



Hotel Carbon Measurement Initiative 1.0

Methodology

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Introduction

The International Tourism Partnership (ITP) and the World Travel & Tourism Council (WTTC) have collaborated on a groundbreaking initiative to unite hotel industry efforts to calculate and communicate carbon impacts by agreeing on a standardised methodology and metrics. A joint Carbon Measurement Working Group, consisting of representatives from ITP and WTTC's hotel members, was established in May 2011. In partnership with advisor KPMG, the Working Group developed this methodology to measure greenhouse gas (GHG) emissions from individual hotels on a meeting room and guest room basis.

The group saw an opportunity to improve how the hotel industry communicates its impacts. Currently, approaches to measuring and reporting on carbon emissions vary widely. This can lead to confusion amongst consumers, particularly corporate clients, looking to understand their own potential carbon footprint and meet their own goals/targets in this area. In addition, the number and range of methodologies and tools in use make transparency of reporting within the hotel industry a challenge.

The methodology, informed by the GHG Protocol Standards¹, was first developed in 2011. During 2012 its practical applicability has been tested in hotels of different style and size in different geographical locations. It has been further refined following a subsequent stakeholder engagement programme, including a number of Hotel Associations and a review by the World Resources Institute (WRI).

The methodology attempts to strike a balance between ease of implementation and accuracy. We recognise that the methodology has certain limitations, but it is designed to be applicable to all types of hotels around the world even those with no previous experience in carbon reporting. The methodology is not an assessment of all environmental risks and opportunities that hotels face and is only a first step in the implementation of a thorough environmental programme. The methodology is a voluntary approach to measure GHG emissions. A number of other organisations provide guidance on activities such as carbon neutrality, product life cycle assessment, or energy management, which are not within the scope of this document.

The priority for the Hotel Carbon Measurement Initiative moving forward will be to maximise the take up and recognition of the methodology by a broader range of hotels and their customers. A review process has been put in place to ensure the methodology may be further refined as user feedback and new research come to light. In particular areas where it is recognised that the accuracy of the proposed approach is less than could be achieved using a more complicated measurement and calculation process, the medium term aim is to identify practical ways of refining the methodology to enhance its accuracy without making it unduly cumbersome.

The Hotel Carbon Measurement Initiative demonstrates how effective collaboration can provide solutions which benefit customers, individual companies, and wider industry. Through common measurement and language, stakeholders will now be able to greater understand their footprints and impacts.

¹ The Greenhouse Gas Protocol (GHG Protocol) is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions. It has been developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The GHG Protocol consists of four separate but linked standards: the Corporate Accounting and Reporting Standards (Corporate Standard), the Project Accounting Protocol and Guidelines, the Corporate Value Chain (Scope 3) Accounting and Reporting Standard, and the Product Life Cycle Accounting and Reporting Standard (www.ghgprotocol.org)

The Working Group

The Working Group comprises representatives of leading international hotel companies such as Accor, Beijing Tourism Group, Carlson Rezidor Hotel Group, Diamond Resorts International, Fairmont Hotels and Resorts, Hilton Worldwide, Hong Kong & Shanghai Hotels, Hyatt Corporation, InterContinental Hotels Group, Jumeirah Group, Mandarin Oriental Hotel Group, Marriott International Inc, Meliá Hotels International, MGM Resorts International, Mövenpick Hotels & Resorts, Orient-Express Hotels Ltd, Pan Pacific Hotel Group, Premier Inn - Whitbread Group, Starwood Hotels & Resorts Worldwide, Inc., Shangri-La Hotels and Resorts, The Red Carnation Hotel Collection, TUI AG, Wyndham Worldwide.

The International Tourism Partnership (ITP), founded in 1992 and part of the International Business Leaders Forum, brings together the world's leading international hotel companies to provide a voice for environmental and social responsibility in the industry. It works to demonstrate in a very practical way that environmental and social responsibility makes good business sense. ITP does this by highlighting best practice, offering a range of practical products and programmes and tackling emerging sustainability issues through its collaborative working groups. ITP's programmes and products include, among others, the Youth Career Initiative, the *Green Hotelier* online magazine, the *Environmental Management for Hotels* handbook, and *Sustainable Hotel Siting, Design and Construction*. The combined reach of the membership extends to over 22,000 properties, over 3.2 million rooms and over 1.5 million employees in over 100 countries worldwide.

The World Travel & Tourism Council (WTTC) is the global authority on the economic and social contribution of Travel & Tourism. It promotes sustainable growth for the industry, working with governments and international institutions to create jobs, to drive exports and to generate prosperity. Travel & Tourism accounts for 255 million jobs globally. At US\$6 trillion (9% of GDP) the sector is a key driver for investment and economic growth. For more than 20 years, the World Travel & Tourism Council has been the voice of this industry globally. Members are the Chairs, Presidents and Chief Executives of the world's leading, private sector Travel & Tourism businesses. These Members bring specialist knowledge to guide government policy and decision-making, raising awareness of the importance of the industry as an economic generator of prosperity.

KPMG in the UK operates from 22 offices across the United Kingdom with over 11,000 partners and staff. KPMG is a global network of professional firms providing Audit, Tax, and Advisory services, operating in 152 countries with 145,000 professionals working in member firms around the world. KPMG's global sustainability practice is over 20 years old, having scoped the first ever greenhouse gas emissions assurance of BP plc in 1992. It has 700 practitioners around the world.

Brief overview of the methodology

The methodology provides hotels with a carbon footprint per occupied room on a daily basis and per area of meeting space on an hourly basis. This information can then be used to calculate the carbon footprint of a specific client's use of the hotel (i.e. number of room nights and usage of meeting rooms). These are the measures which feedback has suggested the industry will find most useful, particularly for hotels completing **Request For Proposals (RFPs)** from potential clients.

The methodology includes all energy used 'on site' and includes certain carbon emissions that may arise from 'off site' or outsourced activities, most notably outsourced laundry operations (a significant source of emissions and a key area of many hotels' environmental programmes). The methodology recognises that some hotels operate a number of different facilities and so to improve comparability excludes any emissions from private areas, i.e. **private space** which is not accessible by guests.

The Working Group has incorporated ongoing research from the Cornell University's Center for Hospitality Research to determine the materiality of certain mobile emissions (e.g. hotel cars, shuttle buses, lawn mowers, etc.) and fugitive emissions (e.g. refrigerants). GHG emissions for the whole of a hotel are then allocated proportionally to guest rooms and meeting space, on a consistent basis.

Carbon dioxide (CO₂) is the most prevalent GHG, but methane (CH₄) and nitrous dioxide (N₂O) are also harmful to the climate. As such GHG emissions are often reported as CO₂-equivalents (CO₂e). These emissions are calculated based on the sources of energy consumption using conversion factors advised in the Green House Gas (GHG) Protocol.

The methodology's practicality was tested with over 50 hotels of different type, class, geography and ownership and via targeted stakeholder engagement to incorporate feedback from the Travel & Tourism industry.

Who should use this methodology?

The methodology is designed to be applied by any hotel around the world. The methodology has been designed in partnership with major hotel groups, however, it applies equally to individual hotels, large and small, regardless of the type of amenities offered.

Hotel managers should refer to the Hotel Carbon Measurement Initiative 1.0 Practical Guide and accompanying spreadsheet, which can be obtained from WTTC and ITP, to calculate their emissions.

Further background information on climate change and GHG emissions can be found on the GHG Protocol website (www.ghgprotocol.org).

For more information or to give your feedback on the methodology please contact info@hotelcarboninitiative.org.

*Please note that all words in **bold and italics** are defined in appendix 1.*

Boundaries

GHG emissions result from a variety of activities within the hotel itself such as heating, cooling, lighting, catering and laundry operations, IT and the use of electronic equipment. The activities of suppliers and independent outlets operating on the hotel's premises also generate GHG emissions. Hotel guests travelling to a hotel may also be responsible for the emissions of GHGs. It is therefore important to define the boundaries of what hotels should include in their GHG reporting.

The methodology requires hotels to report on all GHG emissions resulting from activities within their premises. This includes restaurants, meeting spaces, shops, casinos, golf courses, spas, garden space, fitness centres, '**back of house**', and any other amenities that are located within the hotel's premises.

Private space is the one exception to this rule.

Private space – GHG emissions from areas which are not accessible to hotel guests or conference attendees (e.g. private apartments) or not related to the hotel (e.g. the hotel leases a floor to a third party) should be excluded from the calculations. On-site staff accommodation is also considered private space.

The energy consumption of these private areas may be included in the hotel's energy bills (and measured through the hotel's meters). However, they operate separately from the hotel and their energy consumption should be subtracted from the hotel's total. This is calculated by either:

- Subtracting the **sub-metered** energy consumption of the private space (if all energy sources used in the private areas are sub-metered); or
- Subtracting a percentage of energy consumption based on area apportionment of private conditioned space compared to total condition space.

Note: if the private areas are metered and billed separately, then the hotel does not need to undertake any calculations, as the private areas' energy consumption would already be excluded from the hotel's own energy consumption.

Outsourced laundry:

Laundry associated emissions can make up a significant portion of a hotels overall emissions. Laundry has been a very high profile item in hotel's environmental activities for years and most hotels encourage their guests to re-use towels during their stay. However, many hotels outsource some or all of their laundry activity. GHG emissions from outsourced laundry operations should be included in a hotel's overall footprint, in order to assist with the comparability of different hotels' overall footprints.

Other emissions:

Other 'scope 3 emissions' (referred to in the GHG Protocol) coming from activities such as travel (guests' travel to and from the hotel and employees' business travel), production of purchased materials and consumables in the hotel, waste disposal, product use, and other outsourced activities (except laundry) are excluded from the calculations.

Organisations wishing to calculate such emissions should refer to guidance from the WRI or the Climate Registry.

Non-facility, offsite emissions from corporate offices and water consumption are also excluded.

The Working Group nevertheless recognises that water, waste, biodiversity, and GHG emissions lifecycle analysis are important aspects of a hotel's overall environmental impact.

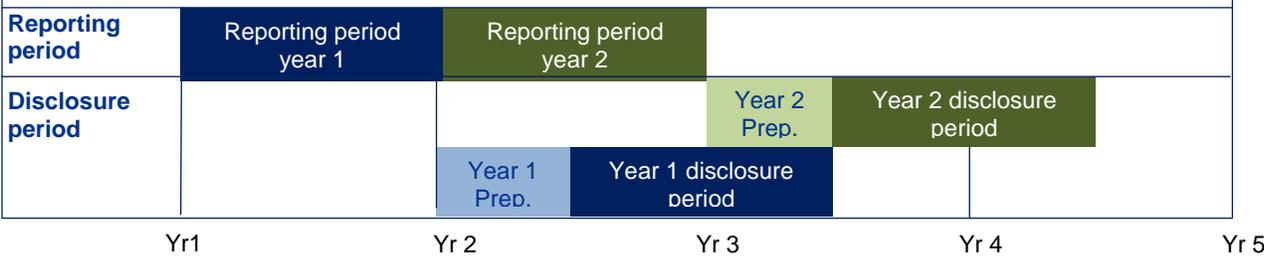
Reporting Period

Baseline year:

The calculations are required to be performed once a year. The methodology includes an element of standing data, which is unlikely to change year on year, and information that should be updated annually (e.g. energy consumption and number of occupied rooms). Total GHG emissions should be calculated using a 12-month data set but the 12-month data period can be defined by each hotel or company internally.

Reporting and disclosure periods:

- Data is collected and reported for a twelve month period (the reporting period). The methodology allows hotels to have a maximum of six months to prepare their data before data for the prior period should be considered to be out of date and only suitable for use as a comparative to show trends against more recent periods. Best practice for preparation is within 60 days. After the calculations have been completed, the carbon footprint data is valid for 12 months (the disclosure period). Therefore, the footprint data is never more than 18 months old.
- The diagram below shows how the reporting and disclosure period interact:



Refurbishments

The methodology calculates GHG emissions during “normal operations”. Conducting extensive refurbishments during the reporting year may distort results which aim to show a normal operating position.

Hotels undertaking refurbishments should disclose this information where possible. If the refurbishment is major and alters the energy consumption by +/- 20% compared to the previous reporting period then hotels must use the previous periods’ data (and disclose this fact). Although the data will be older, it is more likely to be a truer reflection of the hotel energy consumption during normal operations.

Routine refurbishments do not have to be disclosed or accounted for.

Seasonality

We recognise that hotels energy consumption vary by seasons. However, in line with the GHG Protocol, variations in energy consumption and therefore GHG emissions during the year are not taken into consideration. Hotels are asked to provide only one GHG emissions figure per year.

Data Requirements

The main pieces of data necessary for a hotel to calculate the carbon footprint for a guest room and meeting space are as follows:

Standing data

This data is unlikely to change from one year to the next and should be readily available to hotel managers.

Data requirements	Rationale	Likely source
Reporting year (start and end date)	Necessary to provide the disclosure period 12 months period should be used	Determined by the hotel's management team
Total area of guest rooms and corridors (sqft or sqm)	Necessary for footprint apportionment	Architectural plan, property/facility management
Total area of meeting facility space (sqft or sqm)	Necessary for footprint apportionment	Architectural plan, property/facility management
If the hotel has any <i>private space</i>:		
Private space and total conditioned space (sqft or sqm)	Necessary for footprint apportionment	Architectural plans, property/facility management

Please note that conditioned space is only used to calculate the percentage of GHG emissions from private space. It is only necessary to measure it if the hotel has private space with energy which is not sub-metered.

Conditioned space is often calculated in slightly different ways by different hotels (e.g. including or excluding walls). Given its limited impact on the overall calculations and in the interest of simplicity, hotels should continue using their current measurement methods.

The area of guest rooms and meeting space is required to allocate GHG emissions between them. This is explained in more details in the 'Calculating Emissions' section.

Data for the reporting year

Data requirements	Rationale	Likely source
Total number of occupied rooms for reporting year	Necessary for footprint apportionment (and for outsourced laundry estimations, if needed)	Sales data or management accounts data
Total energy consumption for the reporting year from fuel and electricity etc.	Necessary for total footprint calculation	Energy bills and/or meter readings
Emission factors	These should be country or state specific to allow for greater accuracy	Emission factors are obtained from the guidance given by the GHG Protocol (see appendix 3)

Occupied rooms

Occupied rooms are the total rooms that were occupied by guests over the 12 month reporting period. The methodology assumes each occupied room shares its proportion of the total footprint equally.

No-shows are not included in occupied room count, but complimentary rooms that were occupied but not paid for are included.

In summary: Occupied room = total number of rooms sold less no shows plus complimentary rooms that were occupied and not paid for throughout the reporting year.

Since Occupied Rooms are used, out-of-order rooms not within the hotel's inventory do not affect the rooms calculation. Because the methodology uses occupied rooms instead of available rooms, all GHG emissions apportioned to guest rooms are allocated to hotel guests, leaving no emissions unassigned.

Some resorts and camps which calculate beds sold should still follow the methodology and calculate their total GHG emissions and footprint per room. However, they can divide the rooms' total footprint by the number of beds sold to estimate a footprint per bed sold.

Energy Consumption

Energy consumption may come from the following sources:

- Fuels consumed on-site such as natural gas (stationary combustion), oil and other fuels
- Purchased electricity
- Mobile fuels burned (from vehicles and landscaping equipment)
- Purchased steam and chilled water
- District heating or municipal power

Energy consumption data should be obtained from your energy invoices or from taking meter readings at the beginning and end of the reporting period.

Note: Consumption data based on actual meter readings is preferable as energy bills can be inaccurate or based on estimated readings. It is good practice to take your own meter readings to measure your energy consumption and verify the accuracy of your energy bills. Meter readings should be scheduled to coincide with carbon monitoring and reporting periods. Meter readings should be taken at regular intervals and a process should be in place to record the readings.

Smart meters that record consumption on an half hourly basis are effective tools to measure and manage your energy consumption.

Estimating data:

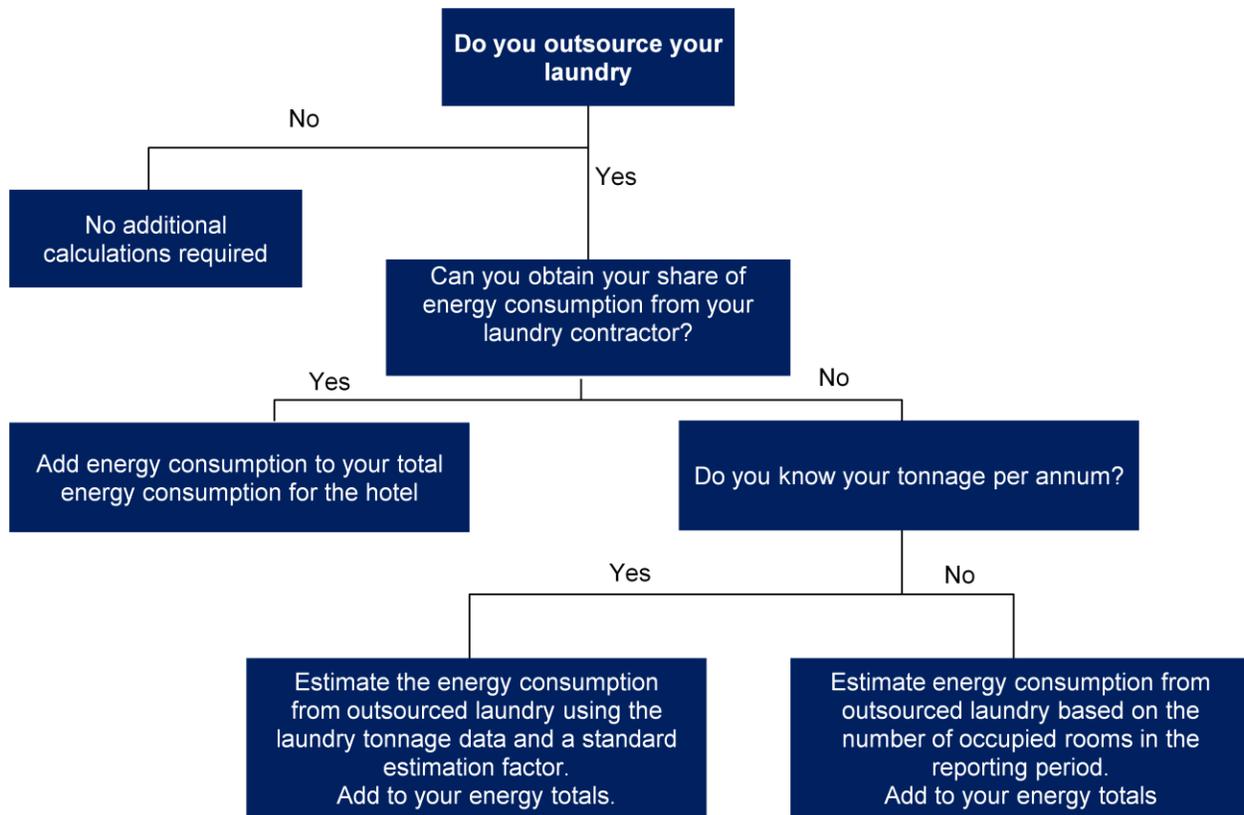
If you do not have data for the entire year, you may estimate your consumption based on the following estimation techniques (source UK Environment Agency: <http://publications.environment-agency.gov.uk/PDF/GEHO0310BRYZ-E-E.pdf>):

- Pro rata estimation technique involves quantifying the missing data for a data gap using a proportional method based on actual consumption from another similar period.
- Direct comparison: using data that corresponds with a similar period of supply. The advantage of this is that it accommodates variability in energy demand (e.g. gas consumption in winter and summer months).
- Price settlement: using the unit price shown on an earlier bill for this billing period or an average price per unit to convert energy costs into consumption data.

Onsite renewable energy (e.g. from solar or wind) reduce the amount of energy that a hotel needs to purchase and therefore reduces its energy consumption. If the onsite energy generation feeds into the local or national grid the hotel should realise this credit on a deduction from its overall energy use.

Outsourced laundry:

The impact of in-house laundry operations is already captured in the core methodology. GHG emissions from outsourced laundry operations should be included in a hotel's footprint based on the decision tree below.



The energy consumption from outsourced laundry operations should be added to the hotel overall energy consumption using one of the estimation techniques below (in order of preference):

Estimation technique 1: data from contractor

Hotels should try to obtain energy consumption data from their laundry suppliers. The supplier should supply energy data for the same reporting year as the hotel’s GHG emissions reporting year, or estimate based on a 12 month period that is similar to the reporting year.

The laundry supplier probably washes and dries laundry for several clients. Therefore its total energy consumption should be apportioned to a specific hotel based on the percentage of volume that hotel is responsible for. If this is not available percentage of revenue may be an appropriate application. The supplier does not have to supply its total revenue or volume data, as this may be commercially sensitive information. However, they should be able to provide your hotel’s portion of the energy use.

For example, if your supplier's total electricity consumption for the year is 100,000 kWh and you represent 10% of their business (by volume or revenue), your share of electricity consumption is: 10,000 kWh. The same calculations should be carried out for gas, oil, and any other sources of energy used by the laundry supplier.

Note: if one central laundry facility services multiple hotels within the same hotel group, the same principle applies. The laundry operator should calculate their energy consumption for the year and a percentage of that consumption should be apportioned to each hotel based on the percentage of volume of laundry.

Estimation technique 2: using laundry tonnage

If your laundry supplier is not able to provide your share of the energy consumption, the next best alternative is to estimate the energy consumption required to wash and dry all of your laundry in a 12 months period using the amount of laundry.

The tonnage of laundry information may be available from your invoices. Alternatively, a reasonable estimate can be obtained by weighing the average amount of laundry used in a room and multiplying by the number of occupied rooms for the reporting period. Please note that the weight of laundry taken from a room may vary and we recommend that a sample should be taken regularly to provide an average for the reporting period. Please note the laundry must be dry when weighed. Best practice would be 5% of rooms each month.

Once you have your laundry tonnage information, you should calculate your energy consumption from outsourced laundry using the following estimates:

- Electricity: 180 kWh per metric tonne of laundry, plus
- Gas: 1,560 kWh per metric tonne of laundry, plus
- Oil: 111 litres per metric tonne of laundry

These estimates are based on the Carbon Trust- Guide to the laundries sector (CTG064) publication, which conducted a survey on the energy consumption of commercial laundries in the UK.

Please note that these figures include a 10% uplift on the Carbon Trust data to take into account the uncertainty of the estimated data and to encourage hotel managers to obtain data directly from their suppliers.

Estimation technique 3: using occupancy

If the two options above are not available to you, you should estimate your laundry tonnage by using an average per occupied room. This is equivalent to: 5.12 kg per occupied room (source: Laundry Today). You should then follow technique 2 to estimate the energy consumption.

Note: Hotels where guest rooms are not fully serviced on a daily basis (e.g. timeshares) are encouraged to use techniques 1 or 2.

Other (fugitive emissions)

Certain gases found within air-conditioning units, fridges, and freezers are released in the atmosphere in a similar fashion to CO₂. These emissions are known as fugitive emissions.

Research is being undertaken by the Cornell University's

The limitations of the estimation technique is recognised, as the mix of electricity, gas, oil, or other sources will vary by country and by laundry contractor. If better information becomes available, it will be reviewed and considered for inclusion in the methodology.

As with technique 2, the limitations of estimation technique 3 are recognised. All guest rooms are cleaned every day and the amount of linen varies by hotel class. In addition, as with technique 2, the mix of electricity, gas, oil, or other sources will vary by country and by laundry contractor. If better information becomes available, it will be reviewed and considered for inclusion in the methodology.

Center for Hospitality Research. Current reports indicate that hotels with decentralized air conditioning or hotels who have chillers using R22 or HFC-134A refrigerants who require regular top ups could have significant fugitive emissions, which should be reported as part of the footprint. If this is the case, you should consult with your engineer or refrigerant suppliers to calculate the amount of refrigerants used during the year.

The methodology will be refined as better information becomes available from the Cornell study,

Mobile fuels

Mobile fuels, such as diesel or gas oil, are used by hotels for a variety of reasons and research is being undertaken by the Cornell University's Center for Hospitality Research in this area. Reports thus far (from a sample of approx 400 hotels) indicate that mobile fuel emissions contribute approximately 1% to the total footprint of the hotel.

The methodology aligns itself with this research and hotel with mobile fuels should include a 1% uplift to the total hotel footprint at the end of the calculation and before the conversion to CO₂e. Additionally, the methodology recommends that if hotels are aware of significant levels of mobile fuel emissions (from resorts with jet skis, car hire, ski mobiles etc.) they should measure and include this energy consumption.

Please note that if a hotel uses diesel or gas oil for heating or electricity generation purposes, the energy consumption should be measured and included in the calculations.

Emission factors

Emission factors convert activity data (e.g. energy consumption) to GHG emissions. Hotels may choose the Emission Factor (EF) sources for stationary combustion, provided that they are from a reputable, 3rd party source such as WRI (www.ghgprotocol.org/calculation-tools/all-tools), the International Energy Agency (<http://www.iea.org/topics/climatechange/>), the Climate Registry (<http://www.theclimateregistry.org/>), or national agencies such as the US Environment Protection Agency (<http://www.epa.gov/climatechange/emissions/index.html>) or the UK Department of Energy & Climate Change (http://www.decc.gov.uk/en/content/cms/statistics/climate_stats/gg_emissions/gg_emissions.aspx),

CO₂ Equivalents:

EFs should include emissions of carbon dioxide, methane and nitrous oxide from all the agreed sources (i.e. hotels should use CO₂-equivalent EF that incorporate the **Global Warming Potentials** of CH₄ and N₂O, instead of CO₂ EF). EFs are to be quantified using High Heating Values².

Electricity EFs:

EFs for purchased electricity are used at the state or regional level for the US and Canada, and country-level for all other countries. CO₂e emission factors are published by a number of entities (e.g. national governmental agencies such as the US EPA and the UK DEFRA) and are updated on a regular basis. Hotels should select the most current and relevant emission factors available.

Transmission & distribution losses:

Site energy is used when quantifying purchased electricity energy (not source energy). Therefore under the guidance of the GHG Protocol, unless a company that purchases electricity, heat, and/or steam owns or controls the transmission and distribution (T&D) network, T&D losses should not be included in the company's GHG inventory.

² Heating Value refers to the amount of energy released when a fuel is burned completely

Sources:

The GHG Protocol recommends the following sources for electricity and heating:

- Electricity
 - Country-level electricity emission factors are available from the International Energy Agency, www.iea.org,
 - Emission factors for U.S. electricity grid regions, states, generating companies, and power plants are available from the U.S. Environmental Protection Agency's (U.S. EPA) E-Grid database, www.epa.gov/cleanenergy/egrid/index.htm.

- Heating:
 - Intergovernmental Panel on Climate Change (IPCC), Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1wb1.pdf.
 - U.S. Department of Energy/Energy Information Administration (DOE/EIA), www.eia.doe.gov/oiaf/1605/factors.html.
 - UK DEFRA, Annexes to Guidelines for Company Reporting on Greenhouse Gas Emissions, www.defra.gov.uk/Environment/business/envrpg/gas/.

Other suggested sources for:

- Imported steam, district heating, cooling and electricity from a Combined Heat and Power Plant
 - The Climate Registry General Reporting Protocol (Chapter 15)
<http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/>
- District heating/Municipal power: Hotels should obtain an emission factor from their energy suppliers.
- Fugitive emissions from the use of refrigeration systems and air conditioning equipment
 - The Climate Registry General Reporting Protocol (Chapter 16)
<http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/>

Calculate Emissions

Total hotel GHG emissions

This is the total energy usage (electricity, gas, gas oil plus any additional energy sources) plus energy usage from outsourced laundry (if applicable) less energy consumed in private space (if applicable), converted into tonnes of CO₂e using the most relevant emission factor for the country/state.

Please be careful of common errors:

- Choice of emission factors: make sure to multiply your energy consumption data from one energy source (e.g. natural gas) with the EF for the same energy source and for your country or region. Electricity EFs vary greatly by regions depending on the energy mix used to generate electricity (e.g. coal, nuclear, etc.).
- Unit conversion factors: energy consumption is reported in your invoices or is measured through your meters using various units (e.g. kWh, GJ, m³, ft³, litres, etc.) these vary from country to country. It is important that your energy consumption data and EFs are in the same units. Standard unit conversions are listed in Appendix 2. There are also several online tools that can help you with conversions.

Offsets:

The methodology measures the GHG efficiency at which a hotel provides guest rooms and meeting space to its customers. If the hotel purchases carbon offsets, it can disclose this information, but it cannot deduct the amount of emissions that is offset from its total GHG emissions.

Apportionment

For carbon reporting purposes, the hotel is divided into its two main services, guestrooms and meeting space, to avoid overlapping of footprints for guests that both attend meetings and stay at the hotel. **Back of house** areas and other services and facilities are interpreted as being part of the service offering.

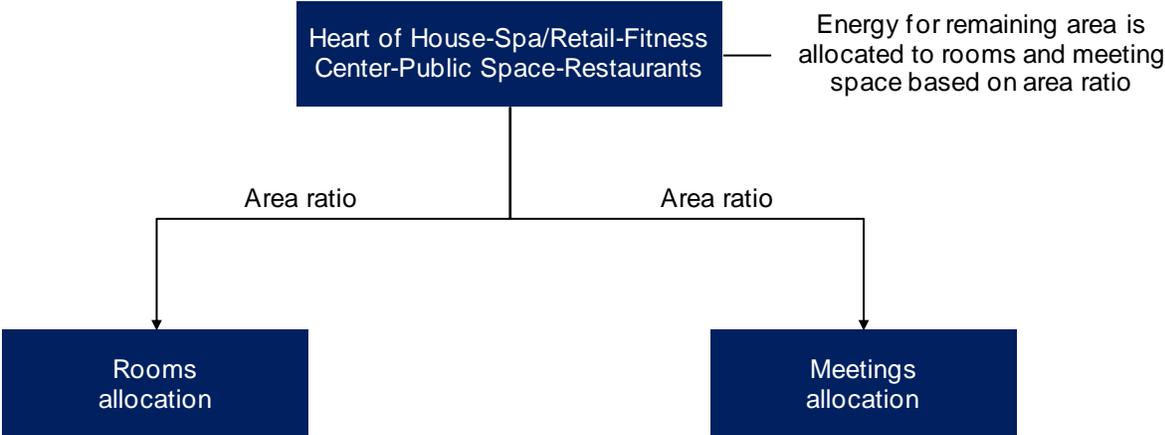
GHG emissions are allocated to guest rooms and meeting space based on the ratio of space occupied by guest rooms and meeting space within the hotel.

The two services are apportioned as follows:



- Total area is defined as total conditioned space
- Rooms and corridors adjacent to rooms are defined as a percentage of total area
- Meeting space is defined as a percentage of total area

- Remaining areas of heart of house, spa, retail, fitness, **public space**, restaurants, etc. make up the remaining percentage of total area
- The percentage of Remaining Areas is allocated proportionately to Rooms and Meeting Space
- Remaining energy is allocated to the categories of “Rooms” and “Meeting Space” proportionate to their area ratio



Carbon footprints for all rooms and all meetings are calculated as follow:

$$\text{Rooms Allocation} \times (\text{Total Energy} \times \text{Emission Factors}) = \text{Carbon footprint for all rooms}$$

$$\text{Meetings Allocation} \times (\text{Total Energy} \times \text{Emission Factors}) = \text{Carbon footprint for all meetings}$$

Note: If a hotel has no meeting space, then all GHG emissions are allocated to guest rooms.

Carbon Intensity:

The methodology assumes equal intensity for all areas of the hotel. This was deemed necessary to keep the methodology simple enough that hotel managers can use it on their own, without the need of extensive sub-metering, data analysis, or external assistance.

This estimation does not impact the overall carbon footprint of the hotel, but may affect the apportionment between guest rooms and meeting space. For clients who book both (e.g. a combination of meeting space and hotel rooms), the methodology does not think this will have a material impact. The methodology can be refined in the future to take into account new research in this field.

Outputs

Carbon footprint per occupied room on a daily basis

The room footprint is intended to communicate the footprint of one night's stay in a hotel room. This footprint can then be multiplied by the number of room nights occupied by a client. Occupied rooms are the total rooms that were occupied by guests in a given period, and according to this methodology each occupied room shares the proportion of the total footprint equally.

Carbon Footprint for all rooms ÷ Occupied Rooms = Carbon Footprint per Occupied Room

Carbon Footprint per Occupied Room x Number of Client Rooms = Client Rooms Carbon Footprint

Carbon footprint per area of meeting space on an hourly basis

Meetings footprints are derived using the average daily consumption of meetings energy. The Meetings Carbon Footprint per Day is broken down based on meeting-hours and proportion of meeting space utilized.

Meetings Carbon Footprint ÷ 365 = Meetings Carbon Footprint per Day

To arrive at the Meetings Carbon Footprint per Hour, the Meetings Carbon Footprint per Day is divided by the average number of operation hours of meetings in one day. The average number of operation hours of meetings in one day is set and standardized at 10 hours.

The Meetings Carbon Footprint per hour is then multiplied by the percentage of meeting space utilized for the meeting and the duration of the meeting in hours.

(Meetings Carbon Footprint per Day) ÷ (10) x (percentage of meeting space utilized) = Client meeting footprint per hour

A client's footprint will be calculated by multiplying this figure by the number of hours that the client has utilized the meeting space, including the client set-up and breakdown time, but excluding the hotel set-up and breakdown time.

For example, a client has booked a meeting room for a three day conference. Two days before the conference, the hotel sets up the room. The day before the conference, the client sets up the conference between 10:00 and 20:00. The conference then runs for 3 days for 8 hours each day. On the last day, the client needs 4 hours to break down their set up. The hotel then cleans the meeting room and set it up for another event. The number of hours used by the client is therefore: $10 + (3 \times 8) + 4 = 38$ hours.

Please note that the energy consumed during the hotel set up and breakdown of the meeting space is still captured in the overall footprint calculations, but the allocation of the GHG emissions is based on the client's utilization of the meeting space.

Hotels which were closed for part of the reporting period should use the number of days they were open for, instead of the standard 365 days.

Comments:

We recognise that the methodology assumes that meeting rooms are being used for on average 10 hours per day 365 days of the year. Feedback suggests that this is a realistic estimate of average usage (excluding set up time) of meeting space across the year, although it is recognised that this varies considerably from hotel to hotel. This assumption may be reviewed in the future if more information becomes available. However, in order to keep the methodology simple, we opted for a standard meeting space utilisation rate.

We recognise that room occupancy levels and utilisation of meeting space has an impact on the final outputs. However, the methodology does not attempt to measure the incremental GHG emissions from a guest room or meeting room but the average over a 12 months period.

Please note that the methodology for guest rooms uses a spatial measure (m² or sq ft) only to allocate GHG emissions between guest rooms and meeting space. The output of this methodology focuses on the client as the generator of emissions. GHG emissions are therefore reported per occupied room. As a result the methodology for guest rooms (unlike meeting rooms) does not account for different room sizes (e.g. standard room v. suite). This may be reviewed in the future.

Internal review:

In line with WRI guidance, we recommend the following activities are implemented in order to reduce the risk of errors:

- Conduct an independent review: at the minimum, ask someone who has not been involved with the calculations to check the data; an external review is likely to add to the credibility of the data
- Check for mistakes in converting measurement units, entering data, using formulas, etc.
- Check for large variances in energy consumption between periods: can these be explained or could there be an error between invoices or meter readings and your calculations spreadsheet?
- Where appropriate compare results of different hotels within a group and investigate unexplained differences in the results to enable different applications of the methodology to be identified and addressed

Improving performance:

This methodology is designed to measure GHG emissions. Each hotel and hotel group is responsible for improving their own performance and reducing their GHG emissions (and energy costs). Guidance on improving performance is available from a number of sources.

Appendix 1: Definitions

Term	Definition
Back of house	<ul style="list-style-type: none"> All non-client facing areas. This includes kitchen, offices, employees locker rooms, storage rooms, in-house laundry facilities, etc.
Carbon footprint	<ul style="list-style-type: none"> The total amount of carbon produced directly and indirectly to support guests' activities; expressed in this methodology as tonnes of carbon dioxide
Carbon footprint per occupied room on a daily basis	<ul style="list-style-type: none"> The carbon footprint that is allocated to each occupied room on a daily basis
Carbon footprint per area of meeting space on an hourly basis	<ul style="list-style-type: none"> The carbon footprint that is allocated to one hour of utilization of a meeting space and based on the percentage of meeting space area used.
Conditioned space	<ul style="list-style-type: none"> The area of a hotel that is conditioned by any heating, ventilations, air conditioning (HVAC) equipment.
Emission factor	<ul style="list-style-type: none"> The conversion figure used to convert energy consumption into a unit of carbon
Energy consumption	<ul style="list-style-type: none"> This is your total energy consumption for all your premises, including any outdoors facilities or private apartments. You should obtain this data from your energy invoices or from taking meter readings at the beginning and end of the reporting period. Consumption data based on actual meter readings is preferable as energy bills can be inaccurate or based on estimated readings. It is good practice to take your own meter readings to measure your energy consumption and verify the accuracy of your energy bills. Meter readings should be scheduled to coincide with carbon monitoring and reporting periods. Meter readings should be taken at regular intervals and a process should be in place to record the readings. Estimating consumption: if you do not have data for the entire year, you may estimate your consumption based on the following estimations techniques (source UK Environment Agency): <ul style="list-style-type: none"> Pro rata estimation technique involves quantifying the missing data for a data gap using a proportional method based on actual consumption from another similar period Direct comparison method uses data that corresponds with a similar period of supply. The advantage of this is that it accommodates variability in energy demand. Price settlement: using the unit price shown on an earlier bill for this billing period or an average price per unit to convert energy costs into consumption data.
Fugitive emissions	<ul style="list-style-type: none"> Emissions that are not physically controlled but result from the intentional or unintentional releases of GHGs. A common example is emissions from refrigerants, air conditioning and refrigeration units.
Global Warming Potential (GWP)	<ul style="list-style-type: none"> A factor describing the radiative forcing impact (degree of harm to the atmosphere) of one unit of a given GHG relative to one unit of CO₂ (GHG protocol definition)
Mobile fuels	<ul style="list-style-type: none"> Energy consumption from transport, machinery and equipment.
Occupied rooms	<ul style="list-style-type: none"> Sum of all rooms sold plus complimentary rooms less no-shows for the reporting period

Public space	<ul style="list-style-type: none"> • Areas of the hotel that are accessible to guests, but excluding guest rooms, corridors and meeting rooms. This includes lobbies and outdoor space.
Private space	<ul style="list-style-type: none"> • Areas which are not accessible to hotel guests or conference attendees (e.g. private apartments) or not related to the hotel (e.g. the hotel leases a floor to a third party) should be excluded from the calculations. On-site staff accommodation is also considered private space. Back of house areas or public spaces are not considered private space.
Reporting period	<ul style="list-style-type: none"> • This should be a 12 month period defined by hotel management and generally in line with other reporting requirements.
Request For Proposal (RFP)	<ul style="list-style-type: none"> • A request from meeting planners to hotels that includes information regarding their event including required number of hotel rooms, meeting space, and other amenities
Sub-metered	<ul style="list-style-type: none"> • An area of your hotel which has its own meter and for which energy consumption can be measured separately.

Appendix 2: Unit conversions

If this annex does not have the conversion factor you are looking for, a more complete list of conversions is available at <http://www.onlineconversion.com>.

Common unit abbreviations:

kilo (k) = 1,000

mega (M) = 1,000,000

giga (G) = 1,000,000,000

Energy

From/To - multiply by	GJ	kWh	therm	toe	kcal
Gigajoule, GJ	1	277.78	9.47817	0.02388	238,903
Kilowatthour, kWh	0.0036	1	0.03412	0.00009	860.05
Therm	0.10551	29.307	1	0.00252	25,206
Tonne oil equivalent, toe	41.868	11,630	396.83	1	10,002,389
Kilocalorie, kcal	0.000004 186	0.00116 27	0.000039 674	0.000000 100	1

Volume

From/To - multiply by	L	m3	cu ft	Imp. gallon	US gallon	Bbl (US,P)
Litres, L	1	0.001	0.03531	0.21997	0.26417	0.0062898
Cubic metres, m3	1000	1	35.315	219.97	264.17	6.2898
Cubic feet, cu ft	28.317	0.02832	1	6.2288	7.48052	0.17811
Imperial gallon	4.5461	0.00455	0.16054	1	1.20095	0.028594
US gallon	3.7854	0.0037854	0.13368	0.83267	1	0.023810
Barrel (US, petroleum), bbl	158.99	0.15899	5.6146	34.972	42	1

Weight/Mass

From/To - multiply by	kg	tonne	ton (UK)	ton (US)	lb
Kilogram, kg	1	0.001	0.00098	0.00110	2.20462
tonne, t (metric ton)	1000	1	0.98421	1.10231	2204.62368
ton (UK, long ton)	1016.04642	1.01605	1	1.12000	2240
ton (US, short ton)	907.18	0.90718	0.89286	1	2000
Pound, lb	0.45359	0.00045359	0.00044643	0.00050	1

Length/Distance

From/To - multiply by	m	ft	mi	km	nmi
Metre, m	1	3.2808	0.000621 37	0.001	0.00053 996
Feet, ft	0.30480	1	0.000	0.000304 8	0.00016 458
Miles, mi	1609.34	5280	1	1.60934	0.86898
Kilometres, km	1000	3280.8	0.62137	1	0.53996
Nautical miles, nmi or NM	1852	6076.1	1.15078	1.852	1

From/To - multiply by	m	ft	in	cm	yd
Metre, m	1	3.28084	39.37008	100	1.09361
Feet, ft	0.30480	1	12	30.48000	0.33333
Inch, in	0.02540	0.08333	1	2.54000	0.02778
Centimetres, cm	0.01	0.03281	0.39370	1	0.01094
Yard, yd	0.91440	3	36	91.44000	1

Appendix 3: Acknowledgements & Sources

The Working Group:

Accor, Fairmont Hotels and Resorts, Hong Kong & Shanghai Hotels, Hyatt Hotels Corporation, InterContinental Hotels Group, Marriott International Inc, Melia Hotels International, MGM Resorts International, Mövenpick Hotels & Resorts, Whitbread Group, Starwood Hotels & Resorts Worldwide, Inc., The Carlson Rezidor Hotel Group, Shangri-la Hotels, The Red Carnation Hotel Collection, The Hong Kong and Shanghai Hotels Ltd., TUI AG, Wyndham Worldwide, Mandarin Oriental Hotel Group, Beijing Tourism Group, Pan Pacific and Diamond Resorts.

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Sources:

- WRI (www.ghgprotocol.org/calculation-tools/all-tools)
- Cornell University School of Hotel Administration Center for Hospitality Research
- UK Environment Agency: <http://publications.environment-agency.gov.uk/PDF/GEHO0310BRYZ-E-E.pdf>
- International Energy Agency (<http://www.iea.org/topics/climatechange/>),
- Climate Registry (<http://www.theclimateregistry.org/>),
- US Environment Protection Agency (<http://www.epa.gov/climatechange/emissions/index.html>)
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- Laundry Today (<http://www.laundrytoday.com/>)