



# Greenhouse Gas Inventory Guidance

## Indirect Emissions from Events and Conferences



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The U.S. EPA Center for Corporate Climate Leadership’s (The Center) GHG guidance is based on The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (GHG Protocol Corporate Standard) developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The Center’s GHG guidance is meant to expand upon the GHG Protocol to align more closely with EPA-specific GHG calculation methodologies and emission factors, and to support the Center’s GHG management tools.

For more information regarding the Center for Corporate Climate Leadership, visit [www.epa.gov/climateleadership](http://www.epa.gov/climateleadership).

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# Section 1: Introduction

Indirect greenhouse gas (GHG) emissions are those that result from an organization’s activities, but are actually emitted from sources owned or controlled by other entities. Scope 3 indirect emissions are the result of activities from assets that the organization indirectly impacts in its value chain. The GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (referred to as the GHG Protocol Scope 3 Standard) identifies events and conferences as a scope 3 activity that is not specifically included in the list of scope 3 categories. It recommends that a public GHG emissions report include emissions from events and conferences, and that they be reported separately from other scope 3 categories, such as in an “other” scope 3 category. Events and conferences may represent a significant quantity of emissions due to high frequency of events, large volume of attendees, or large distances traveled by attendees.

This document presents guidance for calculating scope 3 emissions resulting from events (e.g., sporting events, concerts) and conferences (e.g., business meetings, exhibits, conventions). The emissions sources covered include: travel to and from an event, emissions from hotel stays by attendees, and emissions from the event or conference venue. Additional GHG emission sources not addressed in this guidance include refrigeration and air conditioning systems, production and transportation of food and materials, waste disposal, and construction of new facilities. These are discussed briefly in the Completeness section.

This guidance is intended primarily for use by organizations to account for emissions from events and conferences hosted or sponsored by the organization or attended by a large number of the organization’s employees. It is left to the judgment of the organization to decide whether its participation in an event is significant enough to warrant quantifying or reporting emissions from the event.

This guidance will refer to several other documents that provide applicable guidance in calculating emissions from travel and facilities. These reference documents are listed below, along with the name by which they will be called in this document:

- GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (GHG Protocol Scope 3 Calculation Guidance)
- U.S. EPA Center for Corporate Climate Leadership GHG Inventory Guidance:
  - Direct Emissions from Stationary Combustion Sources (EPA Stationary Combustion Guidance)
  - Direct Emissions from Mobile Combustion Sources (EPA Mobile Combustion Guidance)
  - Indirect Emissions from Purchased Electricity (EPA Electricity Guidance)
  - Direct Fugitive Emissions from Refrigeration, Air Conditioning, Fire Suppression, and Industrial Gases (EPA Fugitive Guidance)
- U.S. EPA Center for Corporate Climate Leadership GHG Emission Factors Hub (Emission Factors Hub)

## 1.1. Allocating Emissions among Multiple Sponsors of an Event or Conference

Conferences, conventions, and other events frequently have multiple sponsors. For example, an industry trade convention may be sponsored by multiple companies at varying levels of sponsorship. A sponsoring organization does not need to report 100 percent of emissions from an event if there are multiple event sponsors. An organization should report the percentage of total emissions that corresponds with the percentage of the total event cost covered by the organization. For example, if an organization co-sponsors an event with two other companies, with equal levels of sponsorship by all three companies (i.e., the event cost is split equally three ways), then the organization should report one-third of the total event emissions.

## 1.2. Greenhouse Gases Included

Conferences, conventions, and other events frequently have multiple sponsors. For example, an industry trade convention may be sponsored by multiple companies at varying levels of sponsorship. A sponsoring organization does not need to report 100 percent of emissions from an event if there are multiple event sponsors. An organization should report the percentage of total emissions that corresponds with the percentage of the total event cost covered by the organization. For example, if an organization co-sponsors an event with two other companies, with equal levels of sponsorship by all three companies (i.e., the event cost is split equally three ways), then the organization should report one-third of the total event emissions.

# Section 2: Calculating Emissions

This section presents guidance to calculate GHG emissions from travel to and from an event or conference, emissions from hotel stays by attendees, and emissions from the event or conference venue. Emissions are calculated by multiplying activity data (passenger-miles of travel, electricity consumption, or fuel consumption) by appropriate emission factors.

The steps involved with calculating emissions from events and conferences are shown below. The same approach is applicable to travel, hotel, and venue emissions.

## Step 1: Select appropriate equation.

Equation 1 is applicable to attendee travel and Equations 2 and 3 are applicable to hotels and venues.

## Step 2: Gather activity data to quantify the amount of travel or energy use.

See Sections 3.1, 4.1, and 5.1 for a discussion of possible activity data sources for travel, hotels, and venues, respectively.

## Step 3: Determine emission factors.

See Sections 3.2, 4.2, and 5.2 for guidance on selecting appropriate emission factors for travel, hotels, and venues, respectively. All emission factors are provided in the Emission Factors Hub, which is available at <https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub>.

## Step 4: Calculate emissions.

Use the equations below to calculate the emissions of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O for travel, hotels, and venues. Multiply the emissions of CH<sub>4</sub> and N<sub>2</sub>O by the respective global warming potential (GWP) to calculate CO<sub>2</sub>-equivalent emissions. The GWPs are 25 for CH<sub>4</sub> and 298 for N<sub>2</sub>O, from the Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (AR4), 2007. Sum the CO<sub>2</sub> equivalent emissions from CH<sub>4</sub> and N<sub>2</sub>O with the emissions of CO<sub>2</sub> to calculate the total CO<sub>2</sub>-equivalent (CO<sub>2</sub>e) emissions.

### Equation 2:

Electricity Emissions = Electricity x EF<sub>E</sub>

#### Where:

Fuel Emissions = Mass of CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emitted

Fuel = Mass, volume, or energy content of fuel consumption for hotels or venues

EF<sub>F</sub> = Fuel CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emission factor per mass, volume, or energy unit

### Equation 1:

Travel Emissions = Travel x EF<sub>T</sub>

#### Where:

Travel Emissions = Mass of CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emitted

Travel = Travel distance for a specific travel mode

EF<sub>T</sub> = Travel CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emission factor

### Equation 3:

Fuel Emissions = Fuel x EF<sub>F</sub>

#### Where:

Fuel Emissions = Mass of CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emitted

Fuel = Mass, volume, or energy content of fuel consumption for hotels or venues

EF<sub>F</sub> = Fuel CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O emission factor per mass, volume, or energy unit

# Section 3: Choice of Activity Data and Emission Factors – Travel

This section discusses the activity data and emission factors used for calculating emissions associated with travel of attendees to and from events and conferences. This guidance specifically addresses GHG emissions from aircraft, passenger vehicles, rail, and buses.

Depending on the nature of the event or conference, organizations may need to account for both long-distance travel and local travel by attendees. For example, an organization holding a national conference in Chicago may need to account for long-distance travel by attendees to reach the Chicago area, and then also local travel by those same attendees to reach the specific conference venue within Chicago. On the other hand, attendees from the local Chicago area may only have local travel from their homes or workplaces to the conference venue. Organizations should account for both long-distance and local travel to the greatest extent possible where they have reliable information.

## 3.1. Activity Data for Attendee Travel

To calculate emissions from travel, organizations must first gather appropriate activity data for describing attendee travel. If there are dedicated vehicles providing transportation for an event, such as shuttle buses or vans, the preferred approach to quantify emissions from these vehicles' travel is based on fuel type, fuel use, and distance traveled. If an organization has these activity data available, the organization should use the calculation methods provided in the EPA Mobile Combustion Guidance to quantify emissions from these vehicles.

For travel in non-dedicated vehicles, such as aircraft, rental cars, taxis, and personal vehicles, the activity data needed are the total round-trip passenger-miles traveled by attendees, subtotaled by travel mode. If possible, air travel distances should be subtotaled separately for different one-way flight lengths: long haul (>2,300 miles), medium haul (300-2,300 miles), and short haul (<300 miles). Possible travel modes include:

- Air travel
- Passenger vehicle
- Intercity rail (e.g., Amtrak)
- Commuter rail (between a central city and adjacent suburbs)
- Transit rail (urban subway or elevated rail)
- Bus

There are several options to gather these data. Three options illustrated below are listed in order of preference.

### **Conduct survey of distance and travel mode:**

The most effective and accurate method for determining passenger-miles by travel mode is to survey attendees on the distance they travel and their mode of travel. Ideally attendees would be able to provide distance and mode for each leg of their trip separately, to account for situations with local travel to and from an airport, in addition to air travel. If the survey requests one-way travel distances, double the resulting distance to obtain round-trip passenger-miles. Survey results can be extrapolated from the number of responding attendees to the total number of attendees to estimate travel distance for the entire event. If a current survey cannot be conducted, data may be available from surveys from prior instances of the event. Data may also be available from venue operators if they are required by local authorities to collect information on attendee travel to plan for parking and public transportation.

**Determine distance based on attendee addresses:**

A survey may not be feasible in all cases, such as for events and conferences that have already occurred, or where event organizers do not have direct contact with attendees, such as for some sports or music events. An alternative approach is possible if the event organizers have home or work address information for some or all attendees. This could be accomplished by gathering address information when participants register or buy tickets for an event. The following steps represent one method to determine distance by travel mode based on attendee addresses. This approach can also be used in other situations where the travel distance is known, but travel mode is unknown.

- Determine the one-way distance between each attendee's home/work address and the venue address, and characterize that attendee as falling into one of the distance ranges in Tables 1 and 2 (<50 miles, 50-99 miles, 100-249 miles, etc.).
- Subtotal the distance for the attendees in each distance range.
- Apply the travel mode percentages from Table 1 and Table 2 to the total distance in each distance range, or make another assumption appropriate to the event, to estimate distance by travel mode for that distance range.
- Subtotal the resulting distances for each travel mode and multiply by two to determine the round-trip distance by travel mode for the attendees with location data.
- Extrapolate from the attendees with location data to the total number of attendees to estimate distance by travel mode for the entire event.

**Table 1: Travel Mode for Local Travel (<50 Miles from Destination)**

Principal Means of Transportation	Percent
Automobile, total	85.4
Drives self	76.3
Carpool, total	9.0
2-person	6.9
3-person	1.3
4+ person	0.9
Public transportation (bus or rail) <sup>1</sup>	5.1
Bicycle, walks, works at home	8.3
Other	1.3

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2017*, Table 1-41: Principal Means of Transportation to Work (Thousands), 2016, <https://www.bts.gov/sites/bts.dot.gov/files/docs/browse-statistical-products-and-data/national-transportation-statistics/217651/ntsntire2017q4.pdf>.

**Table 2: Travel Mode for Long-Distance Travel (>50 Miles from Destination)**

Travel Mode	One-Way Distance (Miles)						
	50 - 99	100 - 249	250 - 499	500 - 749	750 – 999	1,000 – 1,499	1,500 +
Air	0%	3%	30%	64%	84%	84%	90%
Passenger vehicle	97%	94%	67%	33%	15%	14%	7%
Rail	1%	1%	0%	1%	0%	1%	1%
Bus	2%	3%	3%	2%	1%	1%	2%

Source: Air and passenger vehicle percentages from U.S. Department of Transportation, Bureau of Transportation Statistics, *America On the Go: U.S. Business Travel*, p. 2, Figure 1, 2003,

[https://www.bts.gov/archive/publications/america\\_on\\_the\\_go/us\\_business\\_travel/index](https://www.bts.gov/archive/publications/america_on_the_go/us_business_travel/index).

Rail and bus percentages are adapted from U.S. Department of Transportation, Bureau of Transportation Statistics, *Highlights of the 2001 National Household Travel Survey*, p. 14, Table 4, 2003,

[https://www.bts.gov/archive/publications/highlights\\_of\\_the\\_2001\\_national\\_household\\_travel\\_survey/index](https://www.bts.gov/archive/publications/highlights_of_the_2001_national_household_travel_survey/index).

<sup>1</sup> Bus and/or rail travel can be assumed based on the bus and rail systems available near the event.

If there is no available information on distance traveled by attendees, organizations can use default assumptions. For example, for travel to and from business-related events or conferences, Table 3 provides typical distances of business trips. The same data source reports that the median distance of business trips is 123 miles.

**Table 3: Typical Distance of Business Trips**

One-Way Distance (Miles)		
0 - 249	250 – 999	1,000 +
74%	19%	7%

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *America On the Go: U.S. Business Travel*, p. 2, Figure 1, 2003, [https://www.bts.gov/archive/publications/america\\_on\\_the\\_go/us\\_business\\_travel/index](https://www.bts.gov/archive/publications/america_on_the_go/us_business_travel/index).

For travel to and from non-business events (e.g., sporting events, concerts), it may be appropriate to assume that travel is local, with a shorter assumed average one-way distance. A 2017 survey on travel statistics indicates that the average distance traveled one-way from home to work by commuters is 12.8 miles, and the average distance traveled one-way for social or recreational purposes is 11.8 miles.<sup>2</sup> Referencing these data, organizations may assume that the local distance traveled by attendees to an event or conference is 12 miles one-way. This information can also be useful if the organization needs to estimate the local component of travel to a business event.

Assumed default distances can be used along with the number of event attendees to estimate total distance traveled. To estimate distance by travel mode, either data from attendees or the approach in the previous section can be used.

## 3.2. Emission Factors for Attendee Travel

For any dedicated vehicles providing transportation for an event, such as shuttle buses or vans, with fuel type, fuel use, and distance traveled data available, the organization should use the calculation methods provided in the EPA Mobile Combustion Guidance to quantify emissions from these vehicles.

For non-dedicated vehicle travel, once an organization has obtained data on passenger-miles traveled by travel mode, they can calculate emissions from this travel using appropriate emission factors and the equations in Section 2. For all travel modes covered in this guidance (air, passenger vehicle, rail, and bus), the organization should use the emission factors per passenger-mile provided in Table 12 of the Emission Factors Hub, for Scope 3 Category 6: Business Travel and Category 7: Employee Commuting. The factors are provided in terms of mass of GHG emissions per vehicle-mile for passenger vehicles and per passenger-mile for other travel modes.

The following are specific considerations for using the emission factors for the various travel modes.

### Air travel:

The air travel emission factors in the Emission Factors Hub are provided for different one-way flight lengths: long, medium, and short haul distances. These factors should be used if air travel distance data has been subtotaled separately for different flight lengths. If not, the medium haul air travel emission factors can be used to estimate emissions from all air travel. This is based on the fact that the average U.S. passenger flight is approximately 900 miles one-way,<sup>3</sup> which falls within the boundaries of medium haul flights.

<sup>2</sup> U.S. Department of Transportation, 2017 National Household Travel Survey, *Summary of Travel Trends*, p. 20, Table 6b, [https://nhts.ornl.gov/assets/2017\\_nhts\\_summary\\_travel\\_trends.pdf](https://nhts.ornl.gov/assets/2017_nhts_summary_travel_trends.pdf).

<sup>3</sup> Bureau of Transportation Statistics, National Transportation Statistics, Table 1-38: Average Length of Haul, Domestic Freight and Passenger Modes (Miles). Data based on 2014, [https://www.bts.gov/archive/publications/national\\_transportation\\_statistics/index](https://www.bts.gov/archive/publications/national_transportation_statistics/index).

**Passenger vehicle travel:**

The activity data gathered for passenger vehicles is in passenger-miles. Passenger-miles traveled should be divided by the estimated typical passengers per vehicle to quantify vehicle-miles traveled. This would be one passenger per vehicle if no carpooling is assumed, or greater than one with carpooling. Event-specific data or carpooling rates in Table 1 can be used to help estimate passengers per vehicle. The resulting vehicle-miles can be multiplied by the vehicle-mile emission factors in the Emission Factors Hub to quantify emissions. Emission factors are provided for passenger cars, light-duty trucks, and motorcycles. If the vehicle type is not known, use the emission factors from passenger cars.

**Rail travel:**

Emission factors are provided for intercity rail (e.g., Amtrak), commuter rail (between a central city and adjacent suburbs), and transit rail (urban subway or elevated rail). If rail passenger-mile data does not distinguish between the different types of rail, any long-distance rail travel (trips of >50 miles) can be assumed to be intercity rail. For local rail travel (trips of <50 miles) the organization can choose to use commuter rail and/or transit rail emission factors based on the types of rail systems available near the event.

# Section 4: Choice of Activity Data and Emission Factors – Hotels

This section discusses the activity data and emission factors used for calculating emissions associated with electricity and fuel consumption for lighting, cooling, heating, and other uses at hotels used by event attendees.

## 4.1. Activity Data for Hotels

The activity data needed to quantify emissions from hotels are the quantity of electricity and fuel consumption associated with the attendees' hotel stays during the event. There are two primary methods to obtain these data: directly from hotels or through estimation.

### **Collect hotel-specific energy data:**

If hotels can provide electricity and fuel use based on metered or hotel-estimated data, this is the preferred source of activity data. Electricity and fuel consumption by the hospitality industry varies depending on the type and location of the hotel and the relative energy efficiency of the facility. As a result, the most accurate emissions estimate will be derived by using hotel-specific data on electricity and fuel consumption. If an organization obtains electricity or fuel use directly from hotels, it should ensure that the data represent the portion of hotel energy use associated with event attendees' hotel stays. This may require allocating total hotel electricity and fuel use to the number of rooms and nights of the attendees' stays. If a hotel purchases steam, heat, or cooling, data for these may also be available. If so, the organization should use the calculation methods provided in the EPA Electricity Guidance to quantify emissions from these sources.

### **Apply default energy consumption factors:**

If an organization is unable to acquire hotel-specific information regarding electricity and fuel consumption, hotel electricity and fuel use can be estimated using factors that account for electricity and natural gas use per room-night. To use this approach, the organization will need to collect data on the total room-nights of hotel stays for attendees, subtotaled by hotel category.

Electricity and natural gas consumption per room-night factors can be defined based on energy consumption data submitted by 1,200 hotels to EPA's ENERGY STAR® Program. These data include electricity and natural gas consumption, hotel category, hotel size, and number of rooms.<sup>4</sup> Hotels classified as "upper upscale" and "upscale" in the survey are generally more energy intensive than most other categories, due to the number and extent of guest amenities and the food and beverage services offered at these properties.

The relevant hotel classifications are summarized in Table 4, including a general ranking of where major U.S. hotel chains fit within these categories. Organizations can use this table to determine the classification of hotels being used for an event.

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<sup>4</sup> U.S. Environmental Protection Agency, Combined Heat and Power Partnership, *CHP in the Hotel and Casino Market Sectors*, December 2005, [https://www.epa.gov/sites/production/files/2015-07/documents/chp\\_in\\_the\\_hotel\\_and\\_casino\\_market\\_sectors.pdf](https://www.epa.gov/sites/production/files/2015-07/documents/chp_in_the_hotel_and_casino_market_sectors.pdf).

**Table 4: Hotel Categories and Example Brands**

Category		Definition	Example Brands*
Upper Upscale		Hotels in the upper upscale category include branded and independent properties realizing the top 10 to 15 percent room rate within their local market.	Doral, Hotel Sofitel, Nikko, Sheraton, Fairmont, Hyatt, Omni, Vista International, Four Seasons, Inter-Continental, Preferred, W Hotels, Grand Bay Hotels, Loews, Raphael Hotels, Westin, Helmsley Marriott Hotels, Renaissance, Wyndham, Hilton, Meridien, Ritz-Carlton
Upscale		Upscale hotels fall into a price tier just below upper upscale hotels. These full-service hotels have room rates in the highest 25 to 30 percent of all hotels in their markets, but not the highest room rates. Service levels and amenities in upscale hotels are slightly below those found in upper upscale properties.	Adam's Mark, Embassy Suites, Regal, Clarion, Hilton Inn, Westcoast, Courtyard, Holiday Inn Select, Westmark, Crowne Plaza, Hotel Novotel, Woodfield Suites, Doubletree, Radisson, Wyndham Garden, Doubletree Guest Suites, Red Lion
Midscale	With F&B <sup>5</sup>	Hotels that offer some business and recreational amenities fall into the Midscale category. Midscale hotels may or may not offer food and beverage services, and average daily room rates are between the 40th and 70th percentile of the room pricing structure of the local market.	Best Western, Four Points, Holiday Inn, Park Inn, Budget Suites of America, Garden Plaza, Howard Johnson, Quality Inn, Cavanaugh's, Harley Hotel, Little America, Ramada, Doubletree Club, Harvey Hotel, Outrigger, Sheraton Inn
	Without F&B		Amerihost, Cypress Inn, Holiday Inn Express, Shilo Inn, AmeriSuites, Drury Inn, La Quinta, Signature Inn, Cabot Lodge, Hampton Inn, Larkspur Landing, SpringHill Suites, Clubhouse Inn, Hampton Inn & Suites, Lee's Inn, Sumner Suites, Comfort Inn, Heartland, Master Hosts Inn, Wellesley Inn, Conley Inn, Hilton Garden Inn, Platinum Suites, Wingate Inn, Country Lodging Inn
Economy/Budget		Economy hotels have limited amenities and no on-site food and beverage services (except for morning coffee and light breakfast). This category contains properties in the bottom 30 percent price tier of the local market.	Best Inns, Economy Inns, Key West Inn, Sleep Inn, Budget Host Inn, Friendship Inn, National 9, Super 8, Budget Inn, Good Nite Inn, Red Carpet Inn, Thriftlodge, Budgetel, Hojo Inn, Red Roof Inn, Thrifty Inn, Days Inn, Innkeeper, Roadstar Inn, Travelers Inn, Econo Lodge, Interstate Inn, Rodeway Inn, Travelodge

\* These examples do not represent an endorsement by EPA.

The electricity and natural gas consumption per room per night factors for different hotel categories are provided in Table 5. These factors can be multiplied by the number of room-nights in each hotel category to quantify total electricity and natural gas consumption.

<sup>5</sup> Food and beverage is classified as a full-service kitchen or dining area and does not include properties that only offer continental breakfast service or other prepackaged or light offerings.

**Table 5: Hotel Electricity and Natural Gas Consumption per Room per Night**

Hotel Category	Electricity consumption (kWh per room per night)	Natural gas consumption (mmBtu per room per night)
Upper upscale	45	0.122
Upscale	35	0.094
Midscale with food and beverage	30	0.097
Midscale without food and beverage	19	0.059
Economy and budget	15	0.062

Source: U.S. Environmental Protection Agency, Combined Heat and Power Partnership, *CHP in the Hotel and Casino Market Sectors*, Table 16 and 17, December 2015, [https://www.epa.gov/sites/production/files/2015-07/documents/chp\\_in\\_the\\_hotel\\_and\\_casino\\_market\\_sectors.pdf](https://www.epa.gov/sites/production/files/2015-07/documents/chp_in_the_hotel_and_casino_market_sectors.pdf).

The figures in Table 5 are based on the total amount of energy consumed by the hotel divided by the total number of guestrooms. Total energy consumption includes general facilities and amenities that are not guestrooms, such as lobbies, pools, exercise rooms, computer/business rooms, restaurants, and meeting rooms. As a result, the energy consumption per room is an approximation of potential energy use from an attendee's stay and assumes that the guest is partly responsible for energy use from a hotel's general facilities. These factors also assume that there is one attendee per hotel room, not multiple occupants.

## 4.2. Emission Factors for Hotels

Once an organization has obtained the activity data for electricity and fuel consumption, they can calculate emissions from using appropriate emission factors and the equations in Section 2. For electricity consumption, the organization should use the emission factors provided in Table 6 of the Emission Factors Hub. Organizations should use the emission factor from the eGRID subregion where the hotels are located.<sup>6</sup> For fuel consumption, the organization should use the emission factors provided in Table 1 of the Emission Factors Hub.

<sup>6</sup> This approach will quantify location-based electricity emissions. If an organization desires to quantify market-based emissions, which will be necessary if renewable energy is being purchased, see the EPA Electricity Guidance.

# Section 5: Choice of Activity Data and Emission Factors – Venues

This section discusses the activity data and emission factors used for calculating emissions associated with electricity and fuel consumption for lighting, cooling, heating, and other uses at the event or conference venue.

## 5.1. Activity Data for Venues

The activity data needed to quantify emissions from venues are the quantity of electricity and fuel consumption associated with the event. There are two primary methods to obtain these data: directly from venues or through estimation.

### **Collect venue-specific energy data:**

If venues can provide electricity and fuel use based on metered or venue-estimated data, this is the preferred source of activity data. Electricity and fuel consumption varies depending on the type and location of the venue and the relative energy efficiency of the facility. As a result, the most accurate emissions estimate will be derived by using venue-specific data on electricity and fuel consumption. If an organization obtains electricity or fuel use directly from the venue, it should ensure that the data represent the portion of venue energy use associated with the event. This may require allocating total venue electricity and fuel use to the portion of the facility used for the event and the duration of the event. If a venue purchases steam, heat, or cooling, data for these may also be available. If so, the organization should use the calculation methods provided in the EPA Electricity Guidance to quantify emissions from these sources.

### **Apply default energy consumption factors:**

If an organization is unable to acquire venue-specific information regarding electricity and fuel consumption, venue electricity and fuel use can be estimated using factors that account for electricity and natural gas use per square foot of used space. To use this approach, the organization will need to collect data on the square footage of the venue occupied by the event and on the duration of the event.

Data on the average electricity and fuel consumption per square foot of venue space can be obtained from the Energy Information Administration's *Commercial Buildings Energy Consumption Survey (CBECS)*. CBECS provides energy consumption data according to building type, including a category for public assembly,<sup>7</sup> and incorporates several energy intensity metrics, including electricity and fuel consumption per square foot.

The electricity and natural gas consumption per square foot factors for public assembly buildings in the four census regions are provided in Table 6, based on the CBECS data. These factors can be multiplied by the square feet of venue space used for the event and by the days of event duration to quantify venue electricity and natural gas consumption. If more than one venue is used, organizations should quantify energy use for each venue and sum the results.

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<sup>7</sup> CBECS defines "Public Assembly" as buildings in which people gather for social or recreational activities, whether in private or non-private meeting halls. The category is broad enough to include sporting venues, conference centers, and smaller meeting halls.

**Table 6: Public Assembly Facilities' Electricity and Natural Gas Consumption per Square Foot per Day**

Census Region	Electricity consumption (kWh sq ft per day)	Natural gas consumption (cubic feet of gas per sq ft per day)
Northeast	0.0386	0.1167
Midwest	0.0362	0.1110
South	0.0447	0.0712
West	0.0362	0.0732

Source: Commercial Buildings Energy Consumption Survey (CBECS) 2012, Released May 2016. Table C15: Electricity consumption and conditional energy intensity by Census region, <https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/c15.cfm> and Table C25: Natural gas consumption and conditional energy intensity by Census region, <https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/c25.cfm>.

## 5.2. Emission Factors for Venues

Once an organization has obtained the activity data for electricity and fuel consumption, they can calculate emissions from using appropriate emission factors and the equations in Section 2. For electricity consumption, the organization should use the emission factors provided in Table 6 of the Emission Factors Hub. Organizations should use the emission factor from the eGRID subregion where the venue is located.<sup>8</sup> For fuel consumption, the organization should use the emission factors provided in Table 1 of the Emission Factors Hub.

<sup>8</sup> This approach will quantify location-based electricity emissions. If an organization desires to quantify market-based emissions, which will be necessary if renewable energy is being purchased, see the EPA Electricity Guidance.

# Section 6: Completeness

In order for an organization's GHG inventory to be complete it must include all emission sources within the organization's chosen inventory boundaries. See Chapter 3 of the GHG Protocol Corporate Standard for detailed guidance on setting organizational boundaries and Chapter 4 of the GHG Protocol Corporate Standard for detailed guidance on setting operational boundaries of the inventory. These principles should also be applied to quantifying emissions associated with events and conferences. For example, emissions from all event or conference attendees and all emission sources addressed in the earlier sections of this guidance should be included.

As described in Chapter 1 of the GHG Protocol Corporate Standard, there is no materiality threshold set for reporting emissions. The materiality of a source can only be established after it has been assessed. This does not necessarily require a rigorous quantification of all sources, but at a minimum, an estimate based on available data should be developed for all sources addressed in this guidance. The remainder of this section discusses other sources of emissions from events and conferences.

Organizations may wish to quantify an event's share of fugitive emissions from refrigeration and air conditioning systems in venues or hotels, based on the guidance found in the EPA Fugitive Guidance. This may involve contacting hotel and venue operators to obtain data on the types of refrigerants and cooling systems used in their facilities and vehicles.

Production of food and materials and transporting these to and from an event or conference will result in GHG emissions. The disposal of food waste, handouts, and other hotel and event/conference materials by either landfilling or incineration will also generate GHG emissions. Organizations may wish to voluntarily calculate these emissions based on the GHG Protocol Scope 3 Calculation Guidance and emission factors provided in the Emission Factors Hub.

If there are any vehicles dedicated to the event (besides those used to transport attendees to and from the event), organizations may wish to quantify the emissions from those vehicles during the event. This can be done using the EPA Mobile Combustion Guidance.

If new facilities are constructed to host an event, the emissions from that construction could also be quantified.

# Section 7: Uncertainty Assessment

There is uncertainty associated with all methods of calculating GHG emissions from events and conferences. EPA does not recommend that organizations quantify uncertainty as +/- percentage of emissions or in terms of data quality indicators.

It is recommended that organizations attempt to identify any areas of uncertainty in their emissions calculations and make an effort to use the most accurate data possible.

Organizations can improve accuracy by using information from attendee surveys about travel and lodging, rather than using default data. Organizations can also improve accuracy by using site-specific energy consumption data for lodging and venues, rather than using default factors.

# Section 8: Documentation

In order to ensure that emissions calculations are transparent and verifiable, the documentation sources listed in Table 7 should be maintained. These documentation sources should be collected to ensure the accuracy and transparency of the related emissions data, and should also be reported in the organization's Inventory Management Plan (IMP).

**Table 7: Documentation Sources for Events and Conferences**

Data	Documentation Source
Number of attendees	Event registration information
Attendee passenger-miles traveled by travel mode	Survey of attendees, registration information with location of attendees
Hotel electricity and fuel consumption	Metered or estimated data from hotel
Total room-nights by hotel category	Hotel registration information
Venue electricity and fuel consumption	Metered or estimated data from venue
Floor area occupied by the event and number of days occupied	Venue operators or event organizers

# Section 9: Inventory Quality Assurance and Quality Control

Chapter 7 of the GHG Protocol Corporate Standard provides general guidelines for implementing a QA/QC process for all emission calculations. For emissions from events and conferences, the activity data and calculated emissions can be verified using a variety of approaches:

- Organizations can compare the attendee-reported (from attendee surveys) travel mode and distance traveled for long-distance travel, and the travel mode for local travel, to the national averages provided in Tables 1 through 3, checking for reasonable similarity to identify any major calculation errors.
- Organizations can compare the hotel-reported annual electricity and fossil fuel consumption for each hotel to the consumption estimates calculated with default factors, checking for reasonable similarity to identify any major calculation errors.
- Organizations can compare the venue-reported annual electricity and fossil fuel consumption to the consumption estimates calculated with default factors, checking for reasonable similarity to identify any major calculation errors.