electricity, heat or fuel.	
Floor area	The area of a normally horizontal, permanent, load-bearing structure for each level of a building.	International Property Measurement Standards (IPMS)
Food	Any substance whether processed, semi-processed, or raw that is intended for human consumption. Includes drinks, and any substance that has been used in the manufacture, preparation, or treatment of food.	FLW Protocol
Food donation	Redirecting food that is fit for human consumption from landfills to those in need. This includes leftovers or surplus food in inventory.	
Food Loss and Waste (FLW)	Food and/or associated inedible parts removed from the food supply chain.	FLW Protocol
Food Loss and Waste (FLW) Protocol	A multi-stakeholder effort to develop the global accounting and reporting standard for quantifying food and associated inedible parts removed from the food supply chain.	FLW Protocol

H GLOSSARY CONTINUED

Term	Definition	Source
Food revenue	Total revenue from the sale of food.	
Food supply chain	Connected series of activities to produce, process, distribute, and consume food.	
Geography	Geographic borders within which reported waste occurs.	Food Loss and Waste Protocol
GHG Protocol	An international accounting tool for governments and businesses to understand, quantify, and manage greenhouse gas emissions.	GHG Protocol
Hazardous waste	A waste with properties that make it dangerous or potentially harmful to human health or the environment.	US EPA
Incineration	A waste treatment method that includes the combustion of waste and may or may not include energy recovery.	
Inedible parts	Components associated with food that are not intended to be consumed by humans.	FLW Protocol
Kitchen grease	Grease generated from kitchen during cooking.	
Landfill waste	Material sent to an area of land or an excavated site that is specifically designed and built to receive wastes.	FLW Protocol
Ongoing consumables	Products frequently used and replaced for regular operations and maintenance.	
Recycling	Reprocessing of recovered materials at the end of product life, returning them into the supply chain.	Worrell, E., Reuter, M.A. (2004) Recycling: A Key factor for Resource Efficiency
STR segment	A categorization of chain-affiliated and independent hotels based on the rooms' average daily rate (ADR). The segments are Luxury, Upper Upscale, Upscale, Upper Midscale, Midscale and Economy.	Smith Travel Research (STR)
Temporal	Relating to time.	
Universal waste	Hazardous waste produced by households and many types of businesses. Waste types include batteries, mercury containing equipment, pesticides, and light bulbs with cathode ray tubes, non-empty aerosol cans.	See here.
Waste destination	Location where material removed from the food supply chain is directed.	FLW Protocol
Waste-to-energy	The process of generating energy in the form of electricity or heat from the primary treatment of waste.	
Waste source	Location where waste is generated.	
Wastewater treatment	Processing material that is discarded in the sewer system (with or without prior treatment).	
Wet waste	Biodegradable waste that includes cooked and uncooked food, fruits, vegetable peels, flower waste, and other organically decomposable waste.	

CHSB, HCMI, HWMI

Cornell Hotel Sustainability Benchmarking Index

The Cornell Hotel Sustainability Benchmarking Index (CHSB) is the hotel industry's largest annual benchmarking of energy, water, and carbon; it is open to hotels and hotel companies of all sizes and published in a freely available index every year. CHSB offers participants a peer-based reference for analyzing their hotels, and maintains a confidential data set published through an academic research center that does not share individual hotel data with third parties or allow for commercial use. The 2020 Index contains data for 18,000 hotels from 20 global brands across 55 countries. The CHSB methodology was used to determine the industry coefficients calculated for this methodology.

HCMI and HWMI

The Hotel Carbon Measurement Initiative (HCMI) is a free methodology and tool for hotels to calculate the carbon footprint of hotel stays and meetings on their properties (applying a number of aspects from the GHG Protocol Standards). The Hotel Water Measurement Initiative (HWMI) is a methodology and tool for hotels to calculate the water use within their properties.

The methodologies are available via the Sustainable Hospitality Alliance's website and are currently used by over 25,000 properties around the world. They were created by the Sustainable Hospitality Alliance, in collaboration with partners from the hospitality industry, to create a consistent methodology for all hotels to measure and communicate their carbon and water consumption with the aim of improving understanding, transparency, and accuracy across the industry.

HCMI and HWMI data can be used by hotels participating in the Cornell Hotel Sustainability Benchmark Index (CHSB). HCMI methodology is also used by the Hotel Footprinting benchmarking tool.

REVIEW PROCESS

This methodology underwent a six-week review period in which the drafters received feedback from fourteen different groups (full listed included below). The current version of the methodology incorporated many of these edits, including the following major additions and changes:

- Additional clarity around how and by whom this methodology should be used,
- A more detailed discussion around the intensity metric denominator,
- Discussion around why certain boundaries for inclusion and exclusion were chosen by the group, including kitchen grease and classifying end-of-life destinations as diversion, and
- Clarity around the data hierarchy and the intention of this methodology to help with filling data gaps.

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