Measuring Impact: Air Travel Carbon Emission Calculations

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AMERICAN EXPRESS GLOBAL BUSINESS TRAVEL

CHOOOSE

What is the objective of this document?

This guide offers American Express Global Business Travel (Amex GBT) clients an overview of the carbon emission frameworks supported by Amex GBT and CHOOOSE. The relationship between business travel and climate change can't be overstated. Read on to learn the industry-recognized frameworks used to calculate the carbon footprint of flights and considerations when determining which framework to use in corporate sustainability benchmarking and reporting.

This document is intended as a guide across those decision points.

Who is CHOOOSE?

CHOOOSE is a leader in technology-based climate action, building digital tools so that everyone anywhere can easily integrate climate action into everyday life and business. Through flexible integrations, customer-friendly interfaces, automated carbon measurements, and a connected marketplace of climate solutions, CHOOOSE delivers a complete platform that enables its partners to build and manage high-impact climate programs. Learn more at www.chooose.today.

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Introduction

Climate change refers to long-term shifts in global temperatures and weather patterns. In modern times, these shifts are caused by the release of greenhouse gases (GHGs) into the atmosphere by human activity.

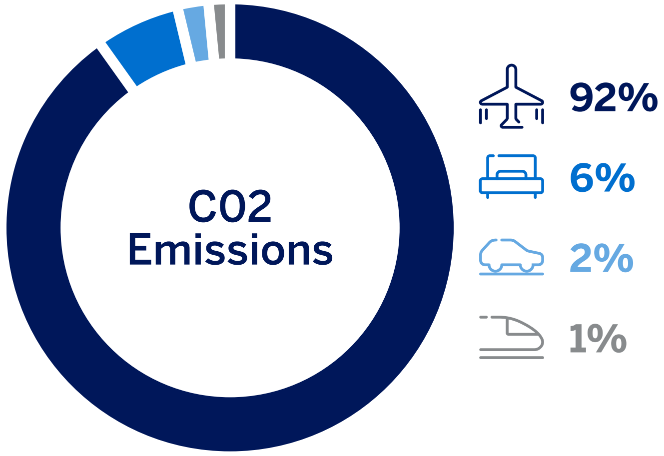
The effects of climate change are dramatic and far-reaching. These consequences demand coordinated, urgent action from governments, businesses, and ordinary people to reduce further harm.

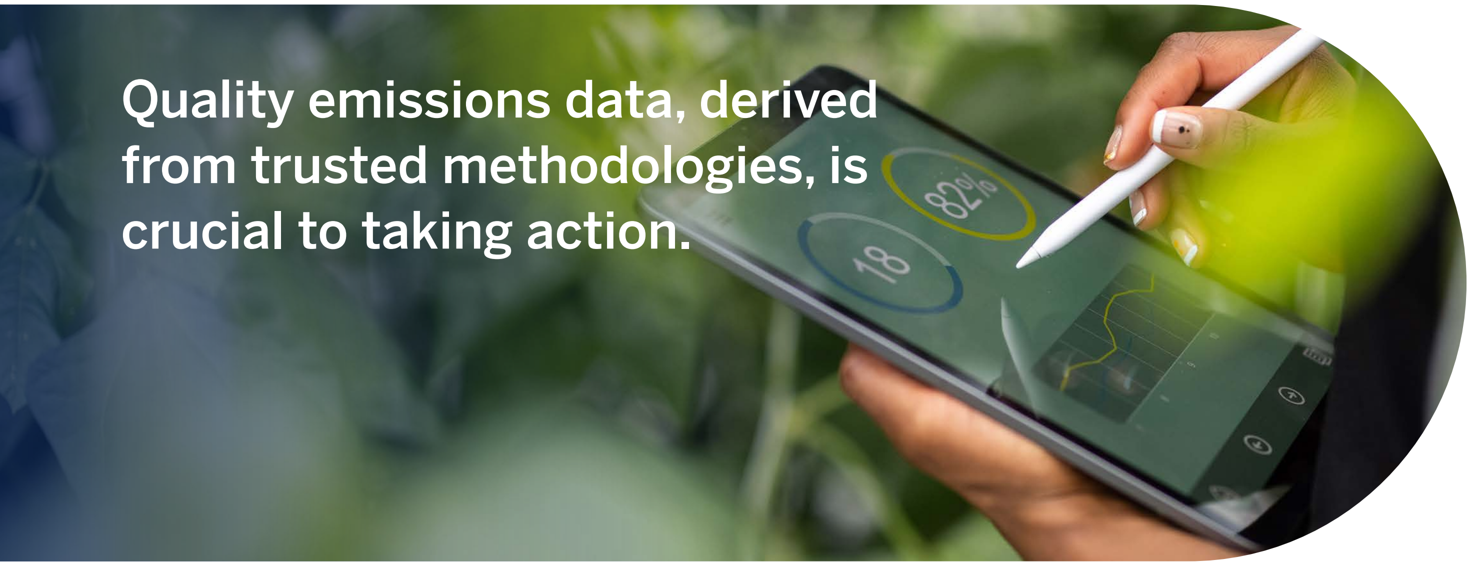
Source: Intergovernmental Panel on Climate Change, Synthesis Report Presentation, March 20, 2023.

Business travel emissions contribute to this and have been identified in the Greenhouse Gas Protocol as a key accounting area. Understanding the impact of travel is an important step towards reducing – and ultimately eliminating – these emissions.

The carbon calculation methodologies presented in this document reflect industry-accepted standards to estimate carbon emissions produced by **aircraft, per passenger**. Air travel is the single largest-emitting activity associated with business travel, accounting for over 90% of a trip's emissions, according to Amex GBT's proprietary analysis using 2019 client benchmarking data.

Types of carbon emissions





Types of carbon emissions methodologies

The GHG Protocol Scope 3.6 identifies three basic approaches to calculating GHG emissions, often referred to as carbon emissions and normalized in reporting to CO2e (equivalents). Most calculation methods fall into one of the categories below. The GHG Protocol recommends fuel-based methodologies are used when possible.

Fuel-based

Based on the amount of fuel consumed during business travel and applying the appropriate emission factor for that fuel.

Distance-based

Based on the distance and mode of business trips, then applying the appropriate emission factor for the mode used.

Spend-based

Based on the amount of money spent on each mode of business travel transport and applying secondary (environmentally extended input-output [EEIO]) emission factors.

Decision tree for selecting a calculation method for emissions from business travel

Does business travel contribute significantly to scope 3 emissions (based on screening) or is engagement with travel providers otherwise relevant to the business goals?

Is data available on the types and quantities/cost of fuels consumed during travel?

Use the fuel-based method

Is data available on distance traveled?

Use the distance-based method

Is data available on the amount of money spent on travel providers?

Use the spend-based method

Source: Greenhouse Gas Protocol, Technical Guidance for Calculating Scope 3 Emissions. Figure 6.1

Overview of supported flight emissions methodologies

A few methods have emerged as prominent in the travel industry to estimate per-passenger emissions. The following are supported by the CHOOOSE/Amex GBT integration and described within this document.

Fuel-based

International Air Transport Association (IATA) Recommended Practice (RP) 1726:
IATA is an aviation trade association supporting the industry with a variety of global standards. It developed RP 1726 together with major airlines and aircraft manufacturers. It is often used by airlines to quantify their own emissions.

International Civil Aviation Organization (ICAO):
ICAO is a specialized agency of the United Nations focused on international aviation.

Distance-based

UK Department for Business, Energy, and Industrial Strategy (BEIS):
The UK government's emission factors, which were initially published under the Department for Environment Food and Rural Affairs (DEFRA).

French Agence de l'Environement et de la Maitrise de l'Energie (ADEME):
The French government's emission factors derive from work supporting commitments made under the Kyoto Protocol.

US Environmental Protection Agency (EPA):
The US government's emission factors.

For calendar year 2022, Amex GBT calculated its own business travel footprint (Scope 3.6) using UK BEIS inclusive of radiative forcing. In the context of calculating sustainable aviation fuel (SAF), we calculate carbon emissions on a well-to-wake full lifecycle basis (see sustainable.mit.edu/sustainablefuel/). In the context of influencing traveler behavior at point of sale, we endeavor to implement an IATA fuel-based methodology in 2023 and beyond.

Broadening the scope of calculations

UK BEIS and FR ADEME provide optional RF and WTT factors that can be included in the per-passenger carbon emission calculations. Applying these factors will increase the emissions of a trip.

Radiative Forcing (RF)

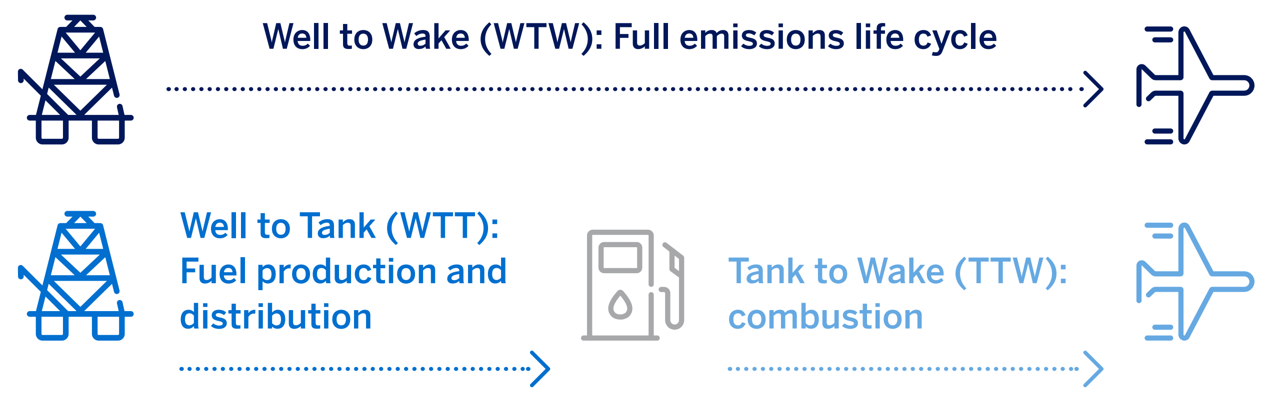
Radiative forcing is a parameter defined by the Intergovernmental Panel on Climate Change (IPCC) that measures the influence a given climate factor has on the amount of downward directed radiant energy impacting Earth's surface. Emissions from an aircraft in combination with other anthropogenic sources modify the atmospheric composition, which results in an increase in the global warming potential. In simple terms, radiative forcing is associated with emissions released at higher altitudes and results in a higher global warming potential, meaning the earth is receiving more incoming energy from sunlight than it radiates to space. This net gain of energy will cause warming and is more impactful to climate change effects.

Your air travel CO2 emissions may be multiplied by the RF factor to account for the higher global warming potential from such emissions. The RF factor is also sometimes referred to as the Radiative Forcing Index. The exact RF impact depends on a few factors during a flight, including altitude, weather condition, flight path, etc.

There is not yet an industry-agreed-upon best practice on RF and not all methodologies provide an RF factor. If RF is used when estimating emissions, that decision should be clearly communicated.

Well to Tank (WTT)

WTT estimates emissions associated with fuel production and distribution, excluding infrastructure and manufacturing of equipment. It is part of the more comprehensive "well to wake" or "well to wing" (WTW) lifecycle view of emissions.



Source: Sustainable Aviation Fuel Greenhouse Gas Emission Accounting and Insetting Guidelines, MIT Center for Transportation and Logistics, 2021

Selecting a methodology

Companies must make their own decision about which methodology is most appropriate for their purposes in accordance with their internal policies and procedures and any applicable laws and regulations. Amex GBT does not recommend a particular method over others.[1] Within this context, we suggest corporates consider how the data will be used. For example:

Influencing traveler choice at point of sale

Fuel burn-based methodologies such as IATA and ICAO provide higher precision than distance-based methodologies and offer travelers better differentiation between flight operators at point of sale.

Sustainability reporting year over year

Any calculation method can be used to benchmark and manage a carbon footprint. However, switching between methods will make communication and managing reduction targets more challenging. Consider consistently applying your method of choice or rebaselining if you decide to change methodologies.

Sustainable Aviation Fuel (SAF)

Carbon accounting requires a full lifecycle analysis (i.e., well to tank + tank to wake = well to wake); both UK BEIS and FR ADEME optionally add WTT, making this possible.

Reporting requirements

There could be considerations related to compliance reporting by specific government organizations or specific needs to use a specific methodology based on current sustainability reporting program or voluntary reporting scheme.

Summary table: Emission calculation parameters

The following table provides a high-level overview of methodology inputs. This is a simplification of scientific and academic work and is intended to directionally inform decision-makers when considering which framework to use. The data used in calculations include factors provided in the methodology guidance, associated reference tables, and CHOOOSE proprietary data, where needed.

Calculation methodology	Distance	Cabin class	Passenger load	Passenger vs. cargo allocation	Fuel burn	Well to Tank	Radiative Forcing
IATA RP 1726[1]	**Yes** For all routes found in a schedule database, IATA CO2 Connect is time-based.	**Yes** IATA narrow- and wide-body factors by economy, premium economy, business, first	**Yes** Computed using schedule and aircraft data	**Yes** Per IATA, proportional to passengers and their checked baggage vs. freight	**Yes**	N/A	N/A
ICAO	**Yes**	**Yes** ICAO economy and premium factors	**Yes** ICAO TSD	**Yes** Per ICAO, proportional to passengers and their checked baggage vs. freight	**Yes** ICAO fuel consumption formula	N/A	N/A
FR ADEME	**Yes** ADEME based on aircraft seat and distance brackets	N/A	N/A	**Yes** ADEME assumes each passenger corresponds to 100kg of freight	N/A	**Optional**	**Optional**
UK BEIS	**Yes** BEIS distance categories: domestic, short-haul, long-haul; (international not used)	**Yes** BEIS cabin classes by average passenger: economy, premium economy, business, first class	N/A	N/A	N/A	**Optional**	**Optional**
US EPA	**Yes** EPA distance categories: short-, medium-, long-haul	N/A	N/A	N/A	N/A	N/A	N/A

Notes: N/A – Not Applicable. The methodology does not include guidance that accounts for emissions relative to the given factor. For example, N/A for Passenger vs. Cargo Allocation means that 100% of emissions are attributed to passengers. N/A for Cabin Class means all classes are treated the same.

Global Business Consulting (GBC) at Amex GBT is an experienced team of global travel strategists delivering 360° services and a results-oriented approach to optimize your travel program. Contact GlobalBusinessConsulting@amexgbt.com for help creating a travel program tailored to achieve your specific sustainability goals.

Glossary and definitions

ADEME	France Environment and Energy Management Agency.
BEIS	United Kingdom Department for Business, Energy & Industrial Strategy. UK BEIS methodology was formerly published under UK Department for Environment Food and Rural Affairs (DEFRA).
Carbon footprint	The total GHG emissions caused by an individual, event, etc., typically expressed as kilograms or metric tons of CO2e. Understanding the carbon footprint of flight options can help travelers make lower-impact decisions.
CO2e	Carbon dioxide equivalent (CO2e) is a measure used to compare the emissions of various GHGs (such as CO2, CH4, NO2) by converting the warming potential of other gases to the equivalent amount of CO2. The emission results of all methodologies are reported in this unit of measurement.
EPA	United States Environmental Protection Agency.
Fuel burn	Quantity of fuel that is burned during a flight. Aircraft that burn less fuel are less impactful to the environment.
GHG	Greenhouse gases trap heat in the atmosphere and contribute to global warming. Carbon dioxide, methane, and nitrous oxide are examples of GHGs.
IATA	International Air Transport Association: an aviation trade association supporting the industry with a variety of global standards.
ICAO	International Civil Aviation Organization: a specialized agency of the United Nations focused on international aviation.
IPCC	Intergovernmental Panel on Climate Change: established in 1988 by the World Meteorological Organization and the United Nations Environment Program.
Passenger load factor	Measures how much of an aircraft's passenger carrying capacity is used. Planes that are filled to capacity are more efficient per person than planes with some empty seats.
Passenger vs. cargo allocation	Measures the percentage of flight emissions that are attributed to passengers and their luggage vs. cargo (freight, mail). Methodologies that consider this factor discount the per-passenger emissions to take cargo into account.
RF	Radiative forcing is a measure of the change in energy balance as a result of a change in a forcing agent (e.g., greenhouse gases) to affect the global energy balance and contribute to climate change. When emissions are released at higher altitudes – as they are when flying – they result in higher global warming potential than they would at ocean level (i.e., they produce greater impact on Earth's surface). In the context of air travel, the carbon footprint of travel can be multiplied by an RF factor to account for this impact.
RP 1726	RP 1726 represents IATA's latest recommended framework for calculating CO2 emissions per passenger.
TTW	Tank to wake (also known as "tank to wing") refers to emissions produced by the burning of fuel associated to an activity, such as flight.
WTT	Well to tank refers to emissions produced "upstream" of the combustion engine. Upstream typically refers to emissions related to the production, refinement, and transportation of fossil fuels.
WTW	Well to wake (also known as "well to wing"): Includes a more complete consideration from the production chain, but exclusive of infrastructure and manufacturing of equipment. WTW can be further split into two parts: well-to-tank (WTT)/upstream emissions and tank-to-wake (TTW)/fuel burn emissions associated to activity.

References:

1 CO2 Connect is IATA's proprietary climate emission solution, based on its RP1726 methodology. CO2 Connect has factors that are applied based on flight duration rather than distance. CO2 Connect uses IATA's proprietary fuel burn factors derived from actual airline-reported consumption data. Learn more on IATA's FAQ website. IATA does not provide factors for radiative forcing or well to tank; however, these may be optionally applied by the user with appropriate notation.