



Sustainable
Hospitality
Alliance

Hotel Carbon Measurement Initiative (HCMI) Methodology

v2.0, October 2022

In support of*



Glasgow Declaration
Climate Action in Tourism

*Final validation in process

Supported by



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Methodology v2.0 (October 2022)

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Hotel Carbon Measurement Initiative (HCMI) is free resource,
available to download from:

www.sustainablehospitalityalliance.org/hcmi

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- The Licensee may not share the methodology with any third party without the prior written consent of the Alliance.
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 - This tool uses the Sustainable Hospitality Alliance's [Hotel Carbon Measurement Initiative \(HCMI\)](http://www.sustainablehospitalityalliance.org/hcmi) version 2.0. <https://sustainablehospitalityalliance.org/resource/hotel-carbon-measurement-initiative/>
- The Licensee shall permit Alliance representatives to review the use of the methodology on reasonable request.
- All users will be required to provide information about the use of the methodology e.g. annual number of hotels using the methodology through the licensees platform.

By submitting the form, you are consenting to your data being held in relation to the usage of our HCMI methodology. We may contact you periodically to request information as outlined above, and to keep you informed of updates to the methodology. Your contact information will not be used for marketing purposes. If you would like to receive our newsletter, please sign up [here](#). Please see our [Privacy Notice](#) for further details.

HCMI was first developed when Sustainable Hospitality Alliance was known as International Tourism Partnership (ITP).

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1.0 Introduction

1.1 Climate action in hospitality

In November 2021, at COP 26, The Glasgow Declaration on Climate Action in Tourism was launched to unite travel and tourism behind a common set of pathways for climate action, align the sector with global commitments and catalyse collaborative solutions to the many challenges facing businesses and destinations globally. The Glasgow Declaration encourages the acceleration of climate action in tourism by securing commitments to reduce emissions in tourism by at least 50% over the next decade and achieve Net Zero as soon as possible before 2050.

To ensure climate action is aligned across all of tourism, five shared pathways were agreed upon; measure, decarbonise, regenerate, collaborate and finance. As a founding partner of the Declaration, the Alliance is pleased to offer continued support to accommodation signatories, to calculate their carbon footprint and fulfil their reporting requirements, through this update of HCMI.

1.2 The creation of the methodology

In June 2012, Sustainable Hospitality Alliance (the Alliance) and the World Travel & Tourism Council (WTTC), in collaboration with 23 leading global hospitality companies, launched the Hotel Carbon Measurement Initiative (HCMI) version 1.0. The methodology was developed by the hospitality industry to calculate and communicate the carbon footprint of hotel stays and meetings in a consistent and transparent way. Version 1.2 of the methodology, clarified the treatment of refrigerants, mobile fuels plants and provides additional guidance on how hotels should calculate their greenhouse gas (GHG) emissions.

HCMI is a ground-breaking 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 Sustainable Hospitality Alliance and WTTC's hotel members, was established in May 2011. In partnership with advisor KPMG, the Working Group developed this methodology to measure 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. Previously, approaches to measuring and reporting on carbon emissions varied widely. This led 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 was first developed in 2011, applying a number of aspects of the GHG Protocol Standards¹. During 2012 its practical applicability was tested in hotels of different styles and size in different geographical locations. It was further refined following a subsequent stakeholder engagement programme, including a number of Hotel Associations and a review by the World Resources Institute (WRI), one of the GHG Protocol development partners. During 2013, the Working Group gathered further feedback from users of the methodology and stakeholders, reviewed research by Cornell University's Center for Hospitality Research, and updated the methodology accordingly.

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

¹ The GHG Protocol is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions. The GHG Protocol is a decade-long partnership between the [World Resources Institute](#) (WRI) and the [World Business Council for Sustainable Development](#) (WBCSD).

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.

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 better understand their footprints and impacts.

1.3 The original Working Group

The original Working Group was comprised of the Sustainable Hospitality Alliance, WTTC, KPMG and representatives of leading international hotel companies such as:

Accor, Arabella Hospitality SE, Beijing Tourism Group, BWH Hotel Group, Carlson Rezidor Hotel Group, Deutsche Hospitality, 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, NH Hoteles, Orient-Express Hotels Ltd, Pan Pacific Hotel Group, Premier Inn - Whitbread Group, Scandic Hotels Holding AB, Starwood Hotels & Resorts Worldwide, Inc., Shangri-La Hotels and Resorts, Soneva, The Red Carnation Hotel Collection, TUI AG, Wyndham Worldwide.

1.4 Version 2.0

In 2022, the Alliance, Greenview and a working group of hotel companies came together to update the methodology and align it more with the GHG Protocol. Full details of the updates made can be found in Appendix 8. This version of the methodology is also supported by industry leading organisations, including:

- AHLA
- GBTA
- GSTC
- Travalyst
- WTTC

1.5 Forthcoming enhancements to HCM I

While this version 2.0 of the methodology has been released to address the critical aspect of allowing market-based purchases of renewable energy such as Renewable Electricity Certificates (RECs) to be incorporated into the final HCM I metrics, it comes a time when the focus and

pressures on businesses to calculate their full value chain emissions are increasing, as are the further needs for standardisation and harmonisation of carbon calculations. In late 2022, the Sustainable Hospitality Alliance is embarking on a subsequent revision to the HCMI methodology, in order to release the version 3.0 in 2023. This version will address the parked issues currently identified, including but not limited to:

- Addressing the industry gap of a common standard or guideline for defining the conditioned space of a hotel that is globally applicable and used in practice
- Further resources and coefficients for estimating energy usage from outsourced laundry based on a hotel's location and type
- Additional configurations of hotels within buildings, as well as amenities or other services within hotels but separate from their direct operations for the provision of the room night, which will impact the allocation of emissions
- Defining boundaries, quantification, and metrics to encompass additional Scope 3 value chain emissions of a hotel
- Arriving at a common industry definition of a carbon neutral stay or carbon neutral meeting with corresponding methodology
- Enabling further consistency in calculation for more accurate comparability among hotels

2.0 Brief overview of the methodology

The methodology provides hotels with a carbon footprint:

- Per area of the total building on an annual basis;
- 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, if applicable, includes carbon emissions from 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 oxide (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 and tourism industry.

2.1 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 to individual hotels, large and small, regardless of the type of amenities offered.

Separately but complementary to HCMI, we have explained in Appendix 7 of this document how to calculate energy consumption per area, which is a metric that is often requested by hotel corporate clients and stakeholders. The calculations follow the same principles as the HCMI methodology.

2.2 Relationship with other GHG reporting standards

GHG Protocol: The HCMI methodology follows the GHG Protocol principles of relevance, completeness, consistency, transparency, and accuracy. The HCMI methodology defines:

- the reporting period and boundaries: entire hotel (minus any private space, plus outsourced laundry) using the operational control approach;
- **scope of emissions:** scope 1 & 2 are included as recommended. In addition, emissions from outsourced laundry (a scope 3 emission) are also included because they help level the playing field across areas or operations of the hotel that may not be visible to the guest, are

significant, contribute to the hotel's GHG risk exposure, are deemed critical to stakeholders, and potential emissions reductions can be influenced by the hotel;

- exclusions from the boundary such as private space, on-site staff accommodation, space leased to 3rd party not related to the hotel;
- on-site generation and purchase of renewable energy; and
- treatment of carbon offsets.

The GHG protocol has four reporting standards², none of which individually fit with the purposes of HCMI. The HCMI methodology is aligned to the GHG Protocol's *Corporate Standard* but it calculates emissions at the individual hotel level, not at the corporate level. The HCMI methodology is aligned to the GHG Protocol's *Product Life Cycle Standard* in so far as it calculates GHG emissions resulting from the running of a hotel, but it does not calculate the emissions of the full life cycle of the hotel such as its construction materials, fittings and amenities including raw materials, manufacturing, transportation, storage, use and disposal. The HCMI methodology incorporates the *GHG Protocol Scope 2 guidance*³ to enable hotels to report on their use of renewable energy and electricity, using the market-based accounting method to enable purchase of renewable energy via market mechanisms to be included. HCMI also offers a simplified method for hotels to aggregate and communicate on their use of renewable energy and electricity.

ISO14064: HCMI also follows the principles of ISO14064-1⁴ and includes requirements for determining boundaries, quantifying emissions and removals, and reporting data at the individual hotel level. HCMI however does not require hotels to disclose specific activities aimed at improving GHG management or provide guidance on quality management of the GHG inventory. Currently, HCMI only recommends an internal review process and does not mandate external verification.

Further information: 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@sustainablehospitalityalliance.org.

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

3.0 Boundaries

Reporting boundaries define what should be included in the hotel's carbon footprint. The methodology requires hotels to report on all GHG emissions resulting from activities within their premises (known as scope 1 and 2 emissions) and, if applicable, from outsourced laundry operations (scope 3 emissions). 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.

² The four separate but linked standards are:

- the *Corporate Accounting and Reporting Standards ('Corporate Standard')*: designed for organizations to inventory and report all of the GHG emissions they produce,
- the *Product Life Cycle Accounting and Reporting Standard*: calculates the full life cycle emissions of a product,
- the *Project Accounting Protocol and Guidelines*: calculates reductions in GHG emissions from specific projects, and
- the *Corporate Value Chain (Scope 3) Accounting and Reporting Standard*: calculates GHG emissions from an organisation's entire value chain emissions impact.

³ See example p50 of: https://ghgprotocol.org/sites/default/files/standards/Scope%202%20Guidance_Final_Sept26.pdf

⁴ ISO 14064 is an international standard against which GHG emissions reports are voluntarily verified. Part 1 (ISO 14064-1:2006) specifies principles and requirements at the organization level for quantification and reporting of greenhouse gas (GHG) emissions and removals. It includes requirements for the design, development, management, reporting and verification of an organization's GHG inventory.

The methodology does not include the activities of suppliers outside of your premises (except laundry facilities), the guests' travel to your hotel, or employees' business travel in non-company cars.

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, such as restaurants, shops, hairdressers, etc.) 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 conditioned 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 hotel's overall emissions. Laundry has been a very high profile item in hotels' 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. However, in order to maintain consistency of reporting, these emissions should not be included in the HCMI calculations. Non-facility, offsite emissions from corporate offices and water consumption are also excluded.

The Working Group recognises that water, waste, biodiversity, and GHG emissions lifecycle analysis are important aspects of a hotel's overall environmental impact, however as these require complex calculations and estimation techniques, they have not been incorporated into HCMI. Additional measurement resources are available via the Sustainable Hospitality Alliance's resources, such as:

- Hotels wishing to measure and report their water use in line can use Sustainable Hospitality Alliance's Hotel Water Measurement Initiative, created in 2016.
- Hotels wishing to measure and report their waste usage and diversion can use the WWF's Hotel Waste Measurement Methodology, created in 2021.
- Hotels wishing to pursue net-zero targets and plans can use the Net-Zero Methodology for Hotels, created in 2021.

GHG Emissions reductions from renewable energy: In addition to the default grid mix from a utility provider, hotels can incorporate energy and electricity from renewable sources in several ways:

Type of renewable energy use	How it is factored in HCMI
Through the electricity and energy purchased from a local utility, which might include a green tariff or other specified addition to the renewables in its procured energy mix (e.g. "20% of our electricity is generated from renewable sources, an additional 6% above the grid mix of 14%").	A cleaner energy mix results in a lower emission factor, therefore a lower hotel carbon footprint.
Through an active approach of the hotel's owner or operator, procuring a set amount of renewable energy through a market mechanism of Energy Attribute Certificate (EAC), Renewable Energy Certificate (REC), with appropriate attestations or certificates of origin.	Hotels that purchase renewable electricity separate from the utility via certificate may count the amount of kWh represented by the purchase with an emission factor of zero for scope 2. Additionally, hotels wanting to report specifically on the amount (or %) of renewable energy/electricity they use can do so through HCMI.
By producing renewable energy or electricity on the hotel premises (e.g. wind turbine, solar panels).	HCMI considers that energy produced on site will be used by the hotel and therefore reduces the need for external energy/electricity supply, thus reducing the overall consumption and carbon footprint. Additionally, hotels wanting to report specifically on the amount (or %) of renewable energy/electricity they use can do so through HCMI.

In addition to carbon footprint metrics, the HCMI spreadsheet allows hotels to aggregate and report on their use of these renewable electricity and energy sources, expressing the results in the following format:

- TOTAL renewable energy and electricity used by the hotel (kWh)
- TOTAL renewable electricity used by the hotel (% of total electricity use)
- TOTAL renewable energy and electricity used by the hotel (% of total energy consumption)

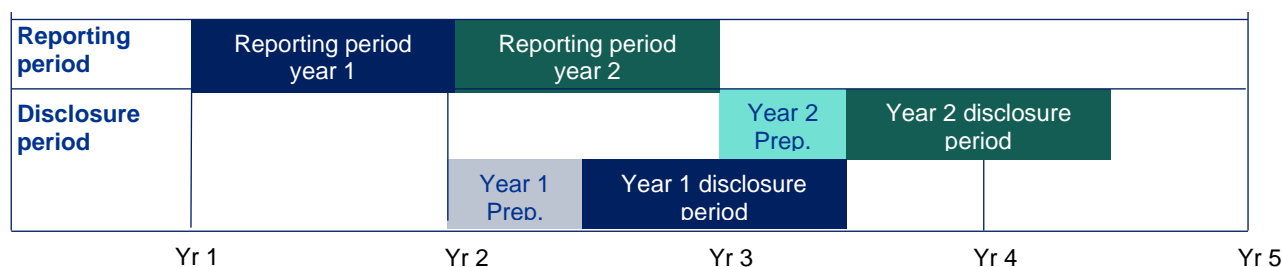
4.0 Reporting Period

4.1 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 e.g. calendar year, financial year.

4.2 Reporting and disclosure periods

- Data is collected and reported for a twelve-month period (the reporting period). From the end of the reporting period, hotels have a maximum of six months to gather data and carry out the footprint calculations. 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 during normal operations.
- Renewable energy purchases must be attributed to the same 12 month period, without forward or retroactive allocation.
- Please note that preparing the data in 60 days instead of 6 months is considered 'best practice'.
- The diagram below shows how the reporting and disclosure period interact:



4.3 Interruptions to Operations

The methodology calculates GHG emissions during “normal operations”. Initial operations for new builds in the first months prior to stabilized occupancy, or interruptions to operations due to refurbishments or other factors (pandemic, geopolitical unrest, etc.) during the reporting year may distort results which aim to show a normal operating position.

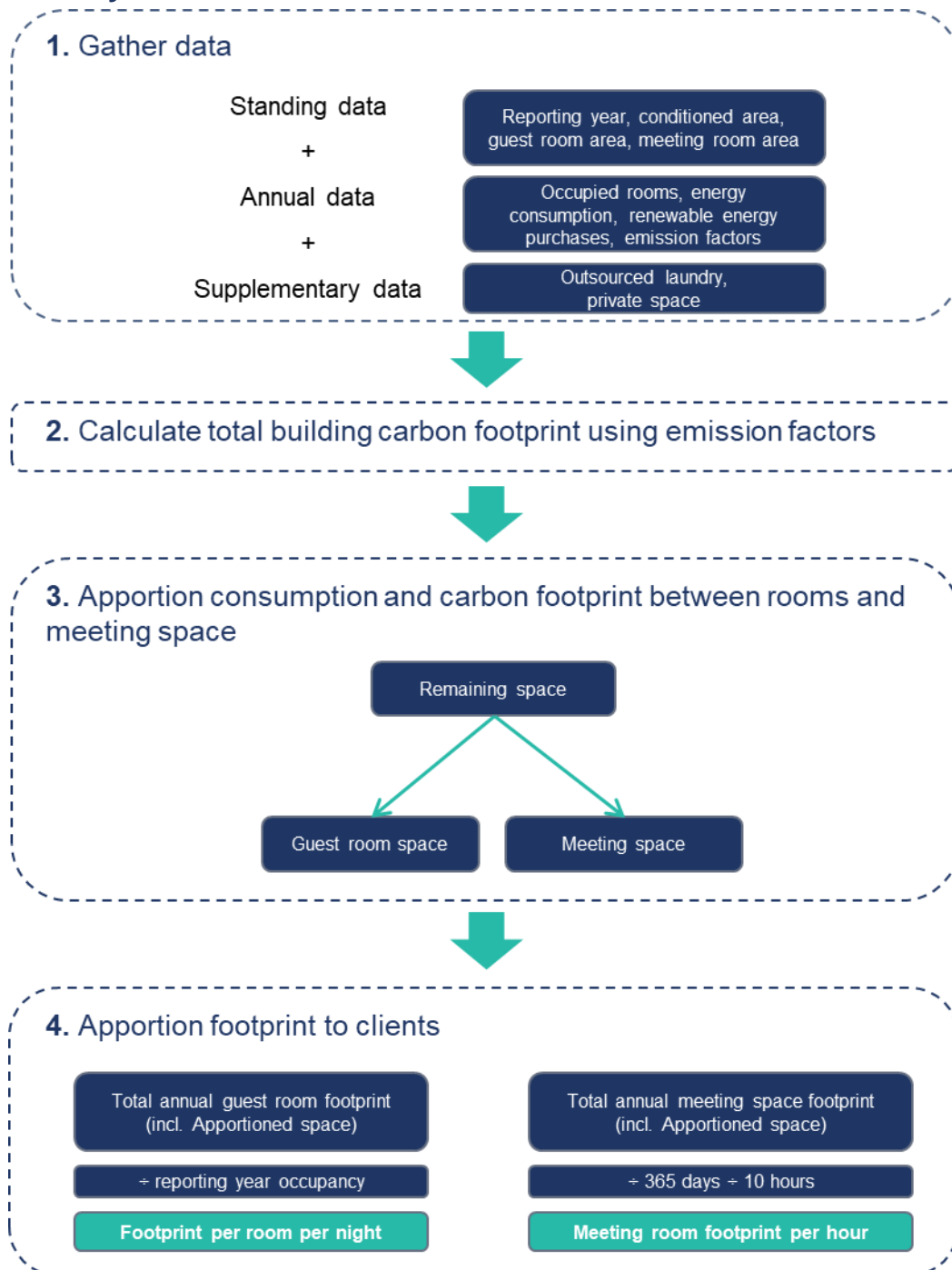
If abnormal circumstances alters the energy consumption by +/- 20% compared to a standard reporting period then hotels must use the most recent period of data that reflects close to normal operations (and disclose this fact alongside impacted HCMI metrics when communicating externally). Although the data will be outside of the standard period in section 4.2, it is more likely to be a truer reflection of the hotel energy consumption during normal operations.

4.4 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 and thus emissions are averaged out over the 12-month period.

5.0 Data Requirements

5.1 Summary of data flow



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

5.2 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 **private space**:

Private space (sqft or sqm)	Necessary for footprint apportionment	Architectural plans, property/facility management
Total area of conditioned space (sqft or sqm)	Necessary for footprint apportionment	Architectural plan, 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.

5.3 Data for the reporting year

You will need to gather the following data for the reporting period each year:

Data requirements	Rationale	Likely source	Further guidance
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	<p>No-shows are not included in occupied room count, but complimentary rooms that were occupied but not paid for are included. Out-of-order rooms not within the hotel's inventory do not affect the rooms calculation.</p> <p>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.</p> <p>Emissions are calculated on a per occupied room basis. If relevant to your business (e.g. some resorts or camps), you may also calculate your footprint per bed sold, using the same methodology. However, you need to make this distinction clear in your reporting.</p>
Total energy consumption for the reporting year from all fuels and electricity etc.	Necessary for total footprint calculation	<p>Energy bills and/or meter readings</p> <p>(See following sections for additional guidance: 5.3.1 estimating consumption 5.3.5 for mobile fuels)</p>	<p>It should include all Scope 1 and 2 fuels, including but not limited to:</p> <ul style="list-style-type: none"> • Fuels consumed on-site such as natural gas (stationary combustion), oil and other fuels • Purchased electricity • Mobile fuels burned (from vehicles and landscaping equipment) • District heating, district cooling or energy purchased from a Combined Heat & Power (CHP) plant not operated by the hotel <p>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.</p> <p>Smart meters that record consumption on a half-hourly basis are effective tools to measure and manage your energy consumption.</p> <p>Energy consumption should be representative of energy consumed, which may differ from energy generated, should the hotel sell or provide a portion of the energy generated to another party or sell back to the grid, in which case the sold energy should not be included.</p>
Emission factors	Necessary for total footprint calculation	Emission factors are obtained from national or international Datasets (e.g. IEA, AIB).	<p>These should be country or state specific to allow for greater accuracy. Each type of energy consumption (e.g. gas, oil, electricity, should have its own emission factor).</p> <p>Hotels may use either the location-based accounting approach or the market-based accounting approach, but should use market-based emissions approach if they are purchasing renewable electricity so that the purchases can be counted. Note that</p>

		<p>Emission factors should correspond to the latest available publication within the same 12 month period of the data set.</p> <p>See section 5.3.6 for further guidance</p>	<p>the HCMI Calculation Tool uses market-based emissions and the AIB emission factors for residual mix for EU countries by default.</p> <p>Where hotels are required to report emissions by local legislation and regulation, they should align the choice of emission factors for HCMI with that reporting.</p> <p>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).</p>
Renewable electricity	Necessary for total footprint calculation and renewable energy metrics	<p>Renewable energy certificates</p> <p>Power Purchase agreements</p> <p>Energy bills</p> <p>Electricity generator meter readings</p>	<p>For electricity purchased from a supplier generating electricity from renewable sources, the amount of renewable electricity supplied should be verifiable through mechanisms such as Power-Purchase Agreements, and Renewable Energy Certificates. Certificates of origin are recommended as the most robust source of data. In case certificates are not available to indicate the specific amount of kWh of renewables or the % of the property's load, please refer to the energy mix or share of renewables as part of the contract that is above the standard grid mix as disclosed on energy bills or contracts, and allocate the incremental difference in percentage proportionate to the amount of electricity covered.</p> <p>Renewable electricity can also be produced on-site by the hotel using solar panels or wind turbines, or any renewable electricity generation system.</p>
Other renewable energy	Necessary for total footprint calculation and renewable energy metrics	Energy bills, or energy generator meter readings	This includes energy and heat purchased from a supplier using renewable sources (e.g. geothermal district heating), or generated on-site using renewable sources (such as biomass, biofuel, hydropower, geothermal energy, solar)
Outsourced laundry	Although this is Scope 3, it is necessary for total footprint calculation to enable comparability between hotels	Laundry contractor or estimations (see section 5.3.3 for guidance)	<p>In order of preference, the data for inclusion is:</p> <ol style="list-style-type: none"> 1. Energy consumption provided by your laundry contractor and added to your total energy consumption. 2. Tonnage of laundry for the year used to estimate the energy consumption. 3. Number of occupied rooms for the year used to estimate the energy consumption.
Refrigerants	Necessary for total footprint calculation	Purchase data or estimations (see section 5.3.4 for guidance)	The amount of refrigerants used is quantified by measuring the amount of refrigerant gas replaced in each cooling unit. This information should be available from your Maintenance team or contractors hired to service your equipment. The data may be obtained from service logs and purchase/usage records.

5.3.1 Estimating data: If you do not have data for the entire year, you may estimate your consumption based on the following estimation techniques⁵.

- Pro rata:
 - calculating the daily energy consumption using the available data, and
 - multiplying the daily energy consumption by the number of missing days
- Direct comparison: using consumption data for a similar period in the previous year. The advantage of this is that it accommodates variability in energy demand (e.g. gas consumption in winter and summer months).
- Price settlement: calculating energy consumption by dividing your energy costs by your energy rate.

5.3.2 Renewable energy: HCMI is designed to take the use of renewable energy into account when calculating the overall carbon footprint of a hotel. Additionally, hotels and businesses are increasingly switching their energy supply towards more renewable sources, and may want to communicate their efforts in that direction to their customers and stakeholders.

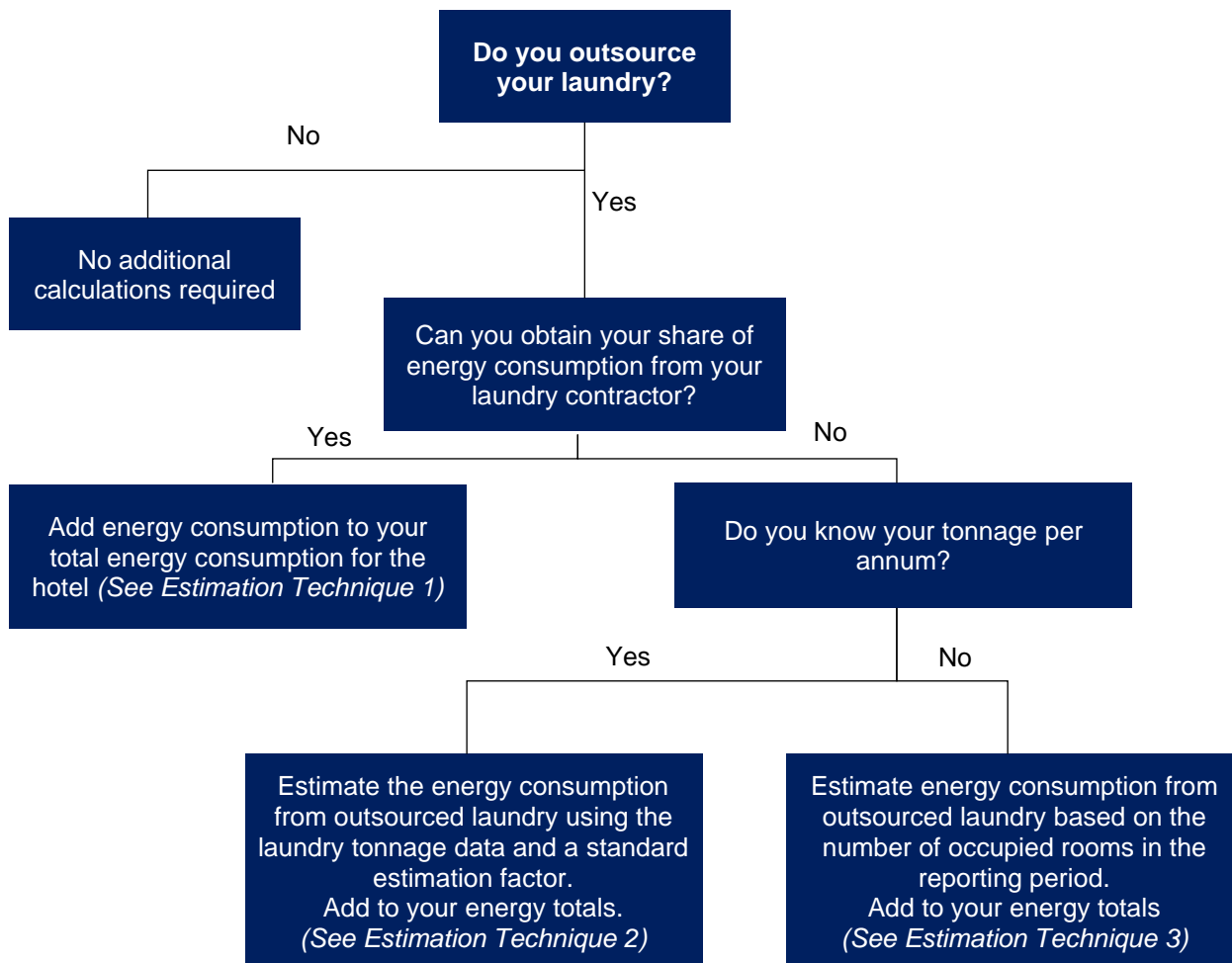
The version 2.0 of the HCMI calculation tool (2022) is designed to help hotels communicate on their use of renewable energy more transparently, as a percentage of the total energy consumed. We therefore recommend businesses wanting to communicate on renewables to break down the information in the following order:

- Total energy and heat generated on-site using renewable sources (using biomass, biofuel, hydropower, geothermal energy, solar, wind), in kWh
- Total energy and heat purchased from supplier using renewable sources (e.g. geothermal district heating, through green electricity supplier, Power-Purchase Agreement, Renewable Energy Certificates), in kWh

Any renewable energy generated on site and sold back to the grid or another party or site should not be counted in the renewable energy metrics.

⁵ UK Government: <https://www.gov.uk/government/collections/energy-and-emissions-projections>

5.3.3 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 each hotel is responsible for. If this is not available, a 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.

This uplift of 10% on estimated data is customary and follows other carbon reporting methodologies. For example, the IPCC Aviation recommends a 9 to 10% uplift to emissions from aviation to take into account non-direct routes and delays/circling and the UK's Carbon Reduction Commitment also applies a 10% uplift for estimated data.

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.

In the estimation techniques, no further purchase of renewable energy through market mechanisms should be assumed, and the same emission factor (before any additional renewable purchases) should be used for the portion of energy from outsourced laundry.

As with technique 2, the limitations of estimation technique 3 are recognised: all guest rooms may not be 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.

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.

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

5.3.4 Fugitive emissions: Fugitive emissions are usually emissions arising from unintentional releases of gas from certain hotel cooling systems. Certain gases (refrigerants) found within air-conditioning units, fridges, and freezers when released have a similar impact on the atmosphere as CO₂. When any of this equipment is installed, operated, serviced or retired there may be leaks of these refrigerant gases, which are known as fugitive emissions. Version 1.1 of HCMI clarifies the treatment of fugitive emissions following the release of Cornell University Center for Hospitality Research's report *Determining Materiality in Carbon Footprinting*⁶.

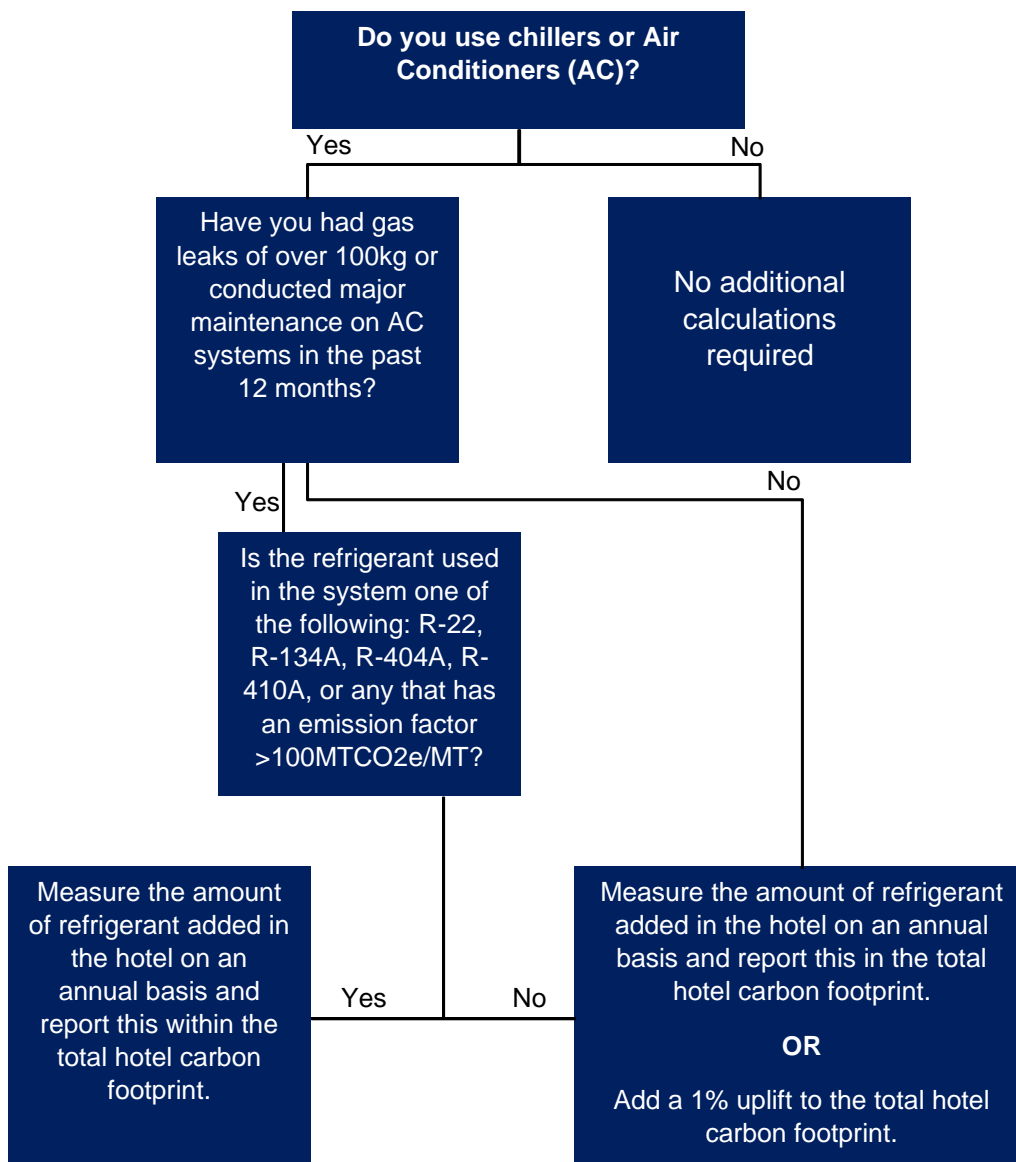
The amount of refrigerant leaked is usually small. However, their impact can be significant. This is because they are much more damaging to the atmosphere than CO₂⁷.

For many hotels, fugitive emissions will be insignificant compared with their total GHG emissions. However, for some hotels with significant air-conditioning or refrigeration systems, refrigerant replacement may be a significant source of emissions, due to leaks or major maintenance programme during the reporting year, and should be measured.

According to the GHG Protocol GHG Emissions Calculation Tool's Emission Factors tab in footnote, "It is customary to exclude CFCs, HCFCs, and halons from GHG inventories because they are regulated and are being phased out under the Montreal Protocol. These ozone depleting substances may be documented as memo items reported as total release of gases, but no GWPs are applied, and they do not contribute to the CO₂e emissions inventory." Therefore fugitive emissions may be included in a hotel's footprint based on the decision tree below:

⁶ Cornell Hospitality Report Vol. 12, No 12, September 2012, Eric Ricaurte

⁷ the **Global Warming Potential** (GWP) of different refrigerants varies greatly. Some commonly used refrigerants (R-22, R-134A, R404, and R410-A) are particularly harmful. For example, the R-22 gas traps 1,810 times more heat in the atmosphere than CO₂.



How to measure fugitive emissions: The amount of refrigerants used is quantified by measuring the amount of refrigerant gas being replaced in each cooling unit. This information should be available from your Maintenance team or from contractors hired to service your equipment. The data may be obtained from service logs and purchase or usage records.

Once you have determined the total amount of each refrigerant used during the reporting year, you can calculate your fugitive emissions by using the conversion table in Appendix 3. Fugitive emissions are calculated in tonnes of CO₂ equivalent (tCO₂e).

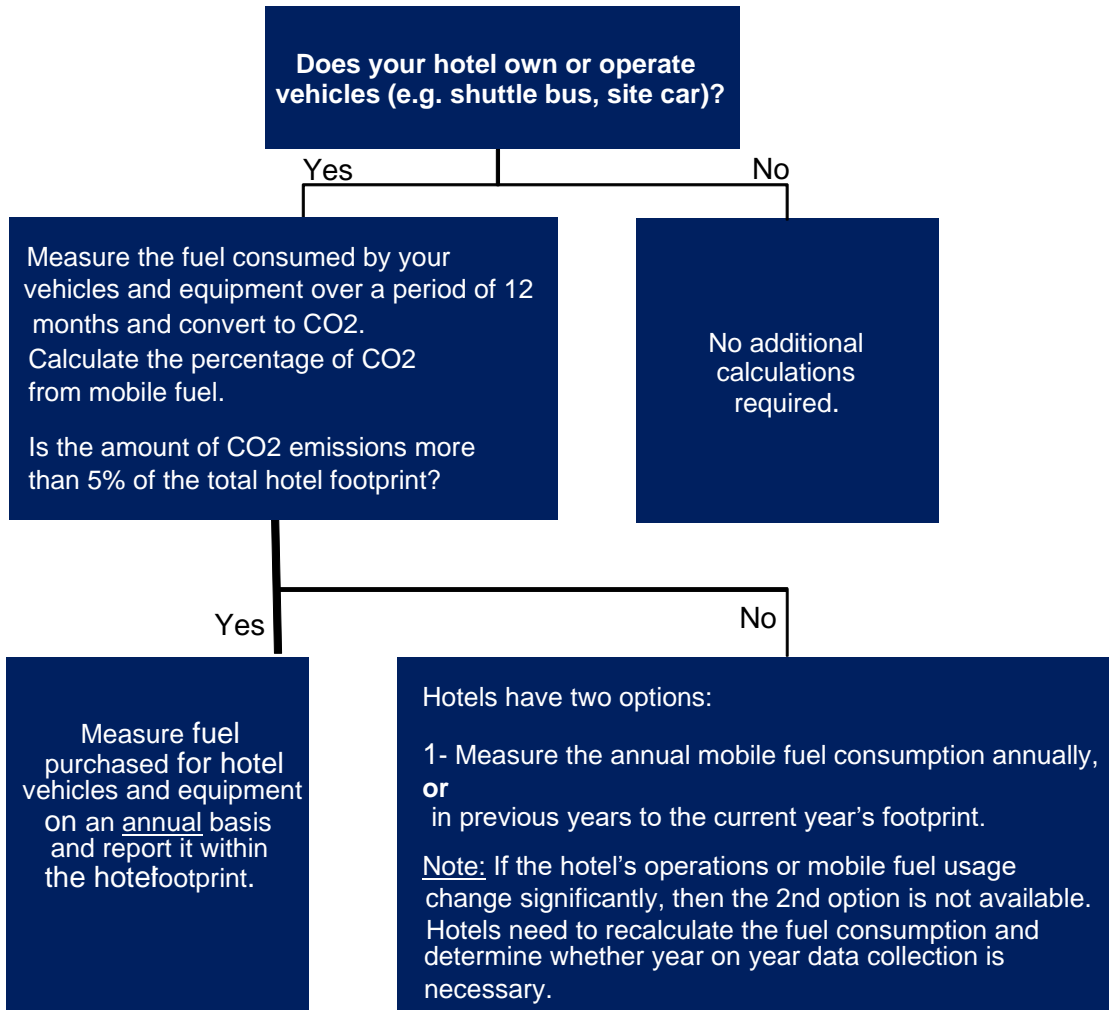
Hotels may also use the Screening method or Material Balance Method of calculating fugitive emissions described in the GHG Protocol's Scope 1&2 GHG Inventory Guidance, page 19 (https://ghgprotocol.org/sites/default/files/Guidance_Handbook_2019_FINAL.pdf). The Screening method is the simpler of the two methods; however it requires hotels to carry out an inventory of equipment, including the type of refrigerants used, the equipment charge capacity, and approximate amount of time the equipment is used during the reporting year.

5.3.5 Mobile fuels: Mobile fuels, such as diesel or gas oil, are used by hotels for hotel shuttles, company cars, landscaping equipment, jet skis, etc. The amount of GHG emissions from the consumption of mobile fuels is unlikely to be more than 10% of a hotel's total emissions and, in

many cases, will be insignificant. As with fugitive emissions, Version 1.1 of HCMI clarifies the treatment of mobile fuel emissions following the release of Cornell University Center for Hospitality Research's report *Determining Materiality in Carbon Footprinting*. The report concludes that:

- if a hotel does not have transportation vehicles, mobile fuel emissions from other sources (e.g. landscaping) are most likely insignificant;
- if a hotel operates vehicles, it can perform a twelve-month performance period test to determine the percentage that mobile fuel emissions represent toward total emissions.

Mobile fuel emissions should therefore be included in a hotel's footprint based on the decision tree below:



How to measure mobile fuel emissions: A hotel should measure the fuel consumption of all vehicles and other equipment (such as landscaping equipment) that it owns or has operational control over. For example, the fuel consumption of owned or leased company cars, shuttles, jet skis, lawn mowers should be included. However, vehicles operated by third parties such as limousines, delivery trucks, taxis, etc. should be excluded.

The appropriate emission factor for each fuel should be applied to calculate the total amount of GHG emissions from mobile fuels. Please refer to Appendix 2 for guidance on emission factors.

5.3.6 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, third-party source such as:

- national agencies (preferred option); e.g. the US Environment Protection Agency (EPA: <http://www.epa.gov/climatechange/emissions/index.html>) or the UK Department of Business, Energy and Industrial Strategy (<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019>)
- GHG Protocol (www.ghgprotocol.org/calculation-tools/all-tools),
- the International Energy Agency (<http://www.iea.org/statistics/topics/co2emissions/>), or
- the Climate Registry (<http://www.theclimateregistry.org/>).

For scope 2 emissions and in particular purchased electricity, hotels may use either the location-based accounting approach or the market-based accounting approach, but should use market-based emissions approach if they are purchasing renewable electricity so that the purchases can be counted. In applying the market-based accounting approach, the GHG Scope 2 Protocol should be followed per the hierarchy of availability of emission factors. Note that the emission factor used for location-based accounting of scope 2 may differ from the emission factor for market-based accounting. Note that the HCMI Calculation Tool uses market-based emissions and the AIB emission factors for residual mix for EU countries by default.

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 Values⁸.

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.

Emissions from District Heating, District Cooling, or energy from a CHP: The emission factors for energy purchased from district heating, district cooling, or CHP plants operated by third parties depend on the efficiency and input fuel of these plants. Appendix 4 provides some guidance on how to calculate GHG emissions for these energy sources, where a hotel is able to obtain this information from its service provider.

⁸ Heating Value refers to the amount of energy released when a fuel is burned completely.

6.0 Calculating Emissions

6.1 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 region depending on the energy mix used to generate electricity (e.g. coal, nuclear, renewables, 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 5. There are also several online tools that can help you with conversions.

6.2 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. This is consistent with GHG Protocol Corporate Standard Revised version 2004 (chapter 11 page 82); "companies should always report their own internal emissions in separate accounts from offsets used to meet the target, rather than providing a net figure."

6.3 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.

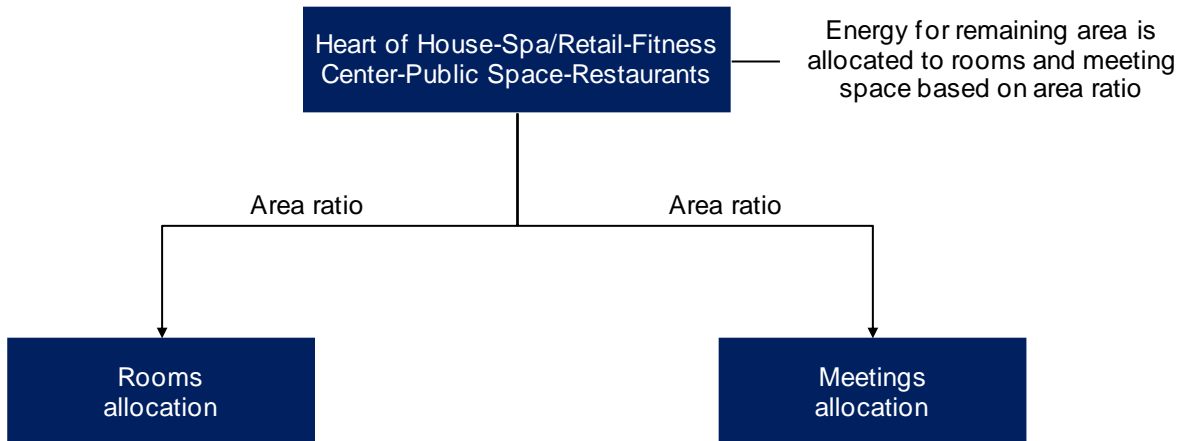
GHG emissions are allocated to guest rooms and meeting space based on the ratio of space occupied by guest rooms and meeting space within the hotel.

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:

Rooms Allocation x (Total Energy x Emission Factors) = Carbon footprint for all rooms

Meetings Allocation x (Total Energy x Emission Factors) = Carbon footprint for all meetings

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

6.4 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 assumes this will not have a material impact. The methodology can be refined in the future to take into account new research in this field.

7.0 Outputs

7.1 Carbon footprint per square meter on an annual basis

The total building footprint is intended to communicate the carbon performance of the hotel on an annual basis, which serves for benchmarking and comparison over time. It is calculated before apportionment occurs.

Carbon footprint for the entire building ÷ Building area (sqm or sqft) = Carbon footprint per square meter

7.2 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

7.3 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 per area of meeting space (sqm/sqft), the Meetings Carbon Footprint per Day is divided by the average number of operation hours of meetings in one day and by the total area of meeting facility space. The average number of operation hours of meetings in one day is set and standardized at 10 hours.

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

(Meetings Carbon Footprint per Day per sqm/sqft) ÷ (10) x (amount 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.

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.

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*8) + 4 = 38 hours

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 for the total building footprint, or to allocate GHG emissions between guest rooms and meeting space. The output of the rooms and meeting footprints focus 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.

7.3 Amount of renewable energy used by the hotel

The total renewable energy use of the hotel (expressed in kWh) is calculated by adding the amounts used from four potential sources:

Total renewable energy use = energy and heat purchased from supplier using renewable sources + energy and heat generated on-site using renewable sources.

7.4 Share of renewable energy used by the hotel (% of total energy use)

This figure takes into account energy use from renewable sources, expressed in one single unit (we recommend using kWh).

Share of renewable energy used by the hotel = Total renewable energy use ÷ total energy use.

7.5 Internal review

In line with GHG Protocol 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

7.6 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

Appendix 2: Emission Factors

The latest published version of emission factors available for the reporting year is used.

	Purchased Electricity	Natural Gas	Butane, Propane (Mobile and Stationary)	LPG (Mobile and stationary)	LNG (Mobile and Stationary)	CNG (Mobile and Stationary)	All fuels, unless specified in "Other Fuels"	Other Fuels (refer to specific types in brackets)	City Gas / Towngas	Biomass	Charcoal	Kerosene	Ethanol	Purchased Steam, Heat, and Hot Water	Purchased Chilled Water
Australia	National Greenhouse Accounts Factors	National Greenhouse Accounts Factors	National Greenhouse Accounts Factors	National Greenhouse Accounts Factors	National Greenhouse Accounts Factors	National Greenhouse Accounts Factors	WRI Stationary Combustion Tool V4.1	National Greenhouse Accounts Factors [Gasoline (Stationary), Diesel (Stationary), Fuel Oil 1-6]	National Greenhouse Accounts Factors	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	National Greenhouse Accounts Factors	WRI Stationary Combustion Tool V4.1	National Greenhouse Accounts Factors	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N
Canada	National Inventory Report 1990-2017	Climate Registry - Default Emissions Factors	Climate Registry - Default Emissions Factors	Climate Registry - Default Emissions Factors	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	Climate Registry - Default Emissions Factors [Diesel (Stationary), Fuel Oil 1-6]	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	US Energy Star Portfolio Manager Technical Reference: Greenhouse Gas Emissions	US Energy Star Portfolio Manager Technical Reference: Greenhouse Gas Emissions
Hong Kong	International Energy Agency CO2 Emissions from Fuel Combustion	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	Hong Kong Carbon Accounting guidelines. Table 1.1 - 1.3	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	Hong Kong Carbon Accounting guidelines. [Diesel (Stationary), Fuel Oil 1-6]	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N
Japan	International Energy Agency CO2 Emissions from Fuel Combustion	(Indigenous natural gas as proxy) National Greenhouse Gas Inventory Report of JAPAN	(LPG as proxy) National Greenhouse Gas Inventory Report of JAPAN	National Greenhouse Gas Inventory Report of JAPAN	National Greenhouse Gas Inventory Report of JAPAN	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	National Greenhouse Gas Inventory Report of JAPAN (CH4 and N2O Only) [Biofuel Wood Waste, Gasoline Biofuel Blend (Mobile), Gasoline (Mobile)]	(City gas) National Greenhouse Gas Inventory Report of JAPAN	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	National Greenhouse Gas Inventory Report of JAPAN	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N
United Kingdom	Association of Issuing Bodies European Residual Mixes	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	UK Government GHG Conversion Factors for Company Reporting	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting [Diesel (Stationary), Fuel Oil 1-6]	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N

	Purchased Electricity	Natural Gas	Butane, Propane (Mobile and Stationary)	LPG (Mobile and stationary)	LNG (Mobile and Stationary)	CNG (Mobile and Stationary)	All fuels, unless specified in "Other Fuels"	Other Fuels (refer to specific types in brackets)	City Gas / Towngas	Biomass	Charcoal	Kerosene	Ethanol	Purchased Steam, Heat, and Hot Water	Purchased Chilled Water
United States, Puerto Rico, other US Territories	EPA eGRID	EPA Emission Factors for GHG Inventories	EPA Emission Factors for GHG Inventories	EPA Emission Factors for GHG Inventories	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories [<i>Diesel (Stationary), Fuel Oil 1-6</i>]	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	US Energy Star Portfolio Manager Technical Reference: Greenhouse Gas Emissions	US Energy Star Portfolio Manager Technical Reference: Greenhouse Gas Emissions
New Zealand	Measuring emissions: A guide for organisations - summary of emissions factors	Measuring emissions: A guide for organisations - summary of emissions factors	WRI Stationary Combustion Tool V4.1	Measuring emissions: A guide for organisations - summary of emissions factors	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	Measuring emissions: A guide for organisations - summary of emissions factors [<i>Diesel (Stationary)</i>]	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N
Mexico	México Registro Nacional de Emisiones	Calculadora de emisiones para el Registro Nacional de Emisiones	WRI Stationary Combustion Tool V4.1	Calculadora de emisiones para el Registro Nacional de Emisiones	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	Calculadora de emisiones para el Registro Nacional de Emisiones [<i>Gasoline (Mobile), Gasoline (Stationary), Diesel (Stationary)</i>]	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N
Singapore	Energy Market Authority Singapore Energy Statistics (OM EF)	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N
EU	Association of Issuing Bodies European Residual Mixes	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N
All Other Countries and Territories	International Energy Agency CO2 Emissions from Fuel Combustion	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	UK Government GHG Conversion Factors for Company Reporting	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1	WRI Stationary Combustion Tool V4.1 (Natural Gas as a proxy)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1 (CH4 and N2O Only)	WRI Stationary Combustion Tool V4.1	EPA Emission Factors for GHG Inventories (CH4 and N2O only)	UK Government GHG Conversion Factors for Company Reporting	US EIA form 1605 (2010). Appendix N

Appendix 3: Global Warming Potential (GWP) of Refrigerants

Refrigerants used	Global Warming Potential (GWP) of refrigerant (kg CO2e)
HCFC-22/R22 = chlorodifluoromethane	1,780
HFC-134a/R-134A	1,360
R-404A	4,200
R-410A	2,100
HFC-23	12,690
HFC-32	705
HFC-41	116
HFC-125	3,450
HFC-134	1,135
HFC-143	340
HFC-143a/R-143a	5,080
HFC-152a	148
HFC-227ea	3,140
HFC-236fa	7,680
HFC-245fa	880
HFC-43-10mee	1,470
HFC-152	17
HFC-161	6
HFC-236cb	1,235
HFC-236ea	1,370
HFC-245ca	720
HFC-365mfc	810
R-407A	2,100
R-407C	1,700
R-407F	1,800
R-408A	3,400
R-507A	4,300
R-508B	12,000
R-403A	3,100
HCFC-123	80
HCFC-124	530
HCFC-141b	800
HCFC-142b	2,070
HCFC-225ca	127
HCFC-225cb	525
HCFC-21	150
R-290/HC-290 = propane	<1 (taken as 1 in the tool)
R-600a/HC-600a = isobutane	<1 (taken as 1 in the tool)
R-406A	1,800
R-409A	1,500
R-502	4,600

The GWP of refrigerants listed in this table indicate the relative amount of heat trapped by refrigerants compared to CO₂. Fugitive emissions are calculated in tonnes of CO₂ equivalent using these GWP factors.

For example, 1 kg of R-22 released in the atmosphere equals 1,810 kg of CO₂-equivalent (or 1.81 tonnes).

To measure your total fugitive emissions, you need to follow these steps:

- 1) Determine the amount of each refrigerant used in the reporting year (in kg);
- 2) For each refrigerant, multiply the amount used by its GWP;
- 3) Sum up the figures to obtain a total in kg of CO₂-equivalent; and
- 4) Divide by 1,000 to obtain a total amount of fugitive emissions in tonnes of CO₂-equivalent. This number will be added to your total GHG emissions.

Sources:

WMO Scientific Assessment of Ozone Depletion: 2018, Global Ozone Research and Monitoring Project—Report No. 58

UNEP Refrigeration, Air Conditioning and Heat Pumps: Technical Options Committee 2018 Assessment Report

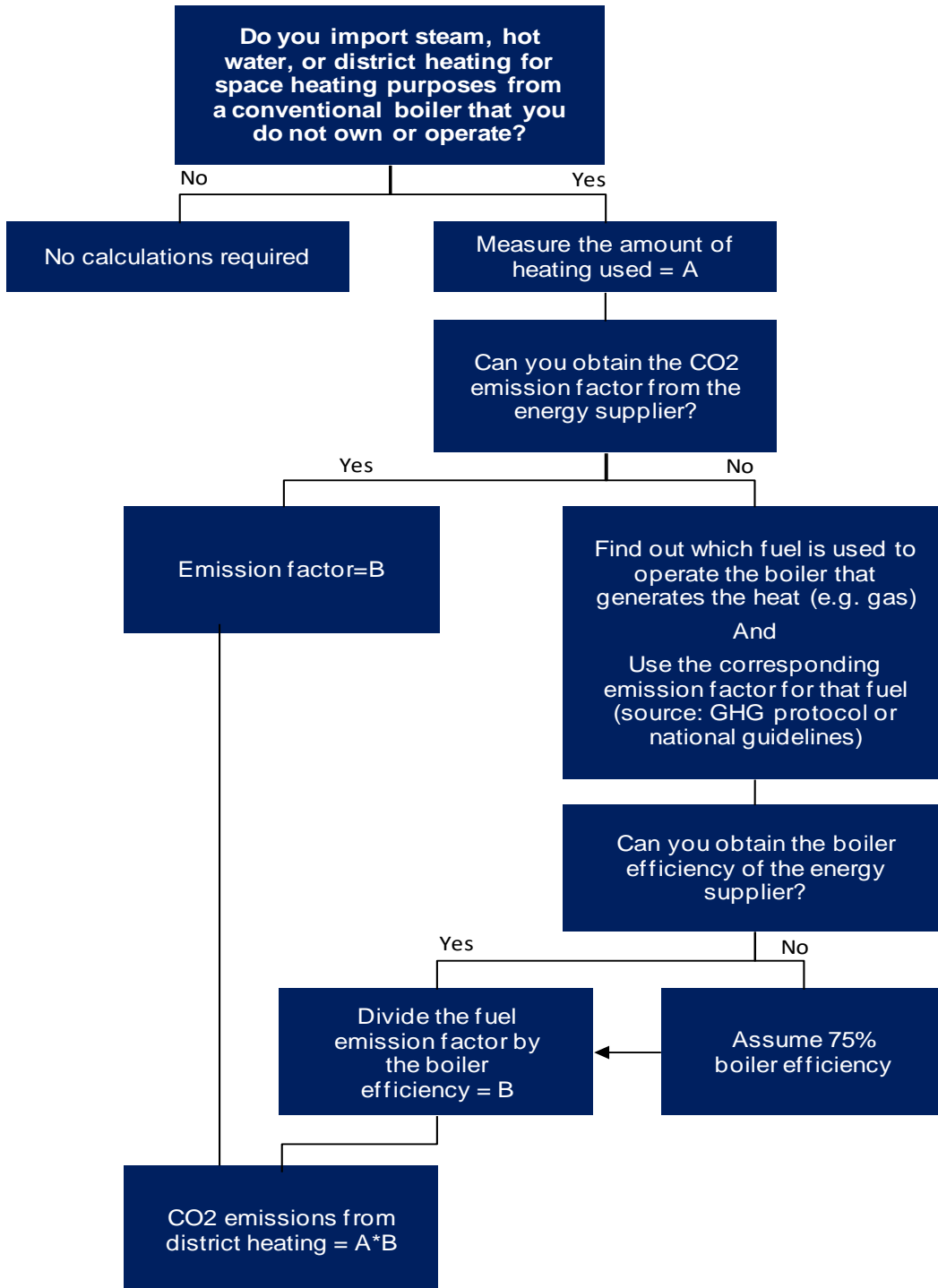
UNEP Refrigeration, Air Conditioning and Heat Pumps: Technical Options Committee 2010 Assessment Report

Further guidance on how to calculate refrigerant leakage is provided in the UK government ['Environmental reporting guidelines'](#).

Appendix 4: District Heating, Cooling, and Combined Heat & Power

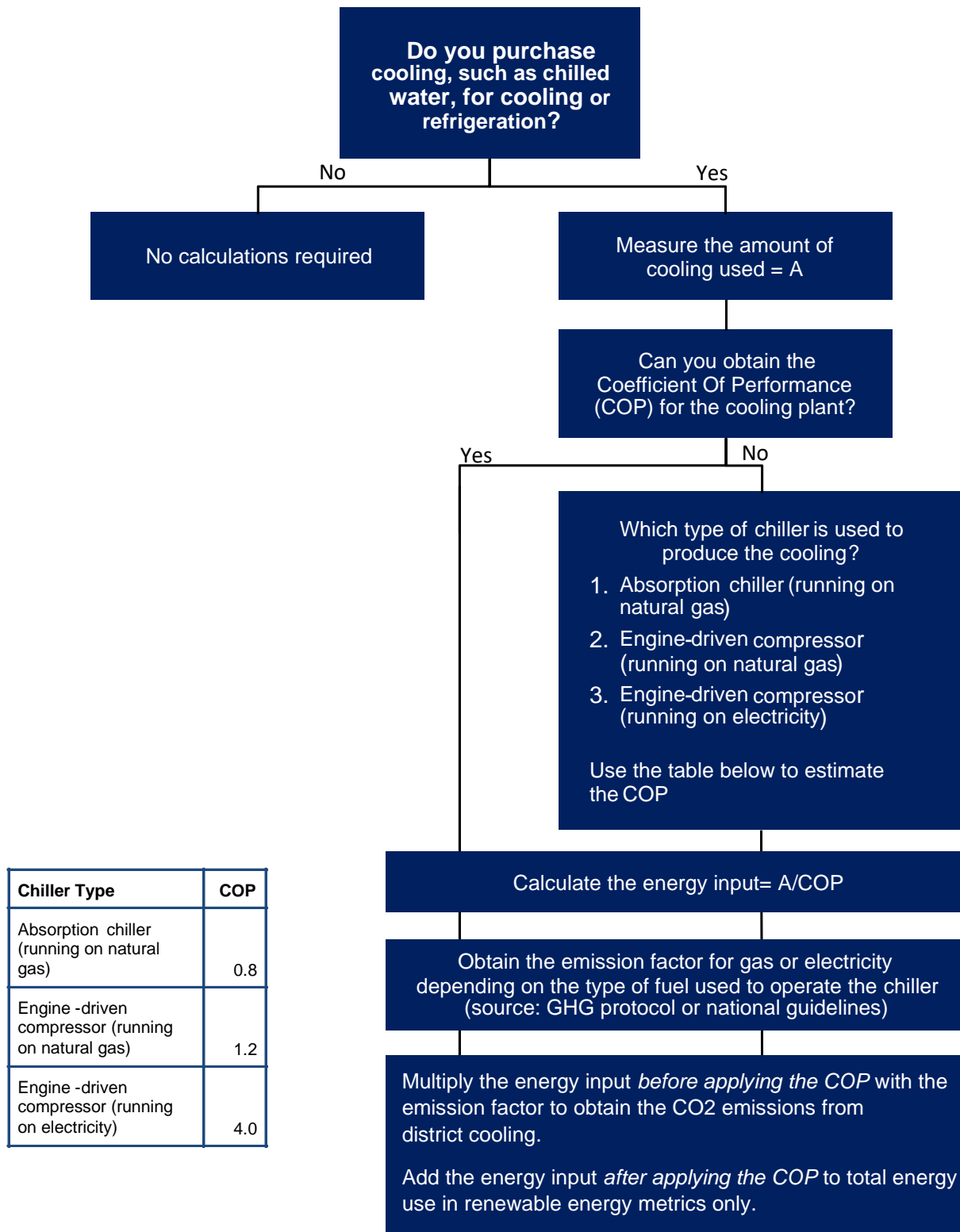
Some hotels purchase electricity, steam, or heat from a Combined Heat & Power (CHP) plant that they do not own or operate. HCMI version 1.1 provides in the following decision trees some information on how to calculate GHG emission from these energy sources, using guidance from the Climate Registry. For hotels using the HCMI spreadsheet tool, this information can be used to fill cells B8 to B11 in Tab 2.

District heating



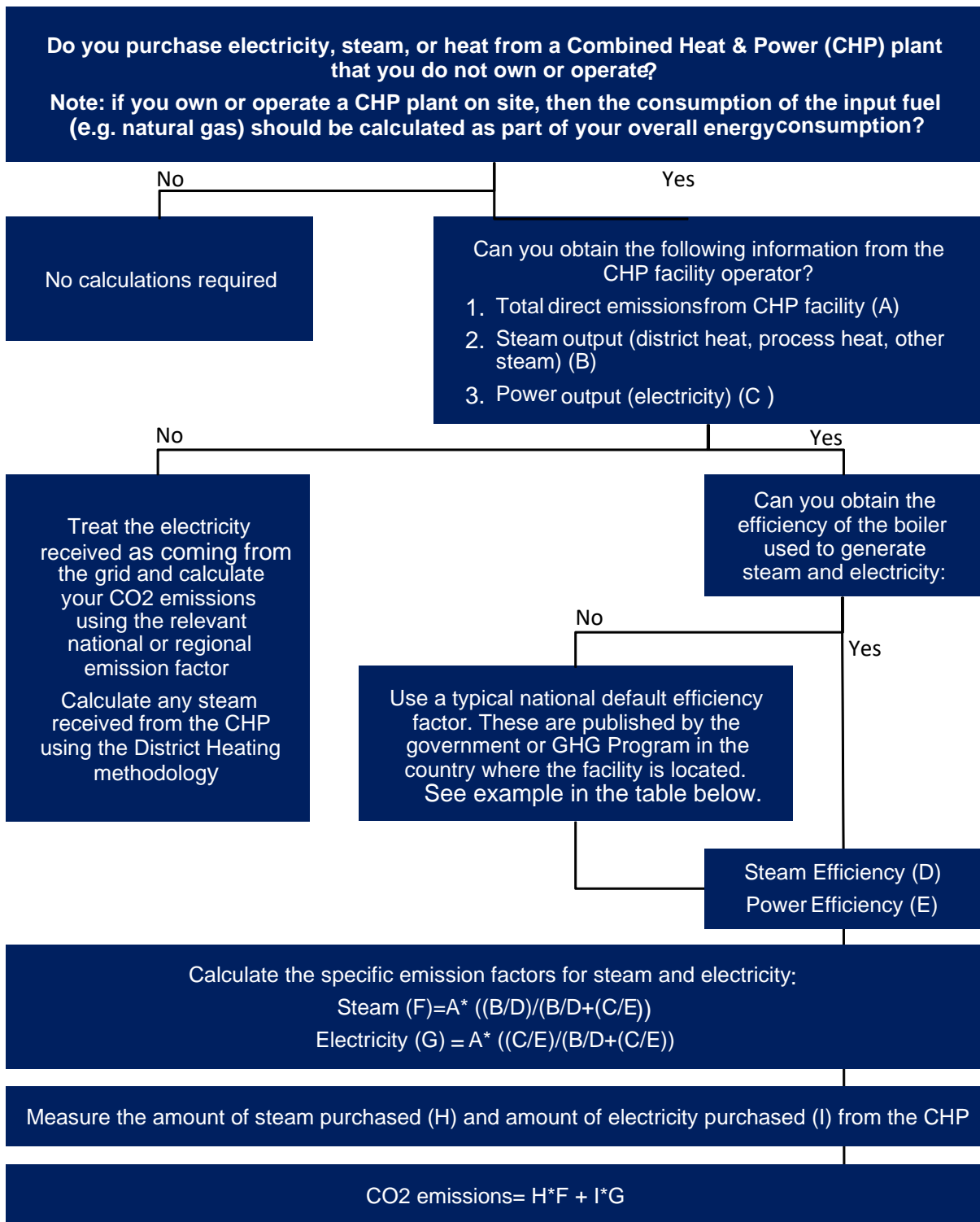
Note: The quantity of steam or heat used (A) can be obtained from invoices or metered records.

District Cooling



Note: The quantity of cooling used (A) can be obtained from invoices or metered records.

Energy from Combined Heat & Power Plants



For example, the US EPA Climate Leaders and UK DEFRA have published the following efficiency factors:

GHG Program / Country	Assumed efficiency of typical power production	Assumed efficiency of typical steam production
US Climate Leaders, EPA	0.35	0.8
UK Emissions Trading Scheme, DEFRA	0.33	0.66

Note: The quantity of heating, steam (B) or electricity (C) used can be obtained from invoices or metered records.

Appendix 5: Unit conversions

If this annex does not have the conversion factor you are looking for, a more complete list of conversions is available [in](#) the tool.

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	kBtu
Gigajoule, GJ	1	277.778	9.47867	947.817
Kilowatthour, kWh	0.0036	1	0.034123	3.41214
Therm	0.1055	29.30558	1	100
Thousand BTUs, kBtu	0.001055	0.29306	0.01	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	2204.62
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

Appendix 6: Worked Example

Profile

Hotel H is an independent, full-service hotel in Los Angeles, California. Hotel H would like to calculate its footprint for calendar year 2019. Management has until 30th June 2020 to gather the required information and complete the calculations.

Tab 1. Hotel Details

Contact & Hotel Details

Total Conditioned Area (i.e. area that is heated or cooled): 8,000 sqm

- 8 floors with guest rooms and corridors only (510 sqm each; 4,080 sqm total).
- Meeting space only on the 2nd floor (1,360 sqm).
- A basement where the back of house functions is located (360 sqm).
- A lobby, restaurant, and bar on the Ground floor (1,000 sqm).
- Private apartments occupy the top two floors (600 sqm each, 1,200 sqm total; 15% of total conditioned area).

Total Unconditioned Area: 500 sqm

- An outdoor swimming pool and outdoor area (500 sqm).

Rooms and Occupancy:

- Hotel H has 180 guest rooms.
- Sales records indicate that during 2019, 50,300 room nights were sold. 500 rooms were no-shows, and 200 rooms were complimentary. The total number occupied rooms was 50,000.

CONTACT & HOTEL DETAILS

1	Name	John Smith	
2	Job Title	Hotel Manager	
3	Reporting Year Ending*	December	2019
4	Name of Hotel	Hotel H	
5	Name of Hotel Group	H Collection	
6	Address	123 Park Lane	
7	City	Los Angeles	
8	Country	United States	
9	State/Province	California	
10	Zip/Postal Code	90079	Proceed to Question 11
11	Total area of guest rooms and corridors	4,080.00	
12	Total area of meeting facility space	1,360.00	
13	Total area of conditioned space*	8,000.00	
14	Unit of Measurement for the above areas*	Square meters	
15	Total number of guest rooms	180	
16	Total number of occupied rooms* for reporting year	50,000	

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[Definitions](#)

[1. Hotel Details and Result](#)

[2. Energy Consumption](#)

[Tab A - Outsourced Laundry](#)

[Tab B](#)

Tab A – Outsourced Laundry

Hotel H outsources its laundry to a local supplier. Management has asked the supplier to provide the hotel's share of energy consumption at the supplier's facilities (i.e. total amount of energy consumed during the year by the supplier multiplied by the amount of the hotel's linen as a percentage of the total amount of linen washed by the supplier). The supplier knows that Hotel H represents 20% of its business however it does not have its total energy consumption data available for 2019.

However, based on the supplier's invoices, Hotel H knows that 347 metric tonnes of linen were washed last year. Total emissions from laundry are calculated by the team using the default emission factors provide by the Carbon Trust:

- 347 Metric Tonne x 180 kWh = 62,460 kWh electricity consumption
- 347 Metric Tonne x 1560 kWh = 541,320 kWh natural gas consumption
- 347 Metric Tonne x 111 litres = 38,517 litres fuel oil 2 consumption

A. Please complete this section if you outsourced your laundry

1	Can you get your share of the energy consumption* from your laundry contractor for the reporting year?	No	Proceed to Question 2
2	Do you know your laundry tonnage*?	Yes	Proceed to Question 3. Fill in both Laundry Tonnage and Unit.
3	Please enter your laundry tonnage	Laundry Tonnage 347	Unit Metric Tonne

A.1 Energy Consumption from Outsourced Laundry

	Energy Type	Total Consumption	Unit

A.2 Estimated Laundry Tonnage*

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A.3 Estimated Energy Consumption from Outsourced Laundry

	Energy Type	Total Consumption	Unit
1	Estimated Consumption: Purchased Electricity (Grid)	62,460.00	kWh
2	Estimated Consumption: Natural Gas	541,320.00	kWh
3	Estimated Consumption: Fuel Oil 2	38,517.00	Litres

Tab 1. Results

Carbon Footprint

Hotel H is now able to obtain the Total Carbon Emissions from its Energy Consumption and Refrigerants for 2019:

Total CO2e for reporting period = 991.25 tCO2e

Hotel H can also obtain the Guestrooms and Meetings Carbon Footprint which is allocated based on the proportion of the respective areas:

- 8 floors with guest rooms and corridors only (510 sqm each; 4,080 sqm total).
- Meeting space only on the 2nd floor (1,360 sqm).
- Proportion of Guestrooms = 4,080/(4,080+1,360) = 75%
- Proportion of Meeting = 1,360/(4,080+1,360) = 25%
- **Guestrooms Carbon Footprint = 991.25 x 75% = 743.43 tCO2e**
- **Meetings Carbon Footprint = 991.25 x 25% = 247.81 tCO2e**

The Carbon footprint per occupied room on a daily basis calculations are as follows:

- Carbon Footprint for all rooms ÷ Occupied Rooms = Carbon Footprint per Occupied Room
- Guestrooms Carbon Footprint = 743.43 tCO2e
- 50, 000 rooms were occupied in 2012.
- **Carbon footprint per occupied room on a daily basis = (743.43 x 1000) ÷ 50,000 = 14.87 kgCO2e**

The Carbon footprint per area of meeting space on an hourly basis calculations are as follows:

- Industry average meeting hours per day = 10 hours
- Meetings Carbon Footprint = 247.81 tCO2e
- Total area of meeting facility space = 1,360 sqm
- **Carbon footprint per area of meeting space on an hourly basis = (247.81 x 1000) ÷ (365 x 10) ÷ 1,360 = 0.05 kgCO2e**

The Carbon footprint per per sqm/sqft on an annual basis calculations are as follows:

- Total CO2e for reporting period = 991.25 tCO2e
- Total area of guestrooms, corridors and meeting facility space = 4,080 sqm
- **Carbon footprint per per sqm/sqft on an annual basis = (991.25 x 1000) ÷ 4,080 = 182.21 kgCO2e**

RESULTS		
CARBON FOOTPRINT		
Total CO2e for reporting period	991.25	tCO2e
Total Guestrooms Carbon Footprint	743.43	tCO2e
Total Meetings Carbon Footprint	247.81	tCO2e
Carbon footprint per occupied room on a daily basis	14.87	kgCO2e
Carbon footprint per area of meeting space (1 sqm/sqft) on an hourly basis	0.049922	kgCO2e
Carbon Footprint per sqm/sqft on an annual basis	182.21	kgCO2e

Renewable Energy & Electricity

The Total renewable energy and electricity used by the hotel is calculated by taking the total energy consumption from onsite-generated renewable energy and electricity purchased through Power Purchase Agreements (PPAs).

The Total renewable electricity used by the hotel is calculated as a percentage of electricity purchased through PPAs out of total electricity purchased from both the national grid and through PPAs.

The Total renewable energy and electricity used by the hotel is calculated as a percentage of total renewable energy and electricity out of total energy consumption.

RENEWABLE ENERGY & ELECTRICITY		
TOTAL renewable energy and electricity used by the hotel (kWh)	2,000,000.00	kWh
TOTAL renewable electricity used by the hotel (% of total electricity use)	90.00	%
TOTAL renewable energy and electricity used by the hotel (% of total energy consumption)	28.23	%

Overview | How to Guide | Definitions | **1. Hotel Details and Result** | 2. Energy Consumption | Tab A - Outsourced Laundry | Tab B

Greenhouse Gas Scopes

Scope 1 Emissions refer to direct emissions resulting from activities within their premises, such as emissions from fuel combustion, mobile combustion and refrigerants.

Scope 2 Emissions refer to indirect emissions from the generation of electricity, heating and cooling which are purchased and consumed by the hotel.

Emissions from outsourced laundry are also given as partial Scope 3 emissions.

GREENHOUSE GAS SCOPES			
<i>*Based on data input into calculator only (no estimation for mobile fuel consumption & refrigerants)</i>			
Scope 1	Fuels burnt on site e.g. gas, oil Mobile fuels and Refrigerants	733.26	tCO ₂ e
Scope 2	Purchased electricity Purchased heating/cooling	32.97	tCO ₂ e
Outsourced laundry Partial scope 3	<i>Please note that full Scope 3 figures should include other sources (e.g. supply chain emissions)</i>	215.21	tCO ₂ e

Overview | How to Guide | Definitions | **1. Hotel Details and Result** | 2. Energy Consumption | Tab A - Outsourced Laundry | Tab B

Tab C – Client Report

Client Details

- Client C has occupied 25 rooms for 3 nights.
- Client C also used one hotel meeting room (100 sqm of meetings space) for a total of 10 hours.

Results

- Client's Guestrooms Carbon Footprint = Carbon Footprint per Occupied Room x Number of room nights
- **Client's Guestrooms Carbon Footprint = 14.87 x 25 x 3 = 1,115.15 kgCO2e**
- Client's Meetings Carbon Footprint = Carbon Footprint per Meeting Space per Hour x Meeting space occupied x Duration of meetings
- **Client's Meetings Carbon Footprint = 0.05 x 100 x 10 = 49.92 kgCO2e**

Client's Total Carbon Footprint = 1,115.15 + 49.92 = 1,165.07 kgCO2e

CLIENT DETAILS

1	Client Name	Client C	
2	Job title	Manager	
3	Reporting Year Ending <i>The most recent month within the defined 12-month reporting period</i>	December	2019
4	Total number of room nights	75	
5	Total area of meeting space occupied	100	
6	Duration of meetings (Hours)	10	

RESULTS

CARBON FOOTPRINT

Client's Guestrooms Carbon Footprint	1,115.15	kgCO2e
Client's Meetings Carbon Footprint	49.92	kgCO2e
Client's Total Carbon Footprint	1,165.07	kgCO2e

2. Energy Consumption

Tab A - Outsourced Laundry

Tab B - Refrigerants

Tab C - Client Report



Appendix 7: Supplement to HCMI – Energy Use per Area

Introduction

Some stakeholders require hotels to disclose various energy-per-area metrics. This Supplement to the Hotel Carbon Measurement Initiative describes how to calculate such metrics using the same data and methodology as HCMI. We still apportion energy consumption between guest rooms and meeting rooms in the same way that carbon emissions are apportioned in the HCMI methodology.

There is no need to gather additional data if you have already calculated your hotel's carbon emissions following the HCMI methodology.

As with HCMI, the calculations are required to be performed once every reporting year. Some of the standing data (e.g. rooms and meeting space areas, number of hotel rooms, etc.) is unlikely to change year on year.

Calculations

When applying the HCMI methodology, you will have calculated your hotel's annual energy consumption for each fuel type (e.g. electricity, natural gas, gas oil, etc.). However, the consumption data for the different fuel types may not all be measured in the same units (e.g. kWh, Joules, m³, ft³, therm, mmBtu, etc.). You will therefore need to convert any fuel consumption that is not measured in kilowatt-hour (kWh) into kWh using unit conversion factors provided by your energy suppliers or using the factors in the Appendix 5 of this document. You will then be able to calculate a total energy consumption in kWh.

As with the HCMI methodology, the total energy consumption is apportioned to guest rooms and meeting rooms based on the following formulas:

Energy consumption for all guest rooms = Rooms Allocation x Total Energy

Energy consumption for all meeting rooms = Meetings Allocation x Total Energy

where the *Rooms Allocation* and *Meetings Allocation* percentages are based on the ratio of space occupied by guest rooms and meeting space within the hotel.

Note: If a hotel has no meeting space, then all energy consumption is allocated to guest rooms.

Building energy use metrics

Annual building energy consumption per m² or sqft = total energy consumption for the entire building ÷ Floor Area

Energy per guest rooms metrics

Annual guest rooms energy consumption per m² or sqft = Energy consumption for all guest rooms ÷ Rooms Area

Annual energy consumption per available guest room = Energy consumption for all guest rooms ÷ Number of hotel rooms

Energy consumption per occupied room = Energy consumption for all guest rooms ÷ Number of occupied hotel rooms

Energy per meeting space area or usage metrics

Annual meeting rooms energy consumption per m² or sqft = Energy consumption for all meeting rooms ÷ Meeting Space Area

Meeting rooms energy consumption per meeting hour = Energy consumption for all meeting rooms ÷ (365 x 10)

Note: 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. Meeting rooms are assumed to be utilised for 10 hours per day.

Meeting rooms energy consumption per area of meeting space per hour = Meeting rooms energy consumption per meeting hour per sqft/sqm x surface of meeting space utilized

The energy consumption used by a client for a meeting is calculated by multiplying the *Meeting rooms energy consumption per area of meeting space on an hourly basis* 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 sets 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 calculations, but the allocation of the energy consumption is based on the client's utilization of the meeting space.

Appendix 8: HCMI 2022 update – key changes

In 2022 the HCMI methodology was revised based on Members' recommendations regarding challenges in using HCMI. A brief summary of the changes is captured in the table below.

What	Revised
Metric of the entire building's footprint	Added an additional metric of the total building footprint, which is essentially the footprint before apportioning to the rooms and meetings footprints.
Purchased renewable energy contribution to the carbon footprint	Changed the carbon footprint methodology and corresponding tool outputs to allow for renewable energy purchased through market mechanisms to reduce the final carbon footprint metrics in alignment with the Scope 2 protocol. As a result, the HCMI calculation tool by default reports using the market-based method for Scope 2, and also applies the same approach to emission factors. As such, when residual mix emission factors are available based on routine publication by a government-related body such as the AIB, they are cited and used instead of those of the IEA.
Purchased Chilled Water COP	Clarified the calculations and adjusted the HCMI tool, in not applying a COP for the energy usage from purchased chilled water that is converted to carbon emissions, as emission factors or suppliers will already apply a COP, and thus a second application of a COP was understating the contribution of purchased chilled water to a hotel's carbon footprint. The COP is still used when calculating energy metrics associated with HCMI, and the default COP for electric-driven chillers has been adjusted to 4.0, under the premise that this default pertains to the COP of a single facility which is more proximate than a utility-scale source for comparison purposes.
Global Warming Potential	Updated the GWP to reflect the latest IPCC 6 th assessment and corresponding references for HFCs.

Appendix 9: Acknowledgements & Sources

The Working Group

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, NH Hoteles, 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.

World Travel & Tourism Council (WTTC).

Sustainable Hospitality Alliance (the Alliance).

Advisors

- KPMG LLP
- Eric Ricaurte, Greenview
- The Working Group would like to thank all of those who helped develop this methodology, particularly the 50 hotels who road tested the initial methodology and the various organisations who provided feedback during our stakeholder engagement process.

Sources

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- International Energy Agency (<http://www.iea.org/topics/climatechange/>),
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- IPCC Sixth Assessment Report (<https://www.ipcc.ch/report/ar6/wg3/>)