RDC

Aviation Emissions Report
December 22

Emissions analysis for largest markets - December 22 vs prior years

25 largest markets by total emissions

Date Origin Country	December 2019 Total CO2 (Tonnes)	December 2021 Total CO2 (Tonnes)	December 2022 Total CO2 (Tonnes)
United States	14,823,511	11,726,780	12,957,667
China	7,759,671	5,555,707	5,060,332
United Kingdom, UK	2,518,044	1,475,536	2,046,602
India	1,936,481	1,472,921	1,739,842
United Arab Emirates	2,053,369	1,233,264	1,640,287
Japan	2,334,795	1,078,992	1,585,423
Australia	1,809,430	655,008	1,303,214
Spain and Canary Islands	1,413,142	1,077,272	1,301,506
Germany	1,718,518	1,059,063	1,287,688
France	1,452,111	1,000,400	1,244,087
Brazil	1,359,462	1,060,416	1,210,032
Canada	1,437,405	859,854	1,188,171
Mexico	1,081,358	965,394	1,098,890
Turkey	972,651	794,803	972,769
Russian Federation	1,462,171	1,173,306	969,398
Indonesia	1,187,783	553,601	850,046
Republic of Korea	1,183,540	397,010	785,474
Singapore	1,034,757	354,627	774,641
Thailand	1,335,486	340,269	766,067
Qatar	810,896	624,139	765,965
Saudi Arabia	775,374	464,922	722,841
Italy	929,237	547,137	702,904
Netherlands	696,495	486,057	552,019
Vietnam	641,154	217,664	514,086
Malaysia	739,850	228,964	460,577

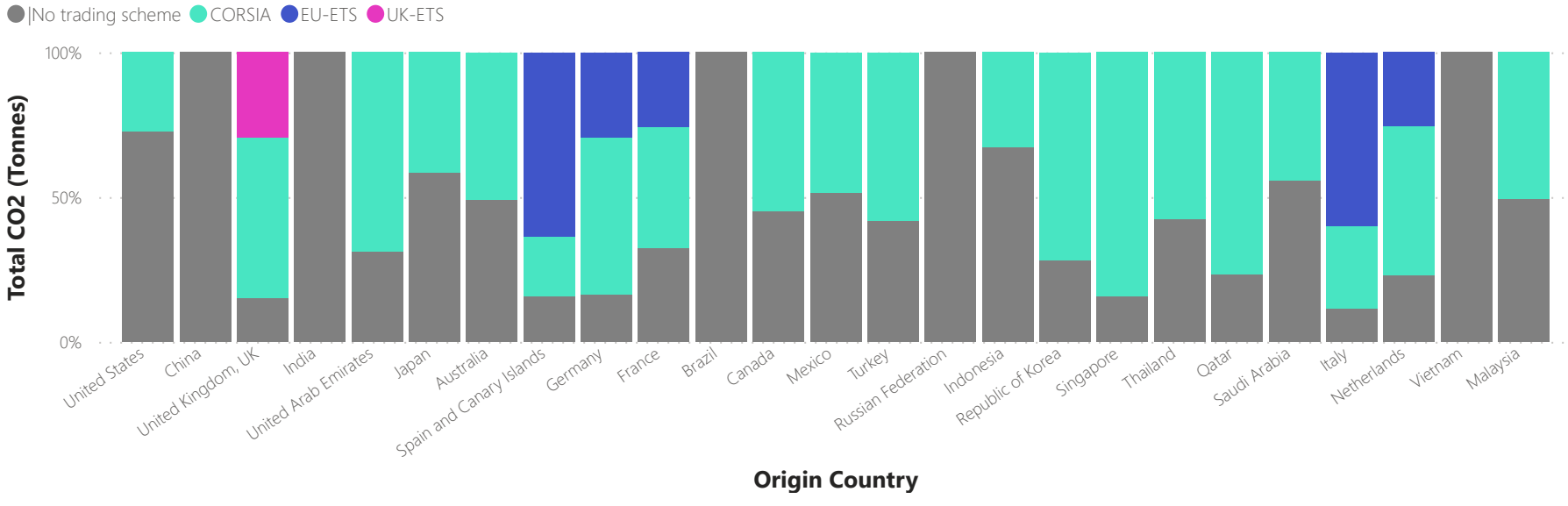
Change in Emissions - Current month vs prior years

This year vs last year	This year vs 2019
10%	-13%
-9%	-35%
39%	-19%
18%	-10%
33%	-20%
47%	-32%
99%	-28%
21%	-8%
22%	-25%
24%	-14%
14%	-11%
38%	-17%
14%	2%
22%	0%
-17%	-34%
54%	-28%
98%	-34%
118%	-25%
125%	-43%
23%	-6%
55%	-7%
28%	-24%
14%	-21%
136%	-20%
101%	-38%

Percent of Emissions covered by Compliance Programmes

December 2019 % covered	December 2021 % covered	December 2022 % covered
-	21.99%	27.33%
-	-	-
27.37%	85.24%	84.82%
-	-	-
-	65.81%	68.79%
-	31.26%	41.62%
-	32.67%	50.84%
57.54%	86.65%	84.43%
29.71%	85.49%	83.72%
24.92%	71.16%	67.58%
-	-	-
-	51.35%	54.91%
-	49.12%	48.42%
-	56.83%	58.09%
-	-	-
-	10.63%	32.88%
-	63.27%	71.71%
-	86.72%	84.30%
-	52.79%	57.62%
-	72.89%	76.75%
-	29.32%	44.31%
49.69%	94.60%	88.37%
23.15%	76.49%	77.07%
-	-	-
-	34.42%	50.72%

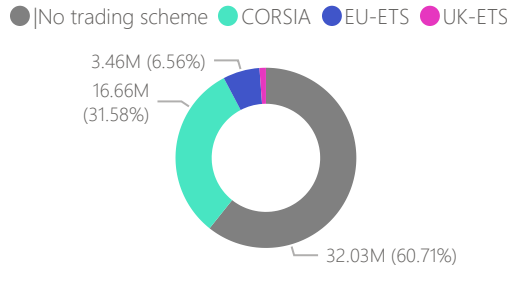
25 largest markets - emissions by Compliance Programme (current month)



Global emissions (tonnes)

52.76M

Emissions by compliance programme



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Emissions analysis for largest markets - YTD to Dec 22 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	178,317,612	118,114,317	148,355,425
China	92,931,723	71,779,878	61,720,498
United Kingdom, UK	33,185,884	9,823,015	23,747,225
India	21,332,863	13,165,591	18,743,556
United Arab Emirates	22,640,915	9,589,751	16,361,074
Spain and Canary Islands	19,319,258	8,938,301	16,280,845
Germany	23,603,946	8,937,939	16,207,156
Japan	27,436,527	10,244,103	14,644,457
France	18,781,949	8,594,355	14,131,356
Russian Federation	18,744,477	14,677,585	13,844,611
Canada	18,274,103	6,120,447	13,039,942
Turkey	13,492,035	8,740,387	12,901,123
Brazil	15,319,341	8,607,294	12,446,056
Australia	20,240,392	5,972,802	12,018,372
Mexico	11,871,694	9,245,436	11,424,336
Italy	12,958,187	4,681,769	9,257,095
Indonesia	13,102,062	5,973,255	8,755,359
Qatar	9,391,229	6,097,215	8,311,747
Saudi Arabia	8,618,330	4,083,275	7,355,163
Netherlands	9,141,124	4,937,274	6,865,827
Singapore	11,889,631	2,853,763	6,620,945
Republic of Korea	13,854,248	4,563,119	6,349,311
Thailand	14,622,671	2,503,008	5,853,817
Vietnam	6,944,880	2,961,373	5,202,045
Portugal	4,731,405	2,228,445	4,226,207

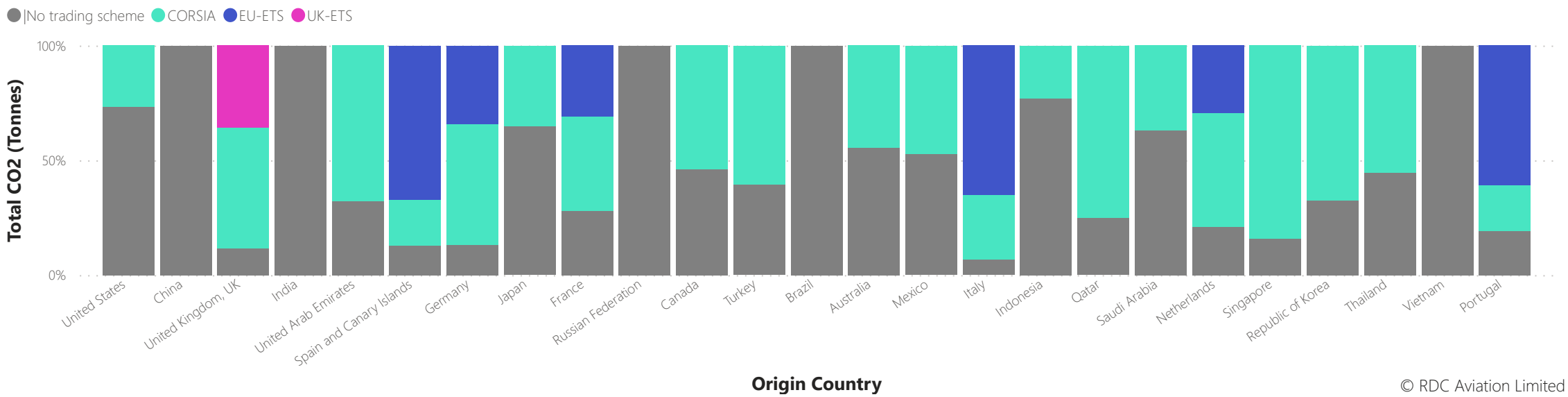
Change in Emissions - Current month vs prior years

This YTD vs Last YTD	This YTD vs YTD 2019
26%	-17%
-14%	-34%
142%	-28%
42%	-12%
71%	-28%
82%	-16%
81%	-31%
43%	-47%
64%	-25%
-6%	-26%
113%	-29%
48%	-4%
45%	-19%
101%	-41%
24%	-4%
98%	-29%
47%	-33%
36%	-11%
80%	-15%
39%	-25%
132%	-44%
39%	-54%
134%	-60%
76%	-25%
90%	-11%

Percent of Emissions covered by Compliance Programmes

YTD 2019 Trading scheme %	YTD Last Year Trading scheme %	YTD This Year Trading scheme %
-	18.50%	26.63%
-	-	-
31.10%	86.26%	88.18%
-	-	-
-	64.03%	67.81%
61.18%	87.84%	87.29%
32.71%	85.68%	86.82%
-	33.44%	35.01%
27.12%	69.53%	71.99%
-	-	-
-	43.12%	53.94%
-	51.53%	60.46%
-	-	-
-	31.68%	44.52%
-	44.78%	47.14%
50.42%	94.56%	93.10%
-	9.98%	22.98%
-	73.56%	74.97%
-	19.17%	36.91%
24.64%	74.98%	79.08%
-	87.71%	84.14%
-	58.46%	67.43%
-	51.82%	55.53%
-	-	-
57.33%	81.83%	80.85%

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



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RDC CARE Index by carrier and home continent - December 22

Top 25 European Carriers

Carrier Name	CARE Index
TUIfly Nordic	7.6
Novair	7.6
World 2 Fly	7.4
SmartLynx Airlines Estonia	7.4
PLAY	7.3
Smartwings Slovakia	7.3
Wizz Air Malta	7.3
French Bee	7.2
Jonair	7.2
La Compagnie	7.0
Norse Atlantic Airways	7.0
TUI Airways	7.0
Wizz Air UK	7.0
Iberojet	6.9
SmartLynx Airlines	6.8
Flyr	6.8
Corendon Dutch Airlines	6.8
Freebird Airlines	6.7
Sundair	6.7
SunExpress	6.6
Georgian Airways	6.6
TUIfly Deutschland	6.6
Sunclass Airlines	6.5
Avion Express	6.5

Top 25 North American Carriers

Carrier Name	CARE Index
Volaris	7.0
Swoop	6.9
Flair Airlines	6.9
Sunwing Airlines	6.8
Lynx Air	6.8
Frontier Airlines	6.8
Air Transat	6.8
Sun Country	6.0
WestJet	6.0
Aeromexico	5.8
Spirit Airlines	5.6
VivaAerobus	5.5
Air Saint-Pierre	5.4
ConocoPhillips Alaska Inc	5.2
Allegiant Air	5.2
American Airlines	5.2
Delta Air Lines	5.1
Avelo Air	5.1
Alaska Airlines	5.1
United Airlines	5.0
Breeze Airways	5.0
Aeromar	4.9
JetBlue	4.8
Air Canada	4.4

Top 25 Asian Carriers

Carrier Name	CARE Index
Thai AirAsia X	6.8
AirAsia X	6.6
ZIPAIR Tokyo	6.6
Pan Pacific Airlines	6.6
STARLUX Airlines	6.5
Scoot	6.5
Nordwind Airlines	6.4
airblue	6.4
Air Premia	6.3
NordStar Airlines	6.2
Aero Nomad Airlines	6.2
Pobeda	6.2
Hong Kong Express	6.2
Air India Express	6.2
Tigerair Taiwan	6.2
MIAT Mongolian Airlines	6.1
Ural Airlines	6.1
T'Way Air	6.1
Philippine Airlines	6.1
Serene Air	6.1
Himalaya Airlines	6.0
Azur Air	6.0
West Air	6.0
Longjiang Airlines	5.9

Top 25 RoW Carriers

Carrier Name	CARE Index
Arajet	7.1
Wizz Air Abu Dhabi	7.0
Flynas	6.6
SalamAir	6.6
Air Tahiti Nui	6.4
flydubai	6.4
Arkia Israel Airlines	6.4
El Al	6.3
Syrian Air	6.2
Jazeera Airways	6.2
LATAM Paraquay	6.0
UR Airlines	6.0
Sudan Airways	6.0
OYA International Airline	6.0
Tarco Aviation	5.9
Badr Airlines	5.9
Nouvelair Tunisie	5.9
JetSmart Airlines S.A.	5.8
Flybondi	5.8
Copa Airlines	5.8
Nesma Airlines	5.8
Air Arabia Abu Dhabi	5.7
TACV	5.7
JetSmart	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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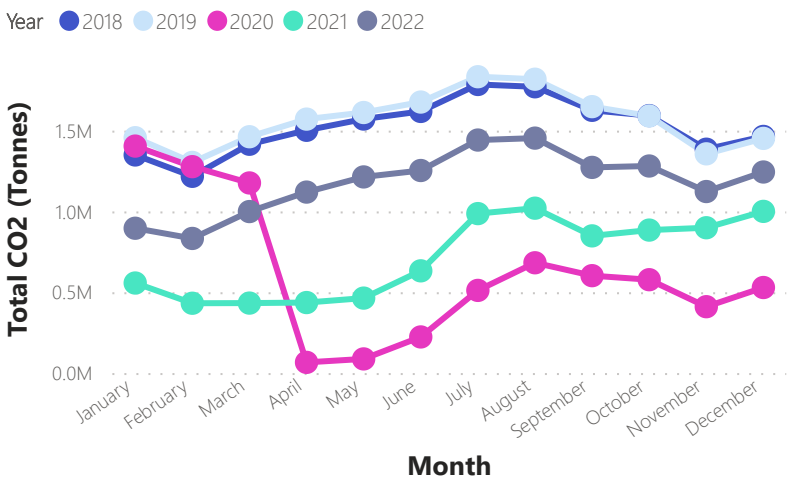
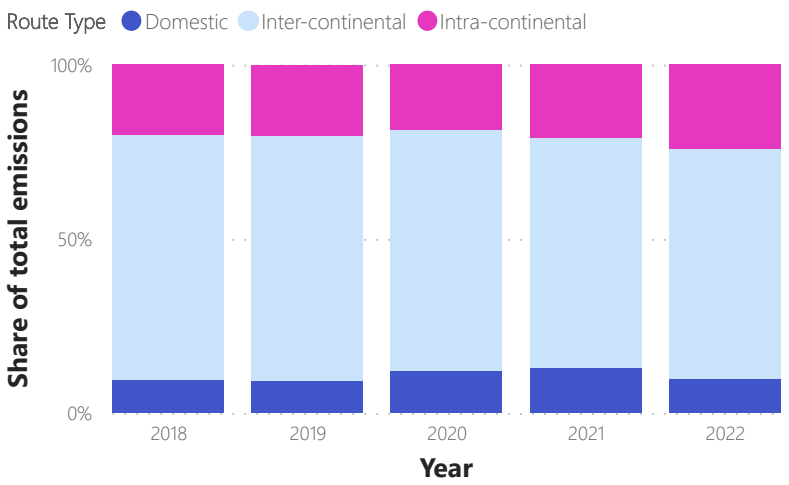
This month's focus country: France

Total CO2 (Tonnes) by Month and Year



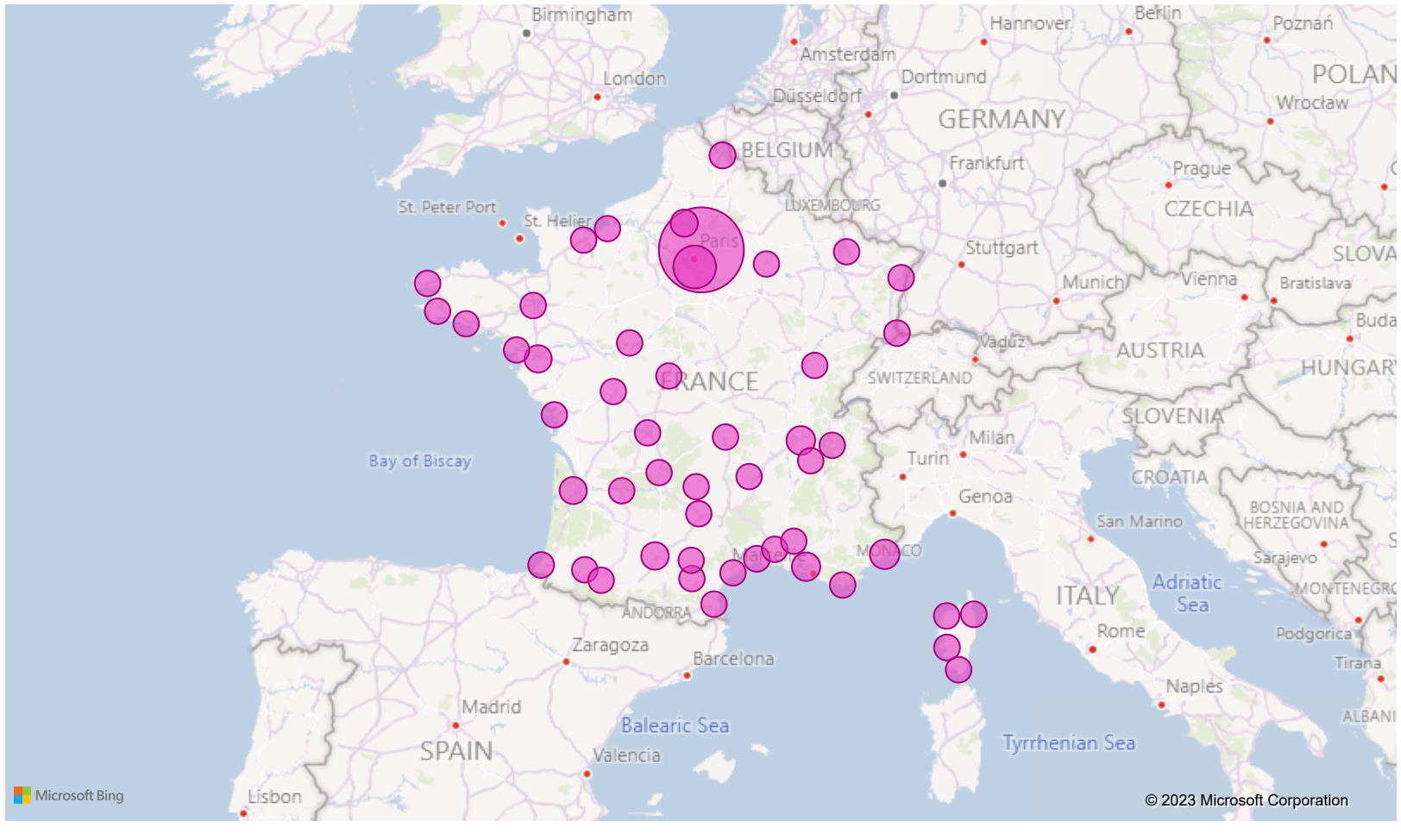
CO2 by Year and Route Type



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

Destination Country	Emissions per ASK (g)	Total CO2 (Tonnes)
Morocco	59.30	465,629
Portugal	62.17	364,024
United States	65.05	2,408,110
Spain and Canary Islands	65.23	575,226
Italy	68.31	414,447
United Kingdom, UK	71.52	318,718
Algeria	72.19	201,101
Germany	77.34	229,034
France	78.34	1,376,572
Switzerland	83.97	94,964

Largest origin airports by total emissions - last 12 months



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

Carrier Name	Emissions per ASK (g)	Total CO2 (Tonnes)
Air France	64.88	5,551,835
easyJet	68.92	773,733
Transavia France	56.69	652,483
Delta Air Lines	66.82	455,967
Corsair	59.86	329,081
Air Caraibes	53.03	300,021
Ryanair	63.57	295,201
Emirates	74.27	285,341
Hop!	110.03	262,063
Volotea	75.49	254,910

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

Carrier Name	Aircraft	Origin	Destination	CARE Index
Sky Express (Greece)	A320neo	CDG	ATH	7.6
SunExpress	B737 MAX 8	CDG	AYT	7.6
SunExpress	B737 MAX 8	LYS	AYT	7.6
Flynas	A320neo	MRS	JED	7.6
French Bee	A350-900	ORY	EWR	7.5
Flyr	B737 MAX 8	NCE	OSL	7.5
Wizz Air	A321neo	BVA	OTP	7.5
Air Transat	A321neo	CDG	YQB	7.5
Air Transat	A321neo	CDG	YUL	7.5

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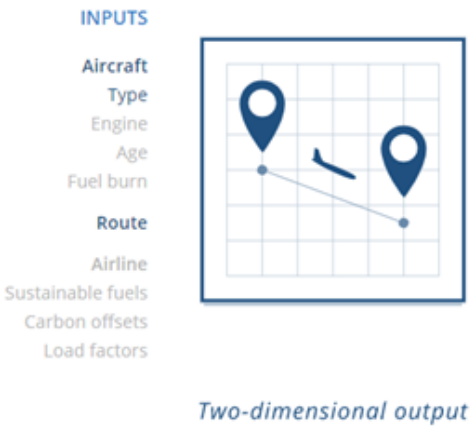
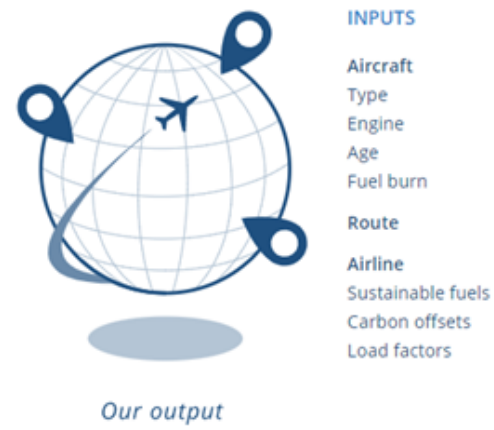
RDC is a UK-based data and technology provider to the international air transport industry. The company has over 300 clients of its **Apex** and **AirportCharges.com** products, which provide market intelligence to operators of aircraft and airports, as well as investors, OEMs and regulators.

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.**



Two-dimensional output



Our output

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

Iain Smith
Global Account Director
iain.smith@rdcaviation.com

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