Aviation Emissions Report
September 23

RDC Emissions analysis for largest markets - September 23 vs prior years

25 largest markets by total emissions

Date Origin Country	September 2019 Total CO2 (Tonnes)	September 2022 Total CO2 (Tonnes)	September 2023 Total CO2 (Tonnes)
United States	14,944,482	12,783,140	14,143,001
China	7,774,891	5,069,278	7,425,059
United Kingdom, UK	3,033,075	2,320,720	2,760,856
India	1,722,215	1,566,691	2,024,384
Japan	2,278,178	1,291,535	1,867,852
Germany	2,192,196	1,600,271	1,803,303
United Arab Emirates	1,885,039	1,392,885	1,774,458
Spain and Canary Islands	1,856,889	1,565,895	1,734,589
France	1,689,485	1,312,637	1,511,472
Australia	1,643,943	1,075,202	1,462,096
Turkey	1,320,265	1,301,701	1,452,375
Canada	1,643,005	1,293,543	1,447,767
Russian Federation	1,730,265	1,417,953	1,400,332
Italy	1,264,742	992,628	1,162,595
Brazil	1,247,808	1,027,233	1,125,111
Republic of Korea	1,173,016	608,468	955,387
Indonesia	1,058,755	788,763	949,236
Mexico	900,974	879,755	913,365
Qatar	787,765	691,184	847,377
Singapore	936,833	587,993	809,225
Thailand	1,121,676	521,693	778,083
Saudi Arabia	692,406	678,676	754,293
Netherlands	844,653	661,750	715,299
Greece	493,657	527,262	550,591
Hong Kong	997,840	161,418	539,264

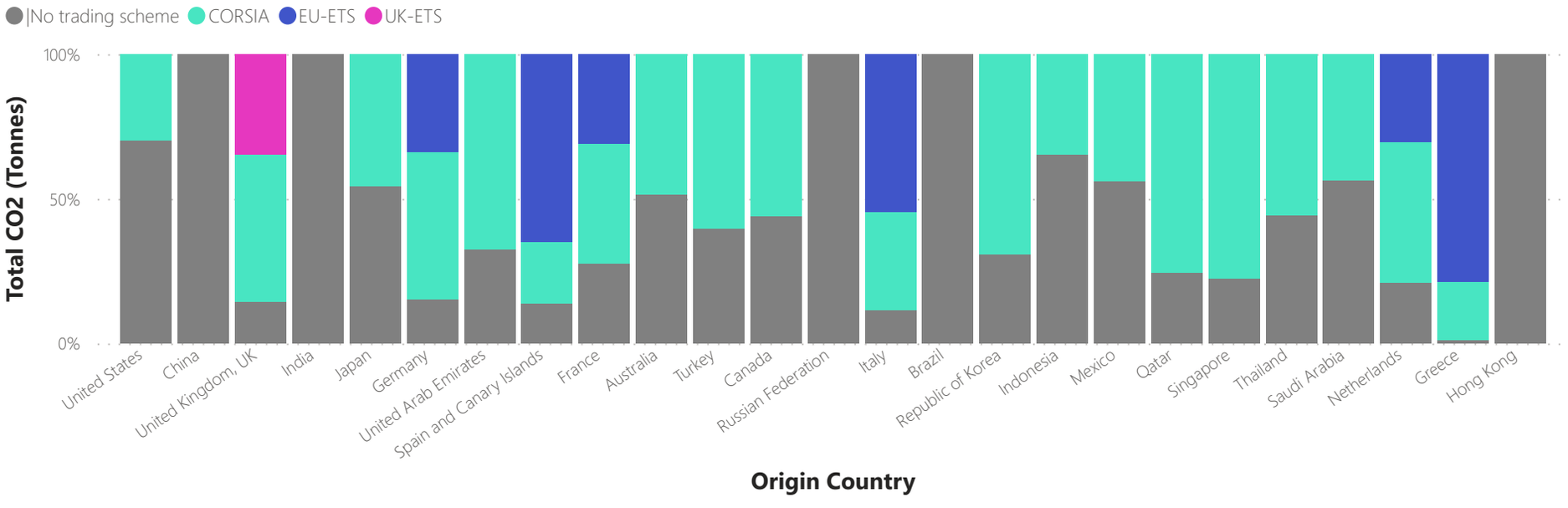
Change in Emissions - Current month vs prior years

This year vs last year	This year vs 2019
11%	-5%
46%	-4%
19%	-9%
29%	18%
45%	-18%
13%	-18%
27%	-6%
11%	-7%
15%	-11%
36%	-11%
12%	10%
12%	-12%
-1%	-19%
17%	-8%
10%	-10%
57%	-19%
20%	-10%
4%	1%
23%	8%
38%	-14%
49%	-31%
11%	9%
8%	-15%
4%	12%
234%	-46%

Percent of Emissions covered by Compliance Programmes

September 2019 % covered	September 2022 % covered	September 2023 % covered
-	28.70%	29.90%
-	-	-
34.26%	89.22%	85.63%
-	-	-
-	35.94%	45.72%
34.27%	88.14%	84.72%
-	68.17%	67.45%
61.43%	88.39%	86.02%
29.36%	75.11%	72.47%
-	46.46%	48.53%
-	62.22%	60.26%
-	54.27%	55.83%
-	-	-
50.16%	92.98%	88.51%
-	-	-
-	69.33%	69.06%
-	29.83%	34.53%
-	43.78%	43.72%
-	76.04%	75.41%
-	84.41%	77.37%
-	56.85%	55.61%
-	43.44%	43.69%
26.70%	81.19%	79.06%
75.16%	99.20%	98.68%
-	-	-

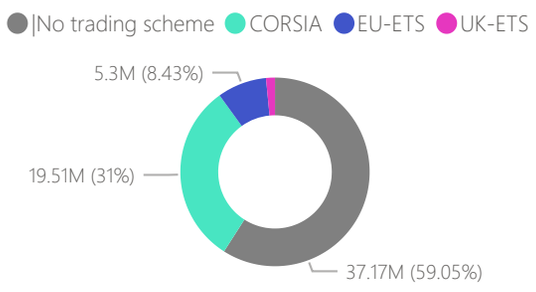
25 largest markets - emissions by Compliance Programme (current month)



Global emissions (tonnes)

62.94M

Emissions by compliance programme



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Emissions analysis for largest markets - YTD to Sep 23 vs prior years

25 largest markets by total emissions

YTD Period Origin Country	YTD 2019 Total CO2 (Tonnes)	YTD Last Year Total CO2 (Tonnes)	YTD This Year Total CO2 (Tonnes)
United States	137,221,794	113,045,187	125,837,364
China	69,809,956	47,148,963	64,171,038
United Kingdom, UK	25,715,678	17,744,483	22,374,449
India	15,798,055	13,829,533	17,476,144
Japan	20,416,032	10,127,010	15,737,175
United Arab Emirates	16,828,815	11,735,500	15,420,416
Germany	18,332,324	12,318,124	14,214,948
Spain and Canary Islands	15,071,570	12,451,335	14,058,264
France	14,733,255	10,821,709	12,696,179
Australia	15,103,505	8,376,378	12,447,662
Canada	14,295,112	9,774,720	12,249,981
Turkey	10,289,897	9,750,093	11,435,043
Russian Federation	14,333,739	10,813,949	11,014,988
Brazil	11,530,723	9,132,379	10,608,609
Mexico	8,935,436	8,471,154	9,093,581
Italy	10,109,974	7,086,689	8,823,350
Republic of Korea	10,416,086	4,213,837	8,103,842
Indonesia	9,773,829	6,306,135	8,062,396
Qatar	7,030,941	6,113,627	7,162,839
Thailand	10,907,508	3,852,923	7,160,478
Singapore	8,594,284	4,266,911	7,024,390
Saudi Arabia	6,477,559	5,267,806	6,649,706
Netherlands	7,179,016	5,326,664	5,972,727
Vietnam	5,134,086	3,745,847	5,105,530
Malaysia	6,029,142	2,523,808	4,429,216

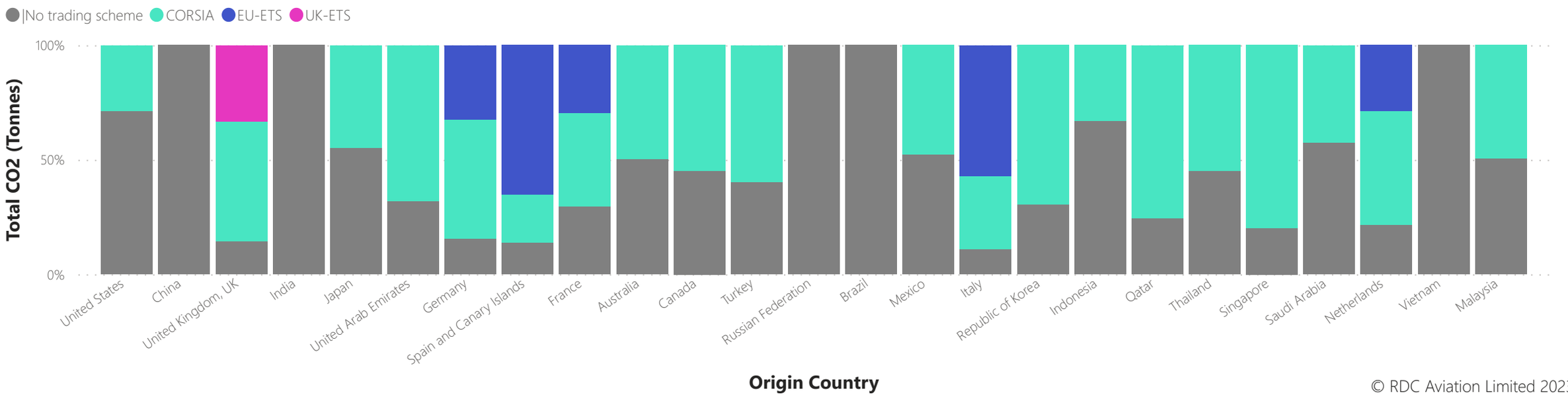
Change in Emissions - Current month vs prior years

This YTD vs Last YTD	This YTD vs YTD 2019
11%	-8%
36%	-8%
26%	-13%
26%	11%
55%	-23%
31%	-8%
15%	-22%
13%	-7%
17%	-14%
49%	-18%
25%	-14%
17%	11%
2%	-23%
16%	-8%
7%	2%
25%	-13%
92%	-22%
28%	-18%
17%	2%
86%	-34%
65%	-18%
26%	3%
12%	-17%
36%	-1%
75%	-27%

Percent of Emissions covered by Compliance Programmes

YTD 2019 Trading scheme %	YTD Last Year Trading scheme %	YTD This Year Trading scheme %
-	26.06%	28.61%
-	-	-
31.98%	88.72%	85.57%
-	-	-
-	33.17%	44.76%
-	67.50%	68.00%
33.51%	87.37%	84.59%
61.95%	87.81%	86.10%
27.87%	72.87%	70.49%
-	42.19%	49.60%
-	54.19%	54.92%
-	60.85%	59.66%
-	-	-
-	-	-
-	47.89%	47.67%
51.00%	94.15%	89.00%
-	65.85%	69.50%
-	18.94%	33.15%
-	74.32%	75.41%
-	54.42%	54.87%
-	84.11%	79.89%
-	33.97%	42.45%
25.28%	79.24%	78.21%
-	-	-
-	39.85%	49.38%

25 largest markets - emissions by Compliance Programme (current YTD)



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RDC CARE Index by carrier and home continent - September 23

Top 25 European Carriers

Carrier Name	CARE Index
Chalair Aviation	7.9
Marabu Airlines	7.6
TUIfly Nordic	7.6
SmartLynx Airlines Estonia	7.6
World2Fly	7.5
PLAY	7.4
French Bee	7.3
Novair	7.2
Iberojet	7.2
Wizz Air UK	7.2
Norse Atlantic Airways	7.1
Sunclass Airlines	7.1
Smartwings Poland	7.0
Wizz Air Malta	7.0
TUI Airways	6.9
La Compagnie	6.8
Wizz Air	6.8
Norse Atlantic Airways UK	6.8
SunExpress	6.7
Freebird Airlines	6.7
TUIfly Deutschland	6.6
Abelo	6.6
Smartwings Slovakia	6.6
Azores Airlines	6.6

Top 25 North American Carriers

Carrier Name	CARE Index
Canadian North	7.7
Lynx Air	7.2
Air Transat	7.0
Sunwing Airlines	6.9
Volaris	6.9
Flair Airlines	6.9
Canada Jetlines	6.9
Frontier Airlines	6.7
Swoop	6.7
Spirit Airlines	6.3
Omni Air International	5.9
Allegiant Air	5.9
WestJet	5.8
Sun Country	5.7
Aeromexico	5.7
Airbahn	5.6
Delta Air Lines	5.6
VivaAerobus	5.6
Alaska Airlines	5.6
Air Saint-Pierre	5.5
American Airlines	5.4
United Airlines	5.4
Breeze Airways	5.4
Air Canada	5.3

Top 25 Asian Carriers

Carrier Name	CARE Index
Japan Air Commuter	7.2
Thai AirAsia X	6.8
AirAsia X	6.7
ZIPAIR Tokyo	6.7
Akasa Air	6.6
STARLUX Airlines	6.4
Thai Summer Airways	6.4
Trigana Air	6.4
Philippine Airlines	6.3
T'Way Air	6.3
airblue	6.3
Air Premia	6.3
Nordwind Airlines	6.2
Himalaya Airlines	6.2
Tigerair Taiwan	6.2
Air India Express	6.2
Aero Nomad Airlines	6.2
Hong Kong Express	6.1
Greater Bay Airlines	6.1
Ural Airlines	6.1
NordStar Airlines	6.1
KrasAvia	6.0
Chongqing Airlines	6.0
Serene Air	6.0

Top 25 RoW Carriers

Carrier Name	CARE Index
SATENA	7.7
Wizz Air Abu Dhabi	6.9
Bahamasair	6.9
Bonza Airline	6.8
Arajet	6.7
TACV	6.6
flydubai	6.5
Air Tahiti Nui	6.4
SalamAir	6.4
Flynas	6.2
Syrian Air	6.2
El Al	6.2
LATAM Paraquay	6.1
FlyEgypt	6.0
Nouvelair Tunisie	6.0
Badr Airlines	5.9
Copa Airlines	5.9
Sudan Airways	5.9
Jazeera Airways	5.8
JetSmart Airlines S.A.	5.8
Flybondi	5.8
Nile Air	5.7
Tunisair	5.7
Sky Pearl Aviation	5.7

The CARE Index is a measure of airline route sustainability, based around our emissions methodology and various other factors, that has been developed to give business and consumers the best information on which to make their purchasing decisions - particularly when it comes to making more environmentally friendly choices. Most 'efficiency measures' use CO2 per passenger, per seat or per available seat kilometre (ASK), which can be hard to understand for consumers. The CARE Index creates a score between 0 (worst) to 10 (best) for any air route, airline and aircraft combination, taking into account:

- fuel burn and **efficiency of the aircraft type**
- **efficiency of the airline** – using specific seat capacity, configuration and overall occupancy rates (load factor)
- use of **Sustainable Alternative Fuels (SAF)**
- if the route is part of a **compliance or regulatory emissions programme** such as EU ETS etc
- whether the **operator offsets any emissions over and above that which is legally required**

The CARE index has been designed to be a force for change, giving consumers better insight into the environmental impact of their chosen airline that will also help to shape airline sustainability strategies.

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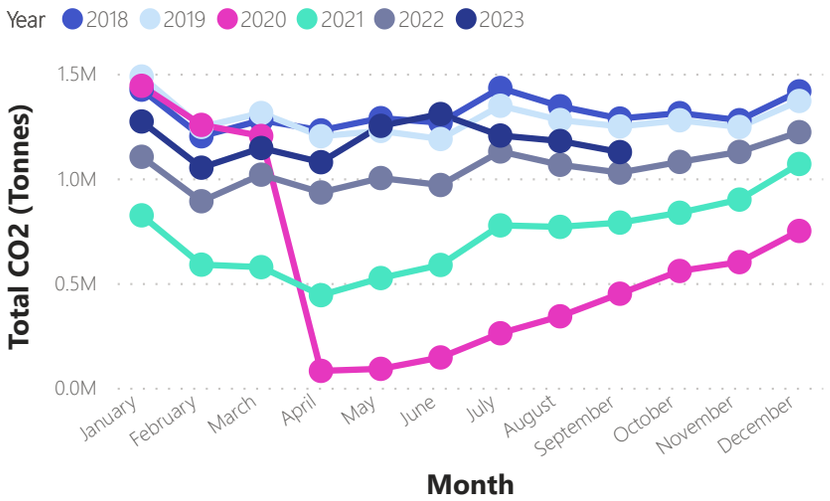
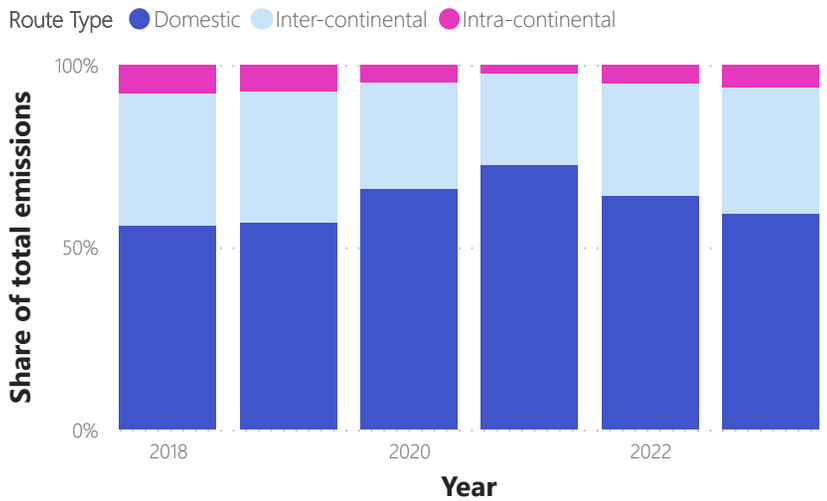
This month's focus country: Brazil

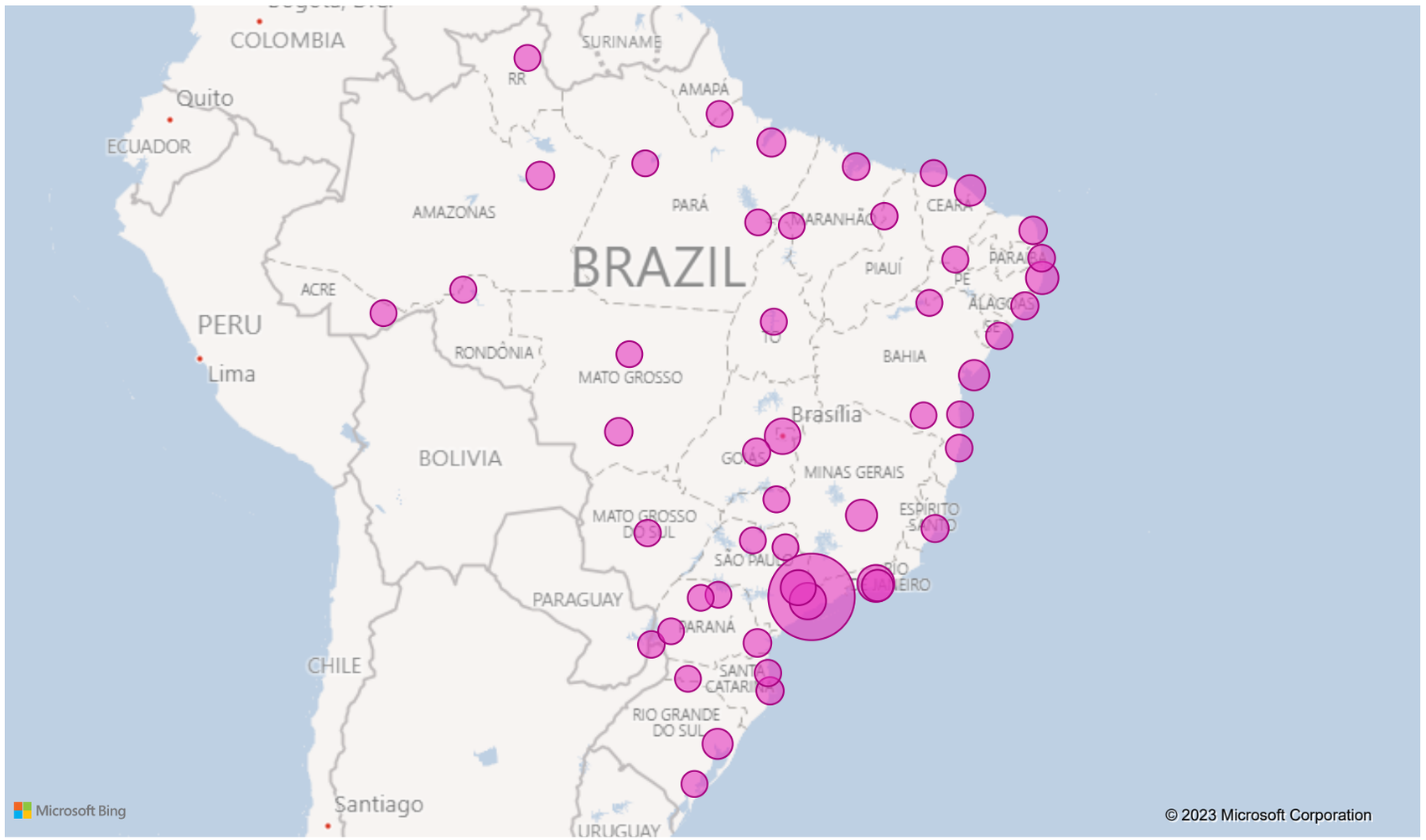
Total CO2 (Tonnes) by Month and Year



CO2 by Year and Route Type



Largest origin airports by total emissions - last 12 months



10 largest markets by seat capacity ranked by lowest Emissions per ASK - last 12 months

Destination Country	Emissions per ASK (g)	Total CO2 (Tonnes)
Panama	53.79	184,686
Chile	59.29	166,304
Portugal	59.30	650,239
Uruguay	60.69	36,942
Spain and Canary Islands	61.15	286,426
Colombia	61.30	101,431
Argentina	63.78	256,803
France	64.65	393,804
Brazil	68.22	8,421,257
United States	69.55	1,501,216

10 largest carrier by emissions ranked by highest total emissions - last 12 months

Carrier Name	Emissions per ASK (g)	Total CO2 (Tonnes)
LATAM Airlines Brasil	66.43	4,138,525
Azul	68.97	2,911,318
Gol	67.01	2,684,637
LATAM Airlines Chile	67.52	479,801
TAP Air Portugal	58.57	472,888
Air France	64.34	305,962
American Airlines	76.32	302,542
United Airlines	75.22	279,258
Qatar Airways	77.01	272,144
Emirates	82.89	265,788

10 most efficient routes according to RDC's CARE Index - current month

Carrier Name	Aircraft	Origin	Destination	CARE Index
Azul	A321neo	REC	MAO	7.6
Azul	A321neo	MAO	REC	7.6
Azul	A321neo	VCP	BEL	7.5
Azul	A321neo	VCP	FOR	7.5
Azul	A321neo	VCP	MAO	7.5
Azul	A321neo	VCP	NAT	7.5
Arajet	B737 MAX 8	GRU	SDQ	7.5
Azul	A321neo	BEL	VCP	7.5
Azul	A321neo	FOR	VCP	7.5
Azul	A321neo	MAO	VCP	7.5

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For decades RDC have been monitoring and modelling the CO2 emissions arising from the growing aviation industry. We have the ability to calculate and report detailed airline operating expenses - including fuel burn, which in turn gives us the CO2 output from flying. For accuracy on CO2 emissions data, our accredited and independent methodology can't be beaten.

We passionately believe that business and consumers should be armed with the best information on which to make their purchasing decisions - particularly when it comes to making more environmentally friendly choices - this is why we developed our **CO2 calculator** and **CARE Index.**

To find out more about how RDC can deliver CO2 emissions data for your business services, get in touch with:

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