TRANSPORTATION THINK TANK

Booking of business and first class flights in Europe.

Assessment of seat numbers and corresponding climate impact of outgoing flights from Europe

Imprint

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CONTENT

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1) Introduction and Methodology

This report estimates the number of first class and business class seats and corresponding passengers of flights departing in Europe. On this basis, the report also allocates CO_2 emissions per seat, passenger, and average aircraft.

It does so by focussing on aircraft which departed in the European Civil Aviation Conference (ECAC) area in the year 2024 and arrived elsewhere. The ECAC comprises of 44 countries (see annex). The seats of these aircraft are allocated to first class, business class, premium economy class and economy class cabins. Load factors are added to deduct passenger numbers. The CO_2 emissions are calculated by utilising the space allocation for first class and business class as a proportion of total seats in typical wide-body aircraft.

Note that this is a calculation balancing effort and data accuracy. Research details are listed in the annex.

Step 1: Determine overall number of relevant flights

First class and business class are typically offered on long-haul flights operated by wide-body aircraft. Narrow-body aircraft do usually not include dedicated first/business class cabins. Similarly, low-cost carriers' business models are based on offering uniform cabins without class distinctions.

Eurocontrol (2025a) provides flight numbers for departing flights in 2024 in relevant market segments, namely business, cargo, low cost, mainline, other, regional. Eurocontrol reports 10.7 million flights (not counting overflights) in its managed area in 2024 (Eurocontrol, 2025c). Of this total, *702,671 mainline flights* departed from and arrived outside the ECAC area (Eurocontrol, 2025a). Other market segments are disregarded.

Of these 702,671 mainline flights, Eurocontrol does not indicate what proportion are long-haul. However, it provides data on the average number of daily flights to and from Europe that connected the region with other parts of the world in 2024: 21.3 % of non-intra-European flights connected Europe with North Africa, 23.3 % with the Middle East, and 6.3 % with other Europe (see Figure 1). On these shorter distances, narrow-body aircraft are efficient and cost-effective. Therefore, narrow-body aircraft dominate on flights connecting European and North African countries and are also used for the Europe-Middle East route.

Figure 1: Average daily departure/arrival flights for 2024

Region	Average daily flights	% previous year	% 2019
Intra-Europe	22,588	+4%	-2%
Europe ↔ Middle-East	1,357	-3%	-5%
Europe ↔ North Atlantic	1,329	+8%	+12%
Europe ↔ North-Africa	1,239	+13%	+21%
Europe ↔ Asia/Pacific	858	+21%	+8%
Europe ↔ Other Europe	364	+9%	-65%
Europe ↔ Southern Africa	305	+3%	-2%
Europe ↔ Mid-Atlantic	178	+2%	+3%
Europe ↔ South-Atlantic	193	+12%	+4%
Non Intra-Europe	5,823	+8%	-5%

Source: Eurocontrol 2025c, p. 20

To approximate the number of flights offering first and business class as accurately as possible, we subtract the proportion of flights between Europe and Other Europe, North Africa and Middle East from the total of 702,671 mainline flights.

Based on these numbers, the overall number of relevant flights is approximated at roughly 50 % of all mainline flights. That is, *350,000 relevant flights* departed from the ECAC area in 2024. Relevant flights are those operated by wide-body aircraft, which typically feature first and business class cabins.

The estimated number of flights included in this calculation is conservative for the following reasons:

- Some airlines offer business seats in narrow-body planes, e.g., La Compagnie. This airline operates exclusively with narrow-body jets, including for transatlantic connections (Airbus A321neo).
- Some routes within Europe, as well as between Europe and the Middle East and North Africa, are operated using wide-body aircraft including first and business class cabins.

Step 2: Determine the mean number of seats per cabin class

The aim of this step is to find a representative sample of flights operated by wide-body aircraft, including a representative fleet of aircraft and cabin layouts.

2a) We select all flights detected by the OpenSky Network in 2024, as provided by Eurocontrol in its database. The number was as high as 15 million flights and tower signals throughout the year (Eurocontrol, 2025b).

2b) We search the internet for wide-body aircraft cabin layouts using a multitude of sources, all of which indicate cabin layouts of airlines and their respective fleet of wide-body aircraft (aeroLOPA, Air France, British Airways, Lufthansa, SeatGuru, Seatlink, Seatmaestro, Swiss Airlines, Turkish Airlines). The research focuses on airlines with European hubs, given their likely dominant market share of flights departing from Europe. Their exact market share cannot be determined through this research method and is not relevant to the research question. Focusing on European airlines simply ensures a large sample size. We search *24 (European) airlines* (see annex). According to the research, their fleets comprise *16 different (wide-body) aircraft types* (see annex). We search up to five different cabin layouts per airline and aircraft type. According to the research, we can assume an even distribution of layouts per aircraft and airline. The research finds *67 combinations of airlines and aircraft types* (see annex), which include *115 different cabin layouts*.

2c) We search for all of the 67 combinations of airlines and aircraft types in the Eurocontrol database (see step 2a, Eurocontrol, 2025b), finding 588,452 out of 15 million flights and tower signals. As the database does in most cases not indicate the departure and/or arrival airport, these flights can be internal flights, arrivals, departures or overflights. Due to the applied filters, they are most likely departures or arrivals. Again, wide-body aircraft are used for long-haul flights. The filters remove narrow-body and other aircraft. The market of regional jets (short haul and "feeder" flights) is excluded from the search, because these planes usually do not offer business or first class cabins.

In the Eurocontrol database (2025b), the flights of the selected 67 combinations can be found by matching the columns "typecode" and "icao_operator" (see illustrative examples in Table 1).

Table 1: OpenSky Network ADS-B data, sample for illustration

DOF	FLT_ID	REGISTRATION	MODEL	TYPECODE	ICAO_OPERATOR
2024-01-01	TAP075	CS-TUP	A330-941	A339	TAP
2024-07-25	DLH500	D-ABVW	747 430	B744	DLH

Source: Eurocontrol, 2025b

Each of the 67 combinations represents a specific share of the 588,452-flight sample (see annex). To determine the average number of seats per cabin class in a representative wide-body aircraft, we use a weighted average. This approach calculates the mean number of first, business, premium economy, and economy seats across the sample.

We assume our sample to be representative, as other (non-European) airlines use the same 16 aircraft types and similar cabin layouts.

Step 3: Assess the space required for business class and first class seats as a proportion of all seats in an average (wide-body) aircraft

Cabin width in wide-body aircraft is typically 5-6 meters (16-20 feet). Premium cabins (first and business) have fewer seats than economy and premium economy per row to provide more space per passenger (e.g., Websites Alternative Airlines; Rosen Aviation):

- First class: Often 1-2 seats per row (e.g., 1-2-1 or 1-1-1), with each seat occupying significantly more floor area than economy.
- Business class: Usually 2-3 seats per row (e.g., 1-2-1 or 2-2-2), with lie-flat seats and more legroom.
- Economy class: 7-10 seats per row, with seat pitch and width minimized for density.

These numbers correspond with the numbers of the "IATA Recommended Practice" (IATA, 2025) guideline for calculating CO_2 emissions per passenger (Table 2).

Table 2: Cabin Class Factors

	ECONOMY	PREMIUM ECON	BUSINESS	FIRST
Narrow-body aircraft	1	1	1.5*	1.5
Wide-body aircraft	1	1.5	4	5

Source: IATA, 2025. **As per the source, a cabin class factor of 4 applies to narrow-body aircraft where all seating is arranged in a business class configuration.*

Our calculation uses Table 2's numbers to deduct the CO_2 impact of business and first class in wide-body aircraft. As described under Step 1, the estimation disregards narrow-body jets, as the role of business class in these aircraft is small (and first class practically non-existent).

To obtain a calculation per passenger, we search airline-wide load factors for combined premium cabins (first and business class) from recent reports (2023–2025). According to IATA (2024), global passenger load factors (all cabins) reached record highs in 2024, with an annual average of 83.5% and peaks of 85.7%–86.9% in mid-2024, surpassing pre-pandemic levels. Further, premium cabins (first and business class) outperform economy, with load factors typically 5-15% higher than the overall average (IATA, 2024).

Based on the IATA report (2024), this calculation assumes *a load factor of 83.5% for economy, and 92% for premium cabins* (i.e., 10% higher than economy).

2) Overview of Results

Table 3 presents the results of the calculations as described in chapter 1.

Table 3: First class and business class in wide-body aircraft In 2024

Average aircraft, 350,000 flights	FIRST	BUSINESS	PREMIUM ECONOMY	ECONOMY
Mean seat number (305.4 seats)	2.1 (0.7 % of seats)	36.4 (11.9 % of seats)	22.5 (7.4 % of seats)	244.4 (80.0 % of seats)
Mean passenger number (258.3 passengers)	1.9 (0.7 % of p.)	33.5 (13.0 % of p.)	18.8 (7.3 % of p.)	204.1 (79.0 % of p.)
CO_2 per cabin*	2.4 %	33.5 %	7.8 %	56.3 %
CO_2 per passenger	1.33 %	1.06 %	0.40 %	0.27 %
Total seats	729,023	12,743,010	7,884,225	85,549,149
Total passengers	670,701	11,723,569	6,583,328	71,433,539

Source: Own research, own calculations. **The calculation accounts for the load factor.*

The mean seat number is based on the sample fleet and corresponding flight shares described. The average CO_2 impact is calculated per cabin and, following IATA (2025), per passenger—thus accounting for load factors. These calculations must also be broken down by distance. Absolute CO_2 emissions, however, can only be determined using actual airport-to-airport routes.

3) SOURCES

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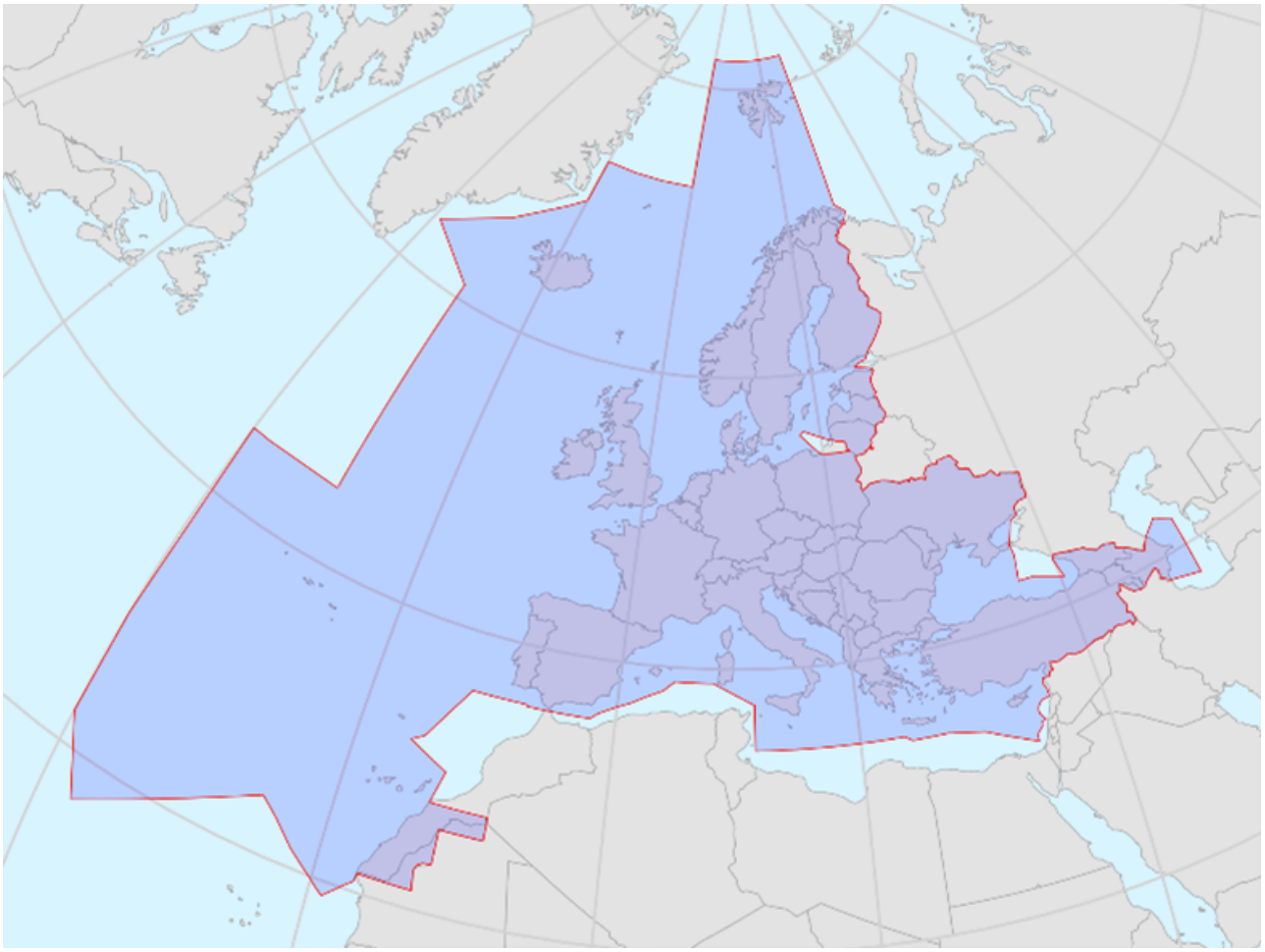
All websites were accessed in October 2025.

ANNEX

The European Civil Aviation Conference (ECAC) is an intergovernmental organisation that was established by the International Civil Aviation Organization (ICAO) and the Council of Europe. ECAC now has 44 Member States, including all 27 EU Member States, and all 42 Eurocontrol Member States. The map below is a graphical representation of the airspace belonging to the ECAC states (Figure 2).

Figure 2: State flight information region for ECAC



Source: Website Eurocontrol

The below linked spreadsheet contains more data from our study, namely the 24 airlines we selected, the 16 aircraft types we found, and the 67 combinations of airlines and types searched in Eurocontrol (2025b), accounting for average cabin layouts (the latter we keep undisclosed to comply with the terms of use of the websites we searched). Note that Alitalia ceased operations in October 2021 and was replaced by ITA Airways. However, the Eurocontrol 2024 data includes the Alitalia ICAO code (AZA), hinting that the existing fleet uses the original transponder signals.

https://t3-forschung.de/wp-content/uploads/2025/11/Airlines_longdistance_configurations.xlsx