IATA RECOMMENDED PRACTICE -RP 1726

Passenger CO_2 Calculation Methodology

RECOGNIZING there is a growing interest from passengers, corporate, travel management companies, and travel agents to receive estimates from members of CO_2 information on a per passenger basis for flown and future flights;

RECOGNIZING ALSO that, there is a requirement and value to have one, standard industry best practice approach to calculate per passenger CO_2 emissions, in order to provide a consistent calculation result for Members;

CONSIDERING that different factors beyond the control of members are impacting the fuel burn and related CO_2 emissions (e.g., weather and traffic), and considering that members offer services that can be highly seasonal and/or directional, it is not recommended to use individual and single-flight data in isolation to predict CO_2 emissions of a flight, as the extent of uncertainties give rise to inaccurate results;

It is therefore RECOMMENDED that the following principles and methodologies are used to calculate CO_2 emissions.[1]

1. SCOPE OF IATA BEST PRACTICE

1.1. Fuel Consumption

The CO_2 emissions calculation is based on recorded fuel consumption on a per-flight basis. For any given flight, to determine at which point monitoring of fuel consumption starts and ends (including subsequent calculations), it is recommended to align with the existing monitoring method and procedures already applied for the purpose of CORSIA monitoring and reporting and as outlined in Annex 16, Volume IV, Part II, Chapter 2 to the Chicago Convention (Link).

1.2. Aircraft type-specific calculation

The CO_2 emissions calculation is aircraft type-specific, reflecting the average fuel burn and related CO_2 emissions of the aircraft type for a given journey covered by the flight itinerary, taking into account each leg of the journey, and based on the booked origin/destination airport(s) of these legs.

1.3. Purpose of calculation

The purpose of CO_2 emissions calculations can be to derive pre-flight or post-flight passenger CO_2 data.

1.3.1. Recommended application of pre-flight CO_2 calculations:

- Online flight search engines
- Online travel agents
- Travel booking systems
- Corporate travel booking systems/Travel Management Systems

1.3.2. Recommended application of CO_2 calculations based on post-flight data averages:

- Passenger or corporate offset solutions
- Airline voluntary passenger offset programs

1.3.2.1. Note: Predicting CO_2 emissions, or pre-flight per passenger CO_2 data, can either be based on industry data averages (e.g., fuel burn or passenger load factor) or Member own data. Future flight calculation will be based on historical and actual data where available. How different entities use the calculated emissions is not part of the scope of this RP.

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[1] Pending Government Approval

1.4. Upstream CO_2 emissions

The upstream CO_2 emissions are not included.

1.4.1. Note: the calculation of upstream emissions might be required by local regulations or can be optionally added by members whenever requested. In such cases, the members should follow the local guidelines for inclusion of upstream emissions and multiply the CO_2 emissions by a given factor. The Member must clearly indicate that upstream emissions were included in the calculation and specify the factor used.

1.5. Non-CO_2 and non-aircraft emissions

Non-CO_2 and non-aircraft emissions are not included. Any administrative processes or overhead (such as operation of buildings and ground fleet, staff commuting, IT infrastructure) are not included.

1.5.1. Note: the calculation of non-CO_2 and non-aircraft emissions might be required by local regulations or can be optionally added by members whenever requested. In such cases, the members should follow the local guidelines for inclusion of non-CO_2 and non-aircraft emissions. The Member must clearly indicate that non-CO_2 and non- aircraft emissions were included in the calculation.

1.6. Radiative Forcing Index (RFI)

Radiative Forcing Index (RFI) is not recommended to be applied while scientific uncertainties on the exact impact exist, and until consensus has been reached by the global scientific community in terms of the value(s) that must be applied.

1.6.1. Note: can be optionally included by the Member indicating the RFI value forming part of the calculation.

1.7. Non-revenue passengers/Non-revenue cargo

Non-revenue passengers (e.g., deadhead crew members, employee business and personal travel) are to be included in the CO_2 calculation methodology.

Non-revenue cargo loaded to the cargo space of an aircraft is to be included in the CO_2 calculation methodology.

1.8. No-show passengers

No-show passenger must be excluded from the calculation.

2. GENERAL PRINCIPLES

2.1. Allocation of CO_2 emissions:

2.1.1. All the CO_2 emissions generated by a commercial flight shall be allocated to revenue and non-revenue load (passengers, cargo, and mail).

2.1.2. To align with existing methodologies, the use of the incremental approach (marginal accounting) is not recommended for cargo in the hold.

2.1.3. The allocation of CO_2 emissions equals the proportional share of weight between passengers (passengers + checked baggage) and freight weight (cargo + mail).

2.2. Data to calculate CO_2 emissions

2.2.1. Whenever possible Members should use their own historical data (fuel burn, seat configuration, payload, etc.) based on flown data to calculate the CO_2 emissions of their operating flights.

2.2.2. Considering that using real time data and fuel burn for each individual flight on which a passenger is transported would be nearly impossible, it would also introduce other factors that are out of the control of members (e.g., weather, traffic, seasonality). It is therefore recommended that members calculate averages based on their historical data. The recommended time range for such calculation is the previous calendar year or equivalent time range such as previous fiscal year or last twelve months. The data in relation to the timeframe must be representative, reflecting the airlines performance during a normal period of operation, and should not include periods that were affecting the operations with a grave impact on the performance of airlines (e.g., due to COVID)

2.2.2.1. Note: in case where data sets available covering a shorter time range than 12 months, for example where a new flight destination was introduced during the calendar year, data can be complemented with data stemming from other destinations that cover a similar distance serviced by the same aircraft type over a 12-month period. This approach would be provisional, and the underlying data should be replaced with the actual data originating from the new destination as soon as the full 12 months data set is available.

2.2.3. It is recommended that the fuel burn data used as a basis for calculating CO_2 emissions has been audited by an external and independent verification organization. The role of the verification organization is to validate the completeness and accuracy of fuel data used, with the recommendation to repeat the auditing of data each calendar year (or equivalent time range), or whenever a new fuel data set is being used for the calculation of CO_2 emissions.

2.3. Standard values for calculation

2.3.1. **Passenger weight:** equal to the actual or standard mass for passengers and checked baggage contained in the mass and balance documentation of members. Alternatively, the industry recognized standard value of **100kg** for each passenger and their checked baggage can be applied.

2.3.2. **Passenger add-on seat weight for all seats**: additional seat weight must not be added to all seats and specific or standard passenger weight.

2.3.2.1. Note: if required due to local regulations, members can optionally add the passenger add-on weight for all seats using the standard weight of 50kg. The exceptional inclusion of passenger add-on weight needs to be clearly indicated to the consumer of the CO_2 emissions data.

2.3.3. **Emissions factor** for converting jet fuel (Jet A / Jet A-1) to CO_2: **3.16**

2.3.4. **Weight of cargo:** freight and mail is determined to be actual or standard mass. The actual freight and mail mass shall **exclude** the tare weight of all pallets and containers that are not payload.

2.4. Cabin class seating configuration and multipliers

2.4.1. Taking into account the different weight and space associated with a passenger seat in different cabin classes, CO_2 emissions should apply cabin class weighting and respective cabin class factor. It is recognized that cabin class factors differ for narrow and wide-body aircraft.

2.4.2. **Cabin Class Factors**

The below cabin class factors and weighting should be applied when calculating the per passenger CO_2 emissions in narrow and wide-body aircraft by cabin class.

	Economy	Premium Economy	Business	First
Narrow-body aircraft	1	1	1.5*	1.5
Wide-body aircraft	1	1.5	4	5

*Narrow body aircraft where seating in its entirety is offered as business class configuration, a cabin class factor of 4 must be applied.

2.4.2.1. Note: In instances where members have specific seating configuration different to this RP, to improve accuracy the Member may use their own cabin class factors better reflecting the weight/space and related CO_2 emissions associated with a given seating class.

2.5. Accounting of Sustainable Aviation Fuels (SAFs)

2.5.1. **SAF CO_2 reductions claimed by passengers or third parties**
Lifecycle emissions in relation to SAF use claimed by passengers or third parties (e.g., corporate businesses or cargo customers) cannot be claimed or reduced as part of the CO_2 calculation for attribution to general passengers. This reporting is in accordance with the Greenhouse Gas Protocol (GHG) protections against double counting. Members and third parties can report emissions reductions as part of their scope 1 and scope 3 emissions respectively and in accordance with the GHG protocol.

2.5.2. SAF CO_2 reductions claimed solely by the members

Members having purchased SAF, and using the SAF on flights that transport passengers, can reduce the CO_2 intensity of a given passenger per flight in accordance with the environmental attributes for the quantity or batch of SAF used. In absence of a global SAF book and claim system, the reduction in carbon intensity only applies to the routes (and per passenger CO_2 calculations) departing the airport where SAF was deployed, with the recommendation to use the CORSIA Default Life Cycle Emissions Values for calculating the reduction values.

With the introduction of a global book and claim system, allowing the tracing of SAF investment of members and feedstock related lifecycle emissions, the CO_2 reduction claim can be disconnected from the physical use of SAF and therefore becomes part of an overall reduction of carbon intensity of flights. The exact accounting rules will have to be determined as part of the global SAF book and claim system.

2.6. Voluntary carbon offsets

2.6.1. **Passenger invested carbon offsets (e.g., voluntary passenger offset programs)** Where passengers or other third parties have purchased carbon offsets from an airline voluntary program, the GHG and related emissions accounting rules to protect against double counting must be applied. As such, the Member should report their full emissions (i.e., all emissions associated with fuel burn) under Scope 1 of the GHG in their reporting.

2.6.2. **Member invested carbon offsets to meet voluntary or mandatory offset requirements (e.g., CORSIA)**
Member invested carbon offsets shall not be used as part of this methodology to reduce the per passenger CO_2 calculated result(s). The calculated result(s) are a representation of the real CO_2 emissions values (and related fuel burn), for the purpose of providing the passenger(s) with information about the environmental impact of a given flight.

3. METHODOLOGY

3.1. Step 1: identification of the different legs of the passenger journey

3.1.1. When measuring the CO_2 emissions on a per-passenger level, the scope shall be defined in terms of individual flight legs.

3.1.2. The passenger journey may include several segments which can be:

- Air segment operated by the Member
- Air segment operated by another airline/Member (interline, codeshare)

As part of this methodology, the calculation of CO_2 emissions is limited to the air segment operated by the Member, accounting for scope 1 emissions only.

3.2. Step 2: calculation of CO_2 emissions for each leg

3.2.1. Calculation of CO_2 emissions per passenger can be performed prior to the journey or after the flight trip has occurred.

3.3. Step 3: calculation of estimated fuel burn average for each leg of a future flight

3.3.1. The CO_2 emissions calculation is based on recorded fuel consumption on a per-flight basis. For any given flight, to determine at which point monitoring of fuel consumption starts and ends (including subsequent calculations), it is recommended to align with the existing monitoring method and procedures already applied for the purpose of CORSIA monitoring and reporting.
Fuel consumption excludes:

- Training flights
- Ferry flights
- Maintenance flights
- Aircraft delivery flights
- State flights
- Search & rescue flights
- Transporting head of state and government ministers
- Police flights
- Military flights

3.3.2. When estimating the fuel burn average of scheduled flights, fuel consumption of non- scheduled flights may be excluded.

3.3.3. **Converting volume to mass using density values:**
If the amount of fuel used is determined in units of volume (e.g., litres) the Member must convert this volume to mass by using either of the two options consistently when applying to fuel data:

Option 1: Adjusted Density Value - adjusted density means density expressed as kg/litre and determined for the applicable temperature or region for a specific measurement.

Option 2: Standard Density Value - a standard density value of **0.8** kg/litre must be applied.

3.4. Step 4: calculation of passenger and cargo weight

The calculation of the total weight caried is based on the:

- **Total passenger weight:**
  Number of revenue and non-revenue passengers occupying a seat multiplied 100kg standard weight, or airline-specific weight.

- **Total cargo weight:**
  Revenue and non-revenue freight and mail, actual or standard mass, (e.g., as derived from the mass and balance documentation) combined equals the total cargo weight.

Total weight carried: Total passenger weight + Total cargo weight.

3.5. Step 5: allocating fuel burn to passengers based on total weight

The total passenger fuel burn per kilogram is equal to the [(Passenger weight kg divided by the Total weight kg) x Fuel Burn kg].

3.6. Step 6: allocating fuel burn to passengers based on travel class and cabin class factor weighting.

Narrow-body	Fuel Burn per Economy Class Pax kg	=	1 x Total Pax Fuel Burn / [(1 x Eco Pax)+((1 x Prem Eco Pax)+(1.5 xBus Pax)+(1.5 x First Pax)]
Narrow-body	Fuel Burn per Premium Economy Class Pax kg	=	1 xTotal Pax Fuel Burn / [(1 x Eco Pax)+((1 x Prem Eco Pax)+(1.5 x Bus Pax)+(1.5 x First Pax)]
Narrow-body	Fuel Burn per Business Class Pax kg	=	1.5 x Total Pax Fuel Burn / [(1 x Eco Pax)+((1 x Prem Eco Pax)+(1.5 x Bus Pax)+(1.5 x First Pax)]
Narrow-body	Fuel Burn per First Class Pax kg	=	1.5 x Total Pax Fuel Burn / [(1 x Eco Pax)+((1 x Prem Eco Pax)+(1.5 x Bus Pax)+(1.5 x First Pax)]

Wide-body	Fuel Burn per Economy Class Pax kg	=	1 x Total Pax Fuel Burn / [(1 x Eco Pax)+((1.5 x Prem Eco Pax)+(4 x Bus Pax)+(5 x First Pax)]
Wide-body	Fuel Burn per Premium Economy Class Pax kg	=	1.5 x Total Pax Fuel Burn / [(1 x Eco Pax)+((1.5 x Prem Eco Pax)+(4 x Bus Pax)+(5 x First Pax)]
Wide-body	Fuel Burn per Business Class Pax kg	=	4 x Total Pax Fuel Burn / [(1 x Eco Pax)+((1.5 x Prem Eco Pax)+(4 x Bus Pax)+(5 x First Pax)]
Wide-body	Fuel Burn per First Class Pax kg	=	5 x Total Pax Fuel Burn / [(1 x Eco Pax)+((1.5 x Prem Eco Pax)+(4 x Bus Pax)+(5 x First Pax)]

3.7. Step 7: converting fuel mass to per passenger CO_2 emissions

Fuel burn per passenger is multiplied by a CO_2 emissions factor of **3.16**.

4. OPTIONS FOR OPERATOR-SPECIFIC ACCURACY IMPROVEMENTS

In cases where the methodology is used in conjunction with a data model and where industry averages for the calculation of CO_2 per passenger data are being used, Members can provide their own operator specific data into the calculation model to improve accuracy and to reflect operational realities.

Operator specific input includes:

Fuel Burn – aircraft type- or route-specific fuel burn information based on flights operated as part of the network.

Cargo Carried – based on aircraft type and operator specific cargo factor.

Passenger Load Factor – aircraft type-specific passenger load factor over a given network, e.g., origin/destination.

5. CALCULATION EXAMPLES

Origin	Dest	Ac Type	Total Fuel burn kg	Eco Pax	Eco Prem	Business	First	Total Pax	Pax standard weight kg	Cargo/Mail weight kg	Total Cargo/Mail fuel burn kg	Eco Pax fuel kg	Eco Prem Pax fuel kg	Bus Pax fuel kg	First Paxfuel kg	Total Fuel
GVA	MAD	A320	6,638	86	-	7	-	93	100	1,290	809	60	60	91	91	
Narrow-body											**Fuel allocated by travel class**	5,195	-	634	-	**5,829**
LHR	JFK	B777	27,000	140	30	20	5	195	100	2,100	2,625	84	126	336	420	
Wide-body											**Fuel allocated by travel class**	11,767	3,782	6,724	2,101	**24,375**

Origin	Dest	Cabin Factor Eco	Cabin Factor Prem Eco	Cabin Factor Business	Cabin Factor First	Emissions Factor	Eco per pax CO2kg	Prem Eco per pax CO2kg	Bus per pax CO2kg	First per pax CO2kg
GVA	MAD	1	1	1.5	1.5	3.16	191	191	286	286
LHR	JFK	1	1.5	4	5	3.16	266	398	1,062	1,328