

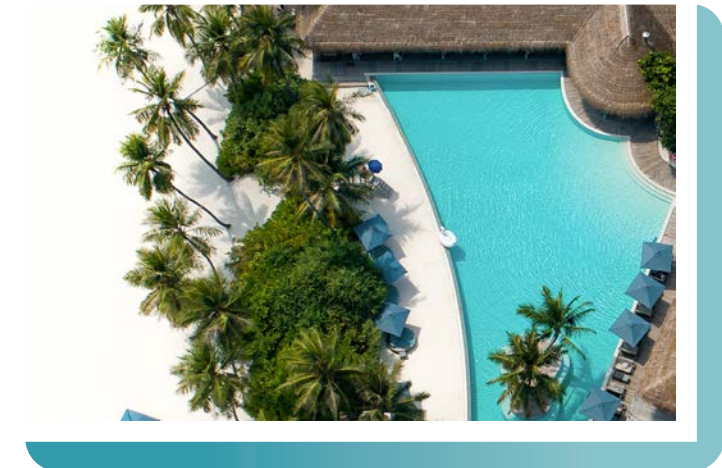
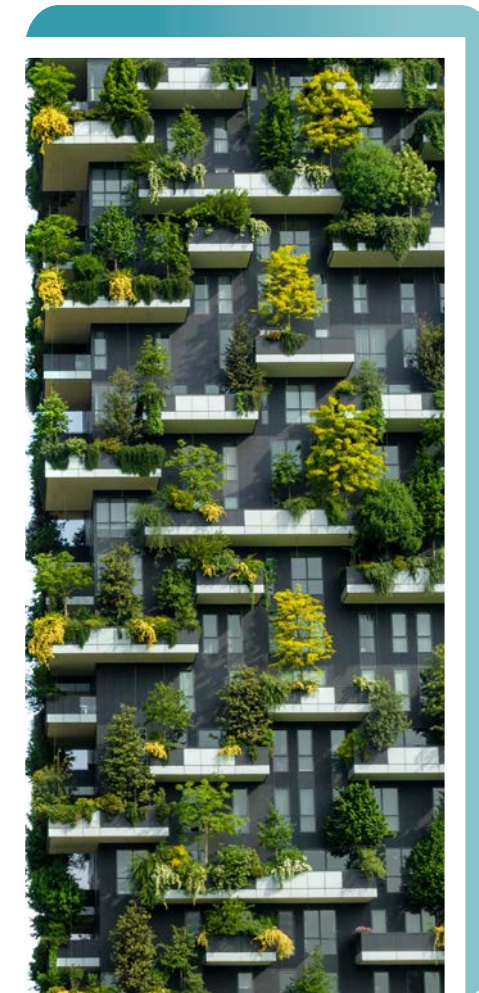
NET ZERO METHODOLOGY FOR HOTELS

2ND EDITION • JUNE 2023

APPENDIX G

EMISSION FACTORS,
COEFFICIENTS, AND DEFAULT
DATA FOR QUANTIFICATION


GREENVIEW



APPENDIX G: EMISSION FACTORS, COEFFICIENTS, AND DEFAULT DATA FOR QUANTIFICATION

G.1 AGGREGATE SOURCES OF EMISSION FACTORS FOR SCOPE 1 & 2

Global

- [GHG Protocol GHG Emissions Calculation Tool](#) (most emissions types)
- [International Energy Agency \(IEA\)](#) – Annual Emission Factor (electricity and heat generation) and Greenhouse Gas Emissions from Energy (formerly CO2 Emissions from Fuel Combustion)¹
- [UNEP Technical Options Committee Refrigeration, Air Conditioning and Heat Pumps Assessment Report](#) (refrigerants)
- [WMO Global Ozone Research and Monitoring Project, Scientific Assessment of Ozone Depletion](#) (refrigerants)
- [WRI GHG Protocol Tool for Stationary Combustion Version 4.1 \(2015\)](#) (most fuel types)

Country-Specific

- [Australia National Greenhouse Accounts Factors](#) (Australia only)
- [European Environment Agency CO2-emission intensity from electricity generation](#) (EU only)
- [Hong Kong Carbon Accounting Guidelines 2010](#) (Hong Kong only)
- [Measuring emissions: A guide for organisations](#) (New Zealand only)
- [México Registro Nacional de Emisiones](#) (México only)
- [National Inventory Report: Greenhouse Gas Sources and Sinks in Canada](#) (Canada only)
- [UK Government GHG Conversion Factors for Company Reporting](#) (UK only)
- [US EPA Emission Factors for GHG Inventories](#) (US only)



USERS SHOULD ENSURE THAT
THEY ARE USING THE LATEST YEAR DATASET
WHEN THEY USE THESE SOURCES

G.2 PROXY SCOPE 1 & 2 EMISSION FACTORS FOR A HOTEL PROPERTY NOT COMMONLY AVAILABLE

Compressed Natural Gas (CNG) – Natural Gas as proxy if unavailable

- [UK Government GHG Conversion Factors for Company Reporting](#) (Global)
- [Australia National Greenhouse Accounts Factors](#) (Australia only)

Diesel (Mobile) – Petroleum Product CH4 and N2O EFs, added to mobile diesel CO2/gallon as proxy

- [EPA Emission Factors for GHG Inventories](#)

Ethanol

- [US EPA Direct Emissions from Stationary Combustion Sources](#) (Global)
- [Australia National Greenhouse Accounts Factors](#) (Australia only)

Purchased Chilled Water

- [US EIA Form 1605 – Appendix N \(2010\)](#) (Global)
- [US Energy Star Portfolio Manager Technical Reference: Greenhouse Gas Emissions](#) (US and Canada only)
- [Decree on CO2 Content of Heating and Cooling Networks](#) (France only)

Residual Mix

- [Green-e Residual Mix Emissions Rates](#) (US only)
- [AIB European Residua Mix](#) (Europe only)

Steam and Hot Water

- [UK Government GHG Conversion Factors for Company Reporting](#) (Global)
- [US Energy Star Portfolio Manager Technical Reference: Greenhouse Gas Emissions](#) (US and Canada only)

G.3 SCOPE 3 EMISSION QUANTIFICATION APPROACHES AND EMISSION FACTORS SOURCES

CATEGORY	ACTIVITY	ACTIVITY DATA	QUANTIFICATION APPROACH	ADVANTAGES & LIMITATION OF APPROACH	SOURCE OF EMISSION FACTORS
1 Purchased goods and services	Emissions from purchased materials or goods (e.g., purchase of raw materials, food & beverages materials, operating supplies, and consumable etc.) and services (e.g., purchase of outsourced laundry services, subscription services etc.).	Option 1 - Spend data Profit or loss report or procurement record encompasses all spend, including goods, services, contract, non-contract, routine, non-routine, operational and non-operational and so on.	Spend based method	Basic calculation - useful as an initial measurement to form an understanding of supply chain activities and identifying top spend categories or items and key suppliers.	Emission factors are calculated based on an environmentally extended input-output model (EEIO). Some of the available sources are: GHG Protocol Quantis Scope 3 Evaluator Tool - Purchases US EPA Supply Chain - Supply Chain GHG Emission Factors for US Commodities and Industries v1.1.1, 2016 Summary Industry Table UK GOV Supply Chain - Table 13 Indirect emissions from the supply chain, 2011
		Option 2 - Record of mass of number of units and quantity in kg, pounds, and other units of measurement of purchased goods and services.	Average data	Allow product-specific assessment which requires proper establishment and reporting in mass or unit. Goods and services purchased that are not recorded and tracked on a mass or weight basis may have to use a spend-based method.	Food related items - WRI Cool Food - CFP Calculator June 10, 2022 Outsourced laundry - Hotel Carbon Measurement Initiative (HCMI) - HCMI v2.0 Tool Other general items - US EPA Production material - Background Chapters, Exhibit 6-1 Production Emission Factors UK GOV GHG Reporting - Conversion factors 2022: full set, Material use
		Option 3 - Emissions data from suppliers obtain either through direct engagement and reporting by suppliers or from available databases (e.g., CDP, Ecovadis etc.).	Supplier-specific	Advanced calculation which involves getting primary data from suppliers. An initial measurement under the spend-based method may be required to be established beforehand to identify key suppliers along with an understanding of supply chain activities and spending patterns.	Supplier-specific
		Option 4 - Combination of data sources from more than one source.	Hybrid	Combination of the above.	Combination of the above.

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CATEGORY	ACTIVITY	ACTIVITY DATA	QUANTIFICATION APPROACH	ADVANTAGES & LIMITATION OF APPROACH	SOURCE OF EMISSION FACTORS
2 Capital goods	Emissions from the acquisition or purchase of capital goods/ fixed assets/ plant and equipment / capital expenditure during the reporting year.	Option 1 - Spend data	Spend based	Basic calculation, which is similar to the Category 1 above and is useful as an initial measurement to form an understanding of supply chain activities.	EEIO factors - Quantis, US EPA, and UK GOV (Refer to Category 1 above)
		Option 2 - Emissions data from suppliers obtain either through direct engagement and reporting by suppliers or from available databases (e.g., CDP, Ecovadis etc.).	Supplier-specific	Advanced calculation which involves getting primary data from suppliers.	Supplier-specific
		Option 3 - Combination of data sources from more than one source.	Hybrid	Combination of the above.	Combination of the above.
	Embodied carbon emissions during construction and renovation of a hotel building.	Separately assessed, under Appendix I . Embodied carbon is a highly complex issue to address. There are existing resources and tools to quantify embodied carbon in buildings included in the Appendix and these are largely still evolving.			
3 Fuel and energy related activities, not included in Scope 1 & 2	Transmission and distribution (T&D) loss.	Electricity consumption (in kwh) calculated for Scope 2.	Average data	Application of industry average emission factors and internal consumption data.	Similar to the Scope 1 & 2 based on country-specific emissions including IEA, EPA, UK GOV etc.
	Well to tank (WTT) upstream emissions of fuel and electricity.	Direct and indirect energy consumption (in kwh) calculated for Scope 1 and 2.	Average data	Application of industry average emission factors and internal consumption data.	UK GOV GHG Reporting <ul style="list-style-type: none"> Fuel - Conversion factors 2022: full set, WTT - fuels Electricity - Conversion factors 2021: full set, WTT- UK & overseas elec
4 Upstream transportation and distribution	Emissions from outsourced transportation and distribution activities including: logistics services used to transport or distribute products from tier 1 suppliers transportation services purchased including inbound and outbound logistics provision of guest transportation services within destinations and properties purchased from third parties.	Option 1 - Spend data Profit or loss report or procurement record for transportation and distribution services.	Spend based	Basic calculation - useful as an initial measurement to form an understanding of transportation and distribution activities and identify key suppliers.	EEIO factors - Quantis, US EPA, and UK GOV (Refer to Category 1)
		Option 2 - Well to Wheel (WTW) emissions based on: Internal source data collected for distance travelled (in km or miles) by vehicle types and location, or Obtain emissions data from suppliers	Distance based	Advanced calculation through: Creating an internal record to track distance travelled, or Gather primary data from suppliers.	Global Logistics Emissions Council (GLEC) Framework - Module 2: Default Fuel Efficiency and CO2e Intensity Factors US EPA GHG Emission Factors Hub - Table 10 Scope 3 Category 6: Business Travel and Category 7: Employee Commuting Supplier-specific

CATEGORY	ACTIVITY	ACTIVITY DATA	QUANTIFICATION APPROACH	ADVANTAGES & LIMITATION OF APPROACH	SOURCE OF EMISSION FACTORS
5 Waste generated in operations	Emissions from disposal of waste generated in operations.	Option 1 - Waste data by weight in kg, pounds, and other units of measurement based on the disposal methods.	Average data	Basic calculation - for an initial measurement.	<ul style="list-style-type: none"> ■ US EPA GHG Emission Factors Hub - Table 9 Scope 3 Category 5: Waste Generated in Operations and Category 12: End-of-Life Treatment of Sold Products ■ UK GOV GHG Reporting - Conversion factors 2022: full set, Waste disposal
		Option 2 - Waste data by material types and disposal methods in kg, pounds, and other units of measurement.	Waste-type-specific method	Advanced calculation - useful for waste management improvement.	
		Option 3 - Collect waste-specific scope 1 and scope 2 emissions data directly from waste treatment companies.	Supplier-specific	Advanced calculation - requires collaboration with waste treatment companies.	Supplier-specific
	Emissions from wastewater generated.	<p>Option 1 - Applies default values as prescribed by the IPCC Guidelines with use of total no of guest data.</p> <p>Option 2 - Water supply and water discharge data.</p>	Average data	Industry average data for water treated and direct discharge to aquatic system.	IPCC Wastewater
6 Business travel	Emissions from business travel transportation - rail, air, bus, automobile, and other mode of transportation.	Option 1 - Spend data for business travel activities	Spend based	Basic calculation - as an initial measurement and to identify key suppliers.	EEIO factors - Quantis, US EPA, and UK GOV (Refer to Category 1)
		Option 2 - <ul style="list-style-type: none"> ■ Internal source data collected for distance travelled (in km or miles) by vehicle types and location, or ■ Obtain emissions data from suppliers 	Distance based	Advanced calculation through: <ul style="list-style-type: none"> ■ Creating an internal record to track distance travelled, or ■ Gather primary data from suppliers. 	US EPA GHG Emission Factors Hub - Table 10 Scope 3 Category 6: Business Travel and Category 7: Employee Commuting UK GOV GHG Reporting - Conversion factors 2022: full set, Business travel Supplier-specific
	Emissions from hotel stay.	Option 1 - Spend data for hotel stay and accommodation.	Spend based	Basic calculation - as an initial measurement and to identify key suppliers.	EEIO factors - Quantis, US EPA, and UK GOV (Refer to Category 1)
		Option 2 - <ul style="list-style-type: none"> ■ Internal source data collected for number of nights/stays based on hotel location, or ■ Obtain emissions data from suppliers 	Distance based	Advanced calculation through: <ul style="list-style-type: none"> ■ Creating an internal record to track number of nights/stays based on hotel location, or ■ Gather primary data from suppliers. 	Greenview Hotel Footprinting Tool (HFT) Supplier-specific
7 Employee commuting	Emissions from employee commuting.	Option 1 - Total headcount. Whenever available, to consider obtaining headcount based on employment type and workplace indicator (on-site, remote, etc.)	Average data	Basic calculation - as an initial measurement.	GHG Protocol Quantis Scope 3 Evaluator Tool - General
		Option 2 - Internal source data collected for distance travelled (in km or miles) by mode of transportation and location.	Distance based	Advanced calculation - Requires establishment of a proper process and record to track distance travelled and modes of transportation	US EPA GHG Emission Factors Hub - Table 10 Scope 3 Category 6: Business Travel and Category 7: Employee Commuting UK GOV GHG Reporting - Conversion factors 2022: full set, Business travel - land

CATEGORY	ACTIVITY	ACTIVITY DATA	QUANTIFICATION APPROACH	ADVANTAGES & LIMITATION OF APPROACH	SOURCE OF EMISSION FACTORS
8 Upstream leased assets	Emissions from leased asset, equipment, vehicle, office space, staff accommodation etc. by a lessee.	Option 1 – Direct and indirect energy consumption (in kwh) of the leased assets.	Asset-specific method	Collection of consumption data for specific leased assets.	Similar to the Scope 1 & 2 based on country-specific emissions including IEA, EPA, UK GOV etc.
		Option 2 – Direct and indirect energy consumption (in kwh) of lessor operations	Lessor-specific method	Collection of consumption data from lessor with allocation using gross floor area, volume, or quantity.	
9 Downstream transportation & distribution	Emissions from transportation and distribution of products sold to end consumers.	This is not applicable to hotel industry in general; classified as out of bounds.	Out of bounds	Out of bounds	Out of bounds
10 Processing of sold products	Emissions from processing of intermediate products sold by downstream companies.	This is mainly for manufacturing industry and such, and not applicable to hotels; classified as out of bounds.	Out of bounds	Out of bounds	Out of bounds
11 Use of sold products	Direct use-phase emissions of sold products over their expected lifetime (i.e., the scope 1 and scope 2 emissions of end users that occur from the use of: products that directly consume energy (fuels or electricity) during use.	Not applicable to hotels in general; classified as out of bounds.	Out of bounds	Out of bounds	Out of bounds
12 End of life treatment of sold products	Emissions from the waste disposal and treatment of all products sold to end consumers.	Option 1 – Total mass of sold products (and packaging) by weight in kg, pounds, and other units of measurement based on the disposal methods.	Average data	Basic calculation - for an initial measurement.	US EPA GHG Emission Factors Hub Table 9, and UK GOV GHG Reporting Waste Disposal (Refer to Category 5)
		Option 2 – Mass of sold products (and packaging) by material types and disposal methods in kg, pounds, and other units of measurement.	Waste-type-specific method	Advanced calculation – useful for waste management improvement.	
13 Downstream leased assets	Emissions from operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting year, not included in Scope 1 and Scope 2 – reported by a lessor.	In general, it is least relevant to the hotel industry. However, if this is applicable, this category is treated similarly to the Category 8 which require the direct and indirect energy consumption (in kwh) of the leased assets.	Asset-specific method	Collection of consumption data for specific leased assets.	Similar to the Scope 1 & 2 based on country-specific emissions including IEA, EPA, UK GOV etc.
		Direct and indirect energy consumption (in kwh) of lessee operations.	Lessee-specific method	Collection of consumption data from lessee and allocating the emissions using area, volume, or quantity.	Similar to the Scope 1 & 2 based on country-specific emissions including IEA, EPA, UK GOV etc.

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14 Franchises	Emissions from the operation of hotel properties under the franchise arrangement, not included in Scope 1 or Scope 2 – reported by franchisors.	Estimating Scope 1 and 2 emissions for franchises based on average data, using average floor area, by building type, numbers etc. This should be used when consumption data are not available.	Average data	Estimation-based approach using floor area or other relevant measures.	Similar to the Scope 1 & 2 based on country-specific emissions including IEA, EPA, UK GOV etc.
		Scope 1 and 2, direct and indirect energy consumption (in kwh) and optionally, Scope 3 emissions from the franchised operations.	Franchise-specific method	Collection of consumption and emissions data from the franchised operations.	
15 Investments	Emissions from operation of investments (including equity and debt investments and project finance), not included in Scope 1 or Scope 2.	Use of revenue data combined with EEIO factor to estimate the scope 1 and scope 2 emissions from the investee company.	Average data	Estimation-based approach using revenue data and allocating the emissions based on the share of investment.	EEIO factors - Quantis, US EPA, and UK GOV (Refer to Category 1)
		Scope 1 and 2, direct and indirect energy consumption (in kwh) from the investee company.	Investment-specific method	Collection of consumption data from the investee and allocating the emissions based on the share of investment.	Similar to the Scope 1 & 2 based on country-specific emissions including IEA, EPA, UK GOV etc.

