

KlimaLink standard method description

KlimaLink has set itself the goal of providing the tourism industry with a platform that makes the CO_{2e} emissions of various tourism service providers available at a central point.

The desire for a standardised calculation of climate emissions has risen sharply in the industry, and business travellers and holidaymakers are increasingly asking about the actual climate footprint of their trips.

There are already various methods for calculating greenhouse gas emissions in tourism. However, these methods do not define CO_{2e} emissions in a standardised way and use different approaches and accuracies to determine emissions. The aim of KlimaLink is to make CO_{2e} emissions available to all users in the sector in a standard (consisting of various methods) according to the following criteria:

- CO_{2e} emissions are recorded systematically and with a high degree of accuracy.
- The CO_{2e} emissions of different service providers (flights, hotels, cruises, etc.) can be compared and categorised.
- The calculations are accurate enough to show travellers ways to reduce climate emissions before they book.
- The calculations are accurate enough to be able to compare combined travel products of different types on the basis of absolute CO_{2e} emissions.
- The various methods work entirely with input data from the trips that are available to the travel industry in their systems as standard from tour operators and travel agents.
- The standard provides a unique CO_{2e} value for each input of travel components worldwide (flight, train journey, hire car, hotel accommodation, etc.). To this end, the individual methods specify fallback hierarchies that require less and less specific input data in descending tiers (method variants) in order to always deliver the best possible result under the circumstances.

This standard is based on the standard for CO_{2e} emissions calculation for business trips of the German Travel Management Association (VDR standard, latest version from 2016). The CO_{2e} calculation methods of this standard were developed by atmosfair specifically for the requirements of CO_{2e} reporting for business trips. The Institute for Sustainable Tourism (Inatour) further developed the VDR standard on behalf of Futouris e.V. and with technical and methodological input from atmosfair for the purpose of KlimaLink and the different requirements in tourism compared to business travel (including ex-ante assessment when booking the trip instead of ex-post reporting for the CO_{2e} balance sheets of companies). myclimate and other committed KlimaLink member companies were also involved. The methodological and scientific content was also brought up to date with the latest research where necessary.

Together with Inatour, Futouris initiated and conducted the dialogue processes for this document with all stakeholders and in particular with the providers of similar standards such as IATA, Travalyst etc., and classified and evaluated the results from a scientific and tourism perspective.

Where these third-party standards are integrated into the new KlimaLink standard, e.g. the use of the HCMI standard for calculating hotel emissions, these are identified in the text.

The various calculation methods are dynamic and are updated when new scientific findings or improved data availability require adjustments.

In anticipation of the EU Count Emissions Regulation, KlimaLink successfully had the calculation standard for air, rail and car/bus transport audited in 2024 by GUTCert¹, an accredited certification body in Berlin, for compliance with ISO 14083, on which the EU Count Emissions Regulation is based.

¹ <https://www.gut-cert.de/en/home-en>

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I. Requirements for the standard

A. Completeness and relevance

The KlimaLink standard covers the key areas of the tourism value chain: Hotel, train, flight, car, bus and ship. It covers the main CO₂e emissions and leaves out the negligible ones, such as local public transport at the destination.

B. Applicability and scientific rigour

The calculation of CO₂e emissions from mobility and overnight stays should be applicable world-wide. This concerns the determinability of the CO₂e emissions of each trip - whether tourism or business-induced - throughout the world with a minimum accuracy based on the availability of data and the relevance of the calculated travel component.

The aim is not to create a completely scientifically based method. This would be illusory - given the existing uncertainties in individual elements of the calculation methods - as the availability and accuracy of data are subject to continuous change. Rather, the aim is to enable a sufficiently good calculation (minimum accuracy) that can be supported by a large number of stakeholders and therefore enables the objective - a standardised calculation across all service providers - to be achieved.

C. Minimum accuracy

The calculation methods described in this document are sufficient to achieve the minimum accuracy described.

1. Transparency

The calculation methods, the influencing factors to be taken into account and possible data sources are described in this standard. This means that every stakeholder can check the CO₂e emissions of their journey and have the calculation method explained to them on the Internet, at travel agencies or at other points of sale.

2. Independence

The input data used to calculate emissions should, as far as possible, come from independent sources and be verified or certified by third parties. Direct provision of service provider data (e.g. from hotels, car hire or rail companies) is also possible, provided these have been verified or certified by third parties. KlimaLink is able to check plausibility. However, for reasons of time and cost, it is not possible to carry out a complete quality control, as is usual with certifiers or other auditing companies. General approaches such as scope delimitations and standard emission factors are based as far as possible on the IPCC², GHG Protocol³ and other internationally recognised organisations.

3. Further development

The standard and its underlying methods are subject to continuous further development. Adjustments, updates and improvements are desired and necessary. Further development takes place in working groups consisting of experts from the member companies.

² Intergovernmental Panel on Climate Change (IPCC)

³ Greenhouse Gas Protocol

D. Operational system limits

1. Travel-specific emissions

When accounting for travel, the emissions that arise during the provision of the respective service and therefore relate specifically to the journey are considered first (e.g. emissions from paraffin consumption during a flight, including the mineral oil supply chain). In contrast, emissions in connection with infrastructure (e.g. facility management of the airport building) and means of transport (e.g. construction and maintenance of the aircraft) do not arise exclusively in the course of the journey in question, but as part of general investments that benefit all users. The methods described do not currently take these indirect emissions into account when balancing a journey.

2. Upstream emissions

The combustion process of raw materials, fuels or combustibles for the production of useful energy directly generates climate-impacting emissions, whereby the type and quantity depend on the fuel used and the technology and efficiency of the plants in the upstream chain (e.g. oil production, logistics and refining). These can be allocated to the tourism users and are to be recorded in the KlimaLink standard with appropriate accuracy as far as possible.

3. Non-CO₂ emissions

In addition to CO₂, other climate-impacting emissions (non-CO₂) such as nitrogen oxides (NO_x) or soot, which have a positive or negative impact on radiative forcing due to their physical and chemical properties in the atmosphere, are produced during the combustion of fuels in air traffic. While the climate impact of non-CO₂ emissions from combustion processes near the ground (e.g. car journeys, train journeys, hotels incl. upstream chain) is negligible compared to the effect of CO₂, non-CO₂ emissions in higher air layers have a considerable effect on the Earth's radiation budget when travelling by air. In general, the term CO₂e⁴ is used throughout the standard.

II. Calculation of hotel emissions

To calculate hotel emissions, KlimaLink uses a hybrid method based on the HCMI standard of the Sustainable Hospitality Alliance and the VDR standard, plus a catering flat rate. This is necessary because the methods are complementary and have different strengths and weaknesses. HCMI provides the better accuracy with a bottom-up approach, but requires data verification by third parties and cannot currently provide data for all regions of the world. The VDR method can fill these gaps if required, can be used worldwide and does not require external verification. However, as a top-down approach, it is far less accurate. As both the HCMI and the VDR standard do not take hotel catering (e.g. breakfast, half board or all-inclusive) into account, both methods are supplemented by a catering flat rate.

The HCMI and VDR methods are therefore used in a combination procedure for the KlimaLink hotel method. If there is a lack of data from the HCMI, the VDR calculation is used.

A. HCMI

The Hotel Carbon Measurement Initiative (HCMI) was developed in 2011 and 2012 by the Sustainable Hospitality Alliance (SHA) and the World Travel & Tourism Council (WTTC) in collaboration with 23 major international hotel chains and the business consultancy firm KPMG. Since then, the method has been tested in practice by a large number of hotels and further developed on this basis.

⁴ CO₂ equivalents, the unit of measurement used to standardise the climate impact of different greenhouse gases.

The HCMI methodology is used by over 30,000 hotels worldwide. Due to the high and steadily increasing number of users, it can be assumed that HCMI will become increasingly important internationally as a specific climate accounting standard. This calculation method is therefore also recommended for use in the German-speaking travel industry.

B. Description of the HCMI method

The methodology provides a CO₂ footprint for hotels per (occupied) room and day. It includes all on-site hotel energy consumption (Scopes 1 and 2 of the GHG Protocol) and also includes CO₂ emissions from laundry operations if cleaning is not carried out in the hotel, as this area is responsible for a large proportion of emissions (Scope 3 emissions). The method also includes the use of renewable electricity and energy sources in the calculation of the CO₂ footprint. Various data is collected for the calculation, as shown in the following table.

Consistent data:

- Total area of guest rooms and corridors in m²
- Total event area in m²
- Total area of air-conditioned premises
- Number of rooms
- Total area of privately used premises, including staff accommodation (if available)

Data per reporting year:

- Total number of occupied rooms in the reporting year
- Total energy consumption in the reporting year from the energy sources used, e.g. fuel, electricity, etc.
- Emission factors (from official international or national data sets)
- Renewable energies (purchased or generated on site)
- Electricity from renewable sources

Additional data

Depending on the facilities and processes in the respective hotel, the following data may also be provided:

- Energy consumption of external laundry services
- Emissions due to leakage of coolant gases
- Fuel consumption of mobility services such as shuttle buses or vehicles used on the hotel premises

Detailed information on the calculation method and the required data can be found via the link to HCMI in the appendix.

C. Data availability & calculation factors:

Of the more than 30,000 hotels that use HCMI as a methodology for calculating their CO₂ emissions, around 15,000 hotels report their actual emissions data annually to the *Cornell Hotel Sustainability Benchmarking Index* (CHSB). CHSB carries out a plausibility check and makes the aggregated data available as a publicly accessible dataset. This means that the actual emissions data of the individual reporting hotels is not available, but the aggregated data is segmented by geographical location (based on countries, regions and, in some cases, cities) and by hotel class or star category.

D. Boundaries

The currently available average data for hotel emissions is limited in its informative value. Essentially, the following points should be mentioned.

- Data is mainly based on information from large hotel chains.
- The majority of data is based on hotels in the USA (approx. 60 %).
- Although CHSB carries out statistical validity tests on the data, it cannot verify the data beyond this.⁵
- Data mainly relates to Scopes 1 and 2 of the GHG Protocol. Only external laundry services from Scope 3 are currently recorded.

In addition, from KlimaLink's perspective, the HCMI standard currently has the disadvantage that the results (CO₂ per guest and night) are only shown in three categories, with the absolute CO₂ emissions in the first two categories broken down as follows.

- kg CO₂ per room (average of all hotel rooms only).
- kg CO₂ per m² and hour (event areas).
- kg CO₂ per m² and year (average for the entire hotel only).

This means that a guest who books a suite that is three times larger than a guest in a standard room, for example, would still have the same CO₂ footprint. This can lead to false incentives for tour operators who base their hotel purchases on the low average values but buy the larger rooms for their guests. The question also remains as to what happens to the CO₂ emissions of the event spaces that are deducted from the overnight guests in the HCMI. If this happens at a time when the event spaces are fully booked by guests, then the CO₂ emissions are also attributable to these guests. However, if, for example, the event areas are not occupied in certain months, only the tourist guests in the hotel contribute to the emissions. They would therefore also have to bear the CO₂ emissions of these event areas.⁶

E. The VDR standard for hotel accommodation

In contrast to the HCMI, the VDR Standard is not based on individual hotels and their specific physical measurement data from the bottom up, but approaches hotel emissions from the top down. It is based on empirical studies that have measured the CO₂ emissions of hotels in various countries and which distribute the total CO₂ emissions of a hotel by floor area to the number of rooms and the various room categories. The total emissions are calculated from Scope 1 and 2 of the hotel and increase with the star classification.

In the VDR top-down approach, the total emissions are derived from the destination's energy mix and the hotel's star rating. These are then divided into the individual room categories, which also increase on average with the star category in terms of space. The necessary data is available independently worldwide and can also be approximately transferred to hotels and countries where no bottom-up data is available from hotels.

1. VDR hotel class

Hotels are classified according to their facilities by awarding stars, whereby several classification systems exist (e.g. Michelin, DEHOGA). The decisive parameters for star classification, such as

⁵ However, over 70% of the data was verified by external audits as part of the companies' sustainability reporting.

⁶ For a more precise application of the KlimaLink hotel method, the size and frequency of bookable hotel rooms as well as the total number of booked guests (tourists and events) and the areas booked by them would therefore have to be recorded in addition to the HCMI data. This data can then be used to create multipliers based on room size - similar to the seat classes in aeroplanes - which calculate the CO₂ emissions for each hotel room category without double counting or undercounting.

room size and comfort, generally have an impact on energy consumption per overnight stay. The number of stars awarded therefore indirectly reflects these factors, with a higher number of stars being associated with higher resource consumption.⁷

2. VDR travel destination

Hotels with comparable facilities can have different energy and water consumption, as well as waste and wastewater volumes, depending on the country. For example, climatic conditions have a direct impact on heating and hot water requirements. The implementation of energy efficiency and waste management systems may depend on political framework conditions. In addition, both the capacity utilisation and the CO₂ emission factors of the energy sources vary from country to country. Therefore, the destination country directly or indirectly reflects these factors.

3. VDR booking class

The booking class - i.e. the room category, e.g. standard double room, junior suite or suite - also plays a role in the emissions caused, as room size, room facilities (technical equipment, air conditioning, etc.) and additional services, which all have an impact on CO₂ emissions, are a key differentiating feature of the booking class. If the booking class is known, this should also be taken into account in the calculation.

This results in the following observations for the VDR standard:

- The VDR standard is based on data from hotels in 22 countries, which can also be transferred to other countries. It takes a generic approach, i.e. it does not recognise the respective data of an individual hotel.
- The VDR standard can always provide a differentiated CO₂ result for a hotel overnight stay worldwide in accordance with the requirements of the KlimaLink hotel method. This value can deviate considerably from reality for individual hotels, but is based on approximations of factors that can be determined objectively (star category, energy mix in the country).
- Verification of data is not necessary, as the data is based on scientific studies and official country data on the energy mix (e.g. from the IEA). However, this data should be updated regularly.

F. KlimaLink method: Interaction between VDR and HCMI

The previous descriptions show that, in practice, no standard has yet been able to precisely calculate the specific CO₂ emissions of an individual hotel. Deviations are unavoidable, e.g. if a hotel has completely switched its energy supply to renewable energies or implemented other efficiency measures, e.g. in the areas of thermal insulation, water supply and waste management.⁸

As part of KlimaLink, VDR and HCMI are therefore used together in accordance with their strengths and weaknesses as follows:

- **Tier 1:** A hotel reports according to HCMI with the above-mentioned additional data (room sizes, number of guests, use of event areas). The report is checked by an independent environmental verifier. The hotel's data is entered into the KlimaLink database and shows CO₂ emissions per guest and night in different room categories of the hotel.

⁷ The CHSB uses a global data set of star categories for hotels. The compilation is based on Expedia.

⁸ In order not to penalise hotels that have invested in reducing CO₂ emissions, it is necessary for KlimaLink to create the conditions for hoteliers to be able to report verified CO₂ emissions individually in future.

- **Tier 2:** Average emissions data for hotels by location and hotel category based on the CHSB dataset is used. If a specific hotel for which the KlimaLink user is looking for CO₂ emissions can be assigned to a group of CHSB datasets (by country, hotel category and location), then this CHSB data flows into the VDR standard as input. This differentiates the CO₂ emissions per average room, additionally by room category, and calculates an uncertainty surcharge of 25 % on the CO₂ emissions per guest and night for event spaces.
- **Tier 3:** If no CHSB data is available for the requested hotel as in Tier 1 or 2, the VDR standard is used as a fallback. An uncertainty surcharge of 50% is applied to the CO₂ emissions per guest and night.

The uncertainty surcharges in Tier 2 and 3 create incentives for hoteliers to provide Tier 1 or at least Tier 2 data under HCMI, have it verified by third parties and report it to KlimaLink.

G. Catering flat rate

The hybrid method based on the HCMI and VDR standards covers Scope 1 and Scope 2 emissions as well as emissions caused by external laundries (Scope 3). However, no other Scope 3 emissions, such as catering, are taken into account. However, catering plays a particularly important role when travelling.^{9,10} Taking into account the relevance and completeness criteria of the GHG Protocol¹¹, the aim should be to integrate catering and, in future, other Scope 3 emissions into the calculation.

In addition to the hybrid method consisting of the HCMI and VDR standard, a flat rate for catering will be integrated in future, as described above. This flat rate is calculated per guest and depends on the following factors:

- Type of catering booked: breakfast, half board, full board or other.
- Number of overnight stays per person
- Star category of the hotel

The catering flat rate can be determined using two different methods .¹²

1. Typical meals (e.g. breakfast, lunch, dinner) offered in hotels of different star categories can be determined based on experience and/or study values. These can be modelled with the help of life cycle assessment databases (e.g. ecoinvent). All processed foods should be recorded and integrated so that food waste can also be taken into account.
2. Alternatively, a flat rate can be determined based on experience or study values. The total amount of emissions from catering is divided by the number of overnight stays according to the star category. In addition, assumptions must be made regarding the allocation of meals (breakfast, lunch, dinner). In general, calculations should be conservative in order to create incentives for specific data collection in the catering sector.

The catering flat rate serves as an approximation of the actual CO₂ emissions generated by hotel catering and can therefore provide an estimate of the scale of emissions attributable to catering. If the HCMI standard integrates catering in the future, the catering flat rate must be dropped. The

⁹ Castellani, Valentina; Sala, Serenella. 2012. "Ecological Footprint and Life Cycle Assessment in the sustainability assessment of tourism activities." *Ecological Indicators*, 16: 135-147. doi: 10.1016/j.ecolind.2011.08.002

¹⁰ Federal Statistical Office. [Tourism-relevant energy consumption, greenhouse gas emissions and raw material input - German Federal Statistical Office \(destatis.de\)](https://www.destatis.de/EN/Tourism-relevant-energy-consumption-greenhouse-gas-emissions-and-raw-material-input-German-Federal-Statistical-Office-(destatis.de))

¹¹ [ghg-protocol-revised.pdf \(ghgprotocol.org\)](https://ghgprotocol.org/ghg-protocol-revised.pdf)

¹² There is currently (2024) insufficient scientific data to calculate a reliable per diem catering allowance using one of the above methods. The integration of a per diem catering allowance will therefore be postponed and will be reviewed again in 2025 on the basis of upcoming scientific research in this area.

Status October 2024

prerequisite for this is that hotels collect greenhouse gas emissions from catering services in future.

Status October 2024

This document was produced as part of the "Climate-conscious travel" project, in which all companies, associations and organisations in the tourism industry are invited to participate. The project is financed and implemented by Futouris e.V.

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