RDC

Aviation Emissions Report
November 22

Emissions analysis for largest markets - November 22 vs prior years

25 largest markets by total emissions

Date Origin Country	November 2019 Total CO2 (Tonnes)	November 2021 Total CO2 (Tonnes)	November 2022 Total CO2 (Tonnes)
United States	13,950,119	11,038,400	12,203,050
China	7,456,720	5,027,053	4,486,217
United Kingdom, UK	2,393,285	1,262,008	1,910,126
India	1,846,611	1,347,411	1,613,797
United Arab Emirates	1,897,341	1,096,872	1,557,758
Japan	2,229,943	963,471	1,427,783
Germany	1,752,278	995,192	1,264,800
Spain and Canary Islands	1,347,037	969,583	1,228,312
Australia	1,630,281	421,849	1,177,135
France	1,355,936	898,033	1,121,805
Brazil	1,235,499	890,878	1,115,307
Canada	1,262,831	705,847	1,052,748
Mexico	967,892	857,810	991,892
Turkey	994,455	777,252	981,076
Russian Federation	1,416,612	1,159,899	923,057
Indonesia	1,126,151	395,244	828,925
Qatar	769,573	537,499	716,480
Singapore	979,353	287,259	716,200
Republic of Korea	1,107,598	368,888	708,817
Saudi Arabia	698,895	397,097	679,257
Thailand	1,242,806	247,795	661,759
Italy	879,316	490,823	640,678
Netherlands	675,015	453,134	535,899
Vietnam	594,232	186,490	467,665
Malaysia	666,939	161,824	426,653

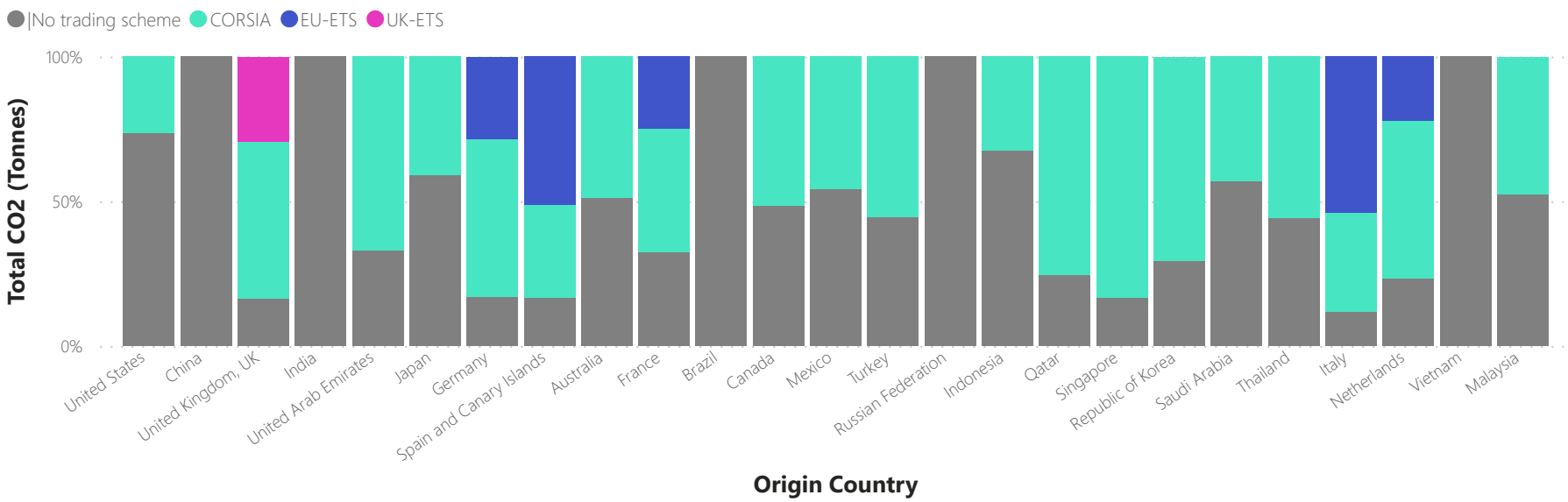
Change in Emissions - Current month vs prior years

This year vs last year	This year vs 2019
11%	-13%
-11%	-40%
51%	-20%
20%	-13%
42%	-18%
48%	-36%
27%	-28%
27%	-9%
179%	-28%
25%	-17%
25%	-10%
49%	-17%
16%	2%
26%	-1%
-20%	-35%
110%	-26%
33%	-7%
149%	-27%
92%	-36%
71%	-3%
167%	-47%
31%	-27%
18%	-21%
151%	-21%
164%	-36%

Percent of Emissions covered by Compliance Programmes

November 2019 % covered	November 2021 % covered	November 2022 % covered
-	19.53%	26.57%
-	-	-
27.09%	82.18%	83.79%
-	-	-
-	63.40%	66.93%
-	32.71%	41.10%
27.89%	84.35%	83.08%
46.67%	85.02%	83.34%
-	34.81%	48.99%
23.60%	67.58%	67.64%
-	-	-
-	50.43%	51.69%
-	47.43%	45.76%
-	49.71%	55.45%
-	-	-
-	12.68%	32.52%
-	69.66%	75.64%
-	88.12%	83.30%
-	62.85%	70.52%
-	23.74%	43.04%
-	55.00%	55.96%
44.15%	93.91%	88.04%
19.66%	74.04%	76.53%
-	-	-
-	32.21%	47.52%

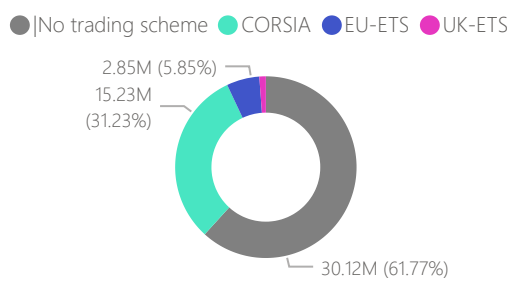
25 largest markets - emissions by Compliance Programme (current month)



Global emissions (tonnes)

48.76M

Emissions by compliance programme



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Emissions analysis for largest markets - YTD to Nov 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	163,458,595	106,365,582	135,367,994
China	85,162,251	66,214,787	56,652,057
United Kingdom, UK	30,614,463	8,321,751	21,634,057
India	19,340,578	11,654,851	16,963,462
Spain and Canary Islands	17,862,600	7,819,955	14,900,943
Germany	21,855,248	7,863,339	14,896,608
United Arab Emirates	20,827,035	8,453,625	14,836,055
Japan	25,039,845	9,146,551	13,029,042
Russian Federation	17,278,033	13,500,933	12,873,350
France	17,324,363	7,586,989	12,871,241
Turkey	12,504,817	7,930,748	11,911,485
Canada	16,839,077	5,261,777	11,850,906
Brazil	13,957,561	7,544,736	11,233,241
Australia	18,405,470	5,301,701	10,679,977
Mexico	10,794,138	8,280,343	10,326,001
Italy	11,971,485	4,091,260	8,477,031
Indonesia	11,909,979	5,422,065	7,904,305
Qatar	8,578,377	5,471,436	7,543,533
Saudi Arabia	7,835,595	3,618,842	6,632,161
Netherlands	8,438,961	4,449,393	6,309,138
Singapore	10,846,586	2,499,453	5,843,175
Republic of Korea	12,641,633	4,146,513	5,542,030
Thailand	13,290,824	2,164,527	5,088,892
Vietnam	6,293,629	2,742,995	4,686,093
Portugal	4,365,794	1,958,593	3,877,221

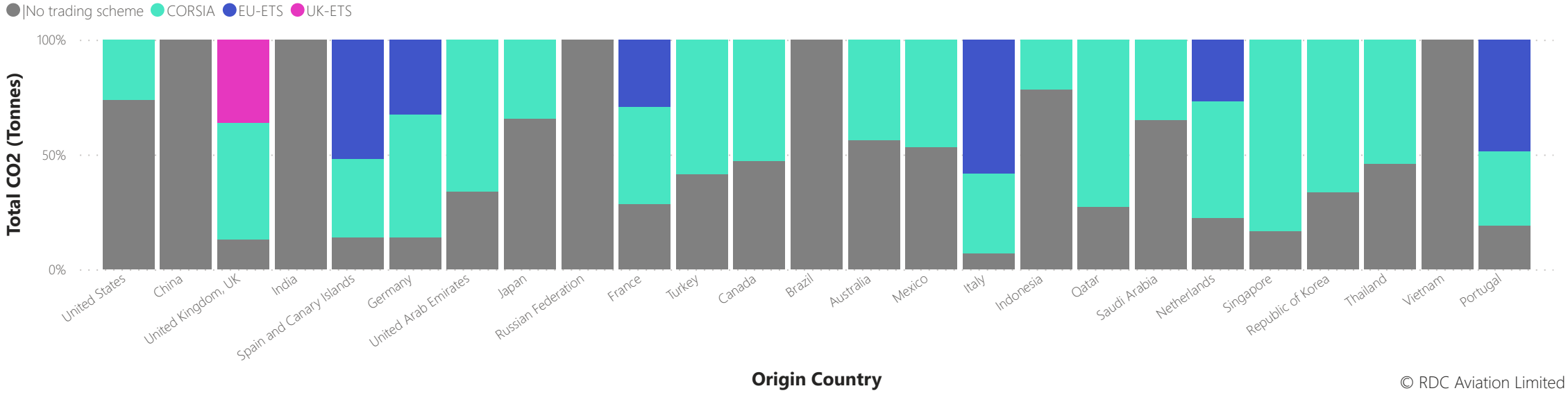
Change in Emissions - Current month vs prior years

This YTD vs Last YTD	This YTD vs YTD 2019
27%	-17%
-14%	-33%
160%	-29%
46%	-12%
91%	-17%
89%	-32%
75%	-29%
42%	-48%
-5%	-25%
70%	-26%
50%	-5%
125%	-30%
49%	-20%
101%	-42%
25%	-4%
107%	-29%
46%	-34%
38%	-12%
83%	-15%
42%	-25%
134%	-46%
34%	-56%
135%	-62%
71%	-26%
98%	-11%

Percent of Emissions covered by Compliance Programmes

YTD 2019 Trading scheme %	YTD Last Year Trading scheme %	YTD This Year Trading scheme %
-	17.91%	26.28%
-	-	-
31.23%	84.54%	87.00%
-	-	-
46.58%	86.57%	86.12%
30.46%	84.74%	86.07%
-	61.64%	66.01%
-	33.71%	34.23%
-	-	-
24.84%	68.52%	71.53%
-	48.90%	58.47%
-	41.39%	52.77%
-	-	-
-	31.70%	43.76%
-	44.24%	46.83%
43.87%	94.14%	92.93%
-	9.88%	21.66%
-	71.27%	72.72%
-	17.19%	34.97%
21.40%	73.90%	77.75%
-	87.15%	83.31%
-	57.84%	66.49%
-	51.34%	53.89%
-	-	-
45.60%	81.76%	80.95%

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



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RDC CARE Index by carrier and home continent - November 22

Top 25 European Carriers

Carrier Name	CARE Index
Novair	7.6
TUIfly Nordic	7.6
PLAY	7.4
World 2 Fly	7.4
Jonair	7.3
French Bee	7.2
SmartLynx Airlines Estonia	7.2
TUI Airways	7.1
La Compagnie	7.0
Norse Atlantic Airways	7.0
SmartLynx Airlines	6.9
Flyr	6.9
Wizz Air UK	6.7
SmartWings	6.7
Freebird Airlines	6.7
Corendon Dutch Airlines	6.7
Georgian Airways	6.7
Iberojet	6.7
Sunclass Airlines	6.6
SunExpress	6.6
Sundair	6.6
TUIfly Deutschland	6.5
Azores Airlines	6.5
Fly One	6.4
Corendon Airlines	6.4
Corendon Airlines Europe	6.4

Top 25 North American Carriers

Carrier Name	CARE Index
Volaris	7.0
Lynx Air	6.9
Swoop	6.9
Flair Airlines	6.8
Air Transat	6.8
Frontier Airlines	6.7
Sunwing Airlines	6.7
Sun Country	6.0
WestJet	6.0
Aeromexico	5.8
Spirit Airlines	5.6
VivaAerobus	5.5
Air Saint-Pierre	5.3
ConocoPhillips Alaska Inc	5.2
Allegiant Air	5.2
American Airlines	5.1
Avelo Air	5.1
Delta Air Lines	5.1
Alaska Airlines	5.0
United Airlines	5.0
Breeze Airways	4.9
Aeromar	4.9
JetBlue	4.7
Air Canada	4.3
Nolinor Aviation	4.3
Porter Airlines	4.1

Top 25 Asian Carriers

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

Top 25 RoW Carriers

Carrier Name	CARE Index
Arajet	7.2
Flynas	6.6
Wizz Air Abu Dhabi	6.5
SalamAir	6.5
Air Tahiti Nui	6.4
flydubai	6.3
El Al	6.3
Syrian Air	6.2
Arkia Israel Airlines	6.2
LATAM Paraquay	6.0
Sudan Airways	6.0
OYA International Airline	6.0
Tarco Aviation	5.9
Badr Airlines	5.9
Nouvelair Tunisie	5.9
UR Airlines	5.9
Flybondi	5.9
JetSmart Airlines S.A.	5.9
Jazeera Airways	5.8
Copa Airlines	5.8
Air Arabia	5.8
Nesma Airlines	5.7
Sky Prime Aviation Services	5.7
Air Arabia Abu Dhabi	5.7
Air Cairo	5.6
JetSmart	5.6

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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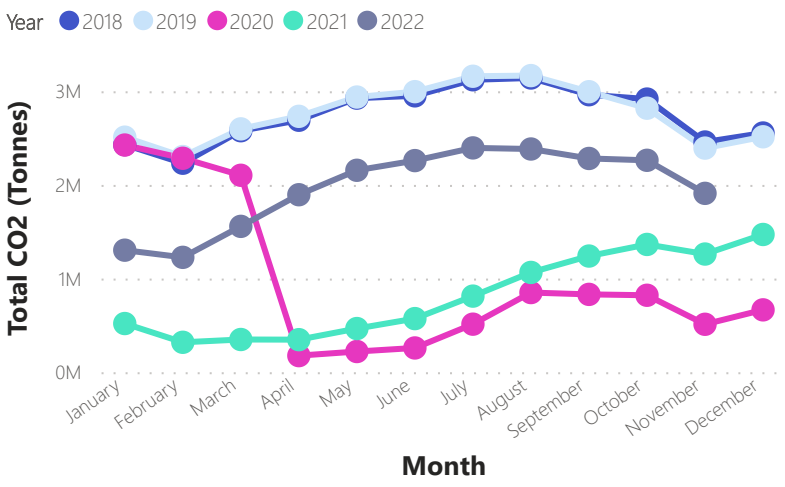
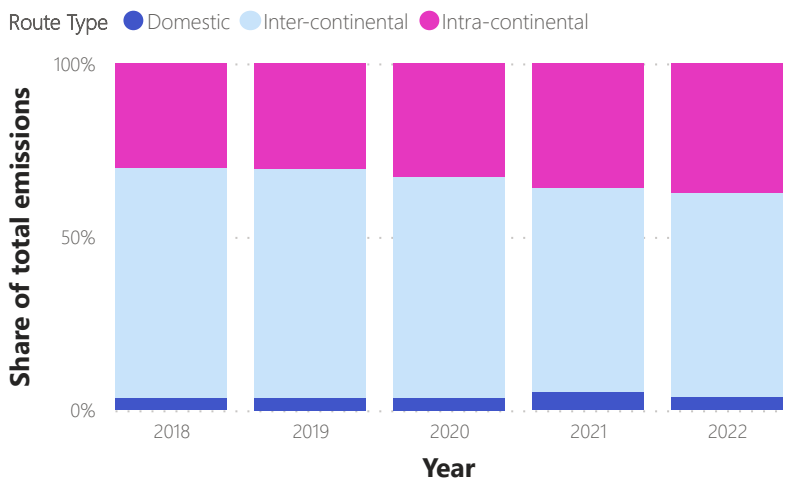
This month's focus country: United Kingdom, UK

Total CO2 (Tonnes) by Month and Year



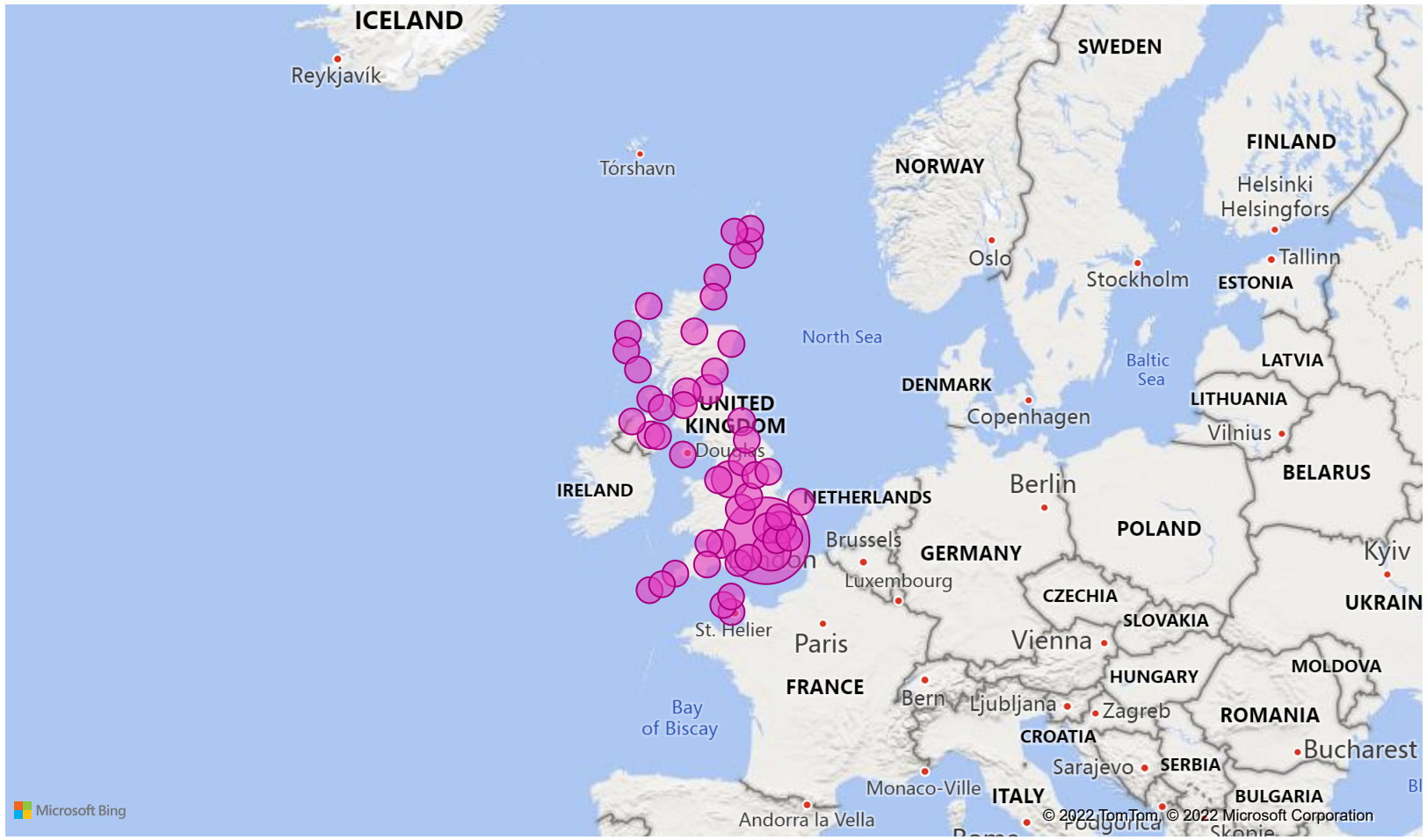
CO2 by Year and Route Type



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

Destination Country	Emissions per ASK (g)	Total CO2 (Tonnes)
Greece	54.10	747,547
Turkey	56.07	789,159
Spain and Canary Islands	57.05	2,435,605
Portugal	57.60	510,410
Italy	61.08	628,506
Germany	69.87	327,553
France	70.90	311,539
United States	76.23	5,585,961
Ireland	82.72	255,212
United Kingdom, UK	91.76	871,955

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)
British Airways	78.92	5,373,161
easyJet	63.86	2,171,582
Ryanair	59.36	1,669,395
Virgin Atlantic Airways	65.01	1,329,638
Jet2	55.03	1,197,374
American Airlines	80.75	1,128,984
TUI Airways	54.34	1,097,084
Emirates	75.04	1,029,075
United Airlines	74.38	763,541
Singapore Airlines	94.63	538,956

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

Carrier Name	Aircraft	Origin	Destination	CARE Index
TUI Airways	B737 MAX 8	BHX	ACE	7.7
TUI Airways	B737 MAX 8	GLA	ACE	7.7
TUI Airways	B737 MAX 8	MAN	ACE	7.7
TUI Airways	B737 MAX 8	NCL	ACE	7.7
SunExpress	B737 MAX 8	BHX	AYT	7.7
SunExpress	B737 MAX 8	EDI	AYT	7.7
SunExpress	B737 MAX 8	LGW	AYT	7.7
TUI Airways	B737 MAX 8	LGW	AYT	7.7
SunExpress	B737 MAX 8	MAN	AYT	7.7
World2Fly	A350-900	CWL	DIA	7.7
TUI Airways	B737 MAX 8	BHX	FUE	7.7

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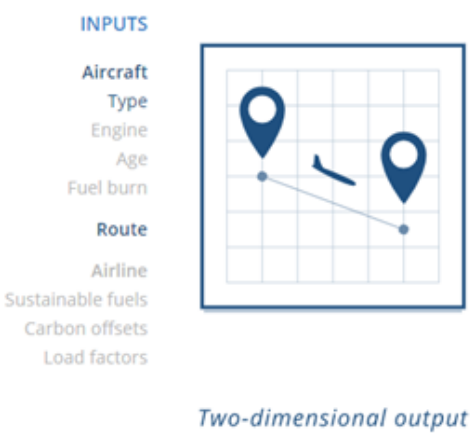
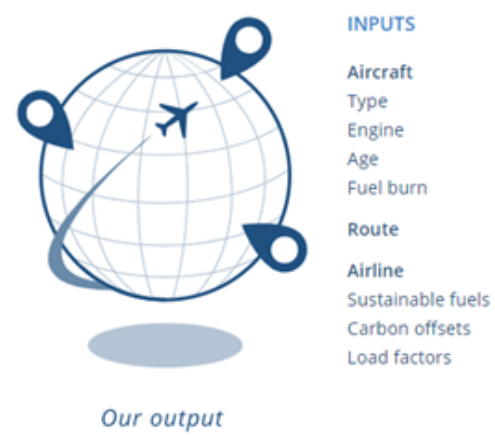
RDC is a UK-based data and technology provider to the international air transport industry. The company has over 300 clients of its **Apex** and **AirportCharges.com** products, which provide market intelligence to operators of aircraft and airports, as well as investors, OEMs and regulators.

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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