



CIRIUM

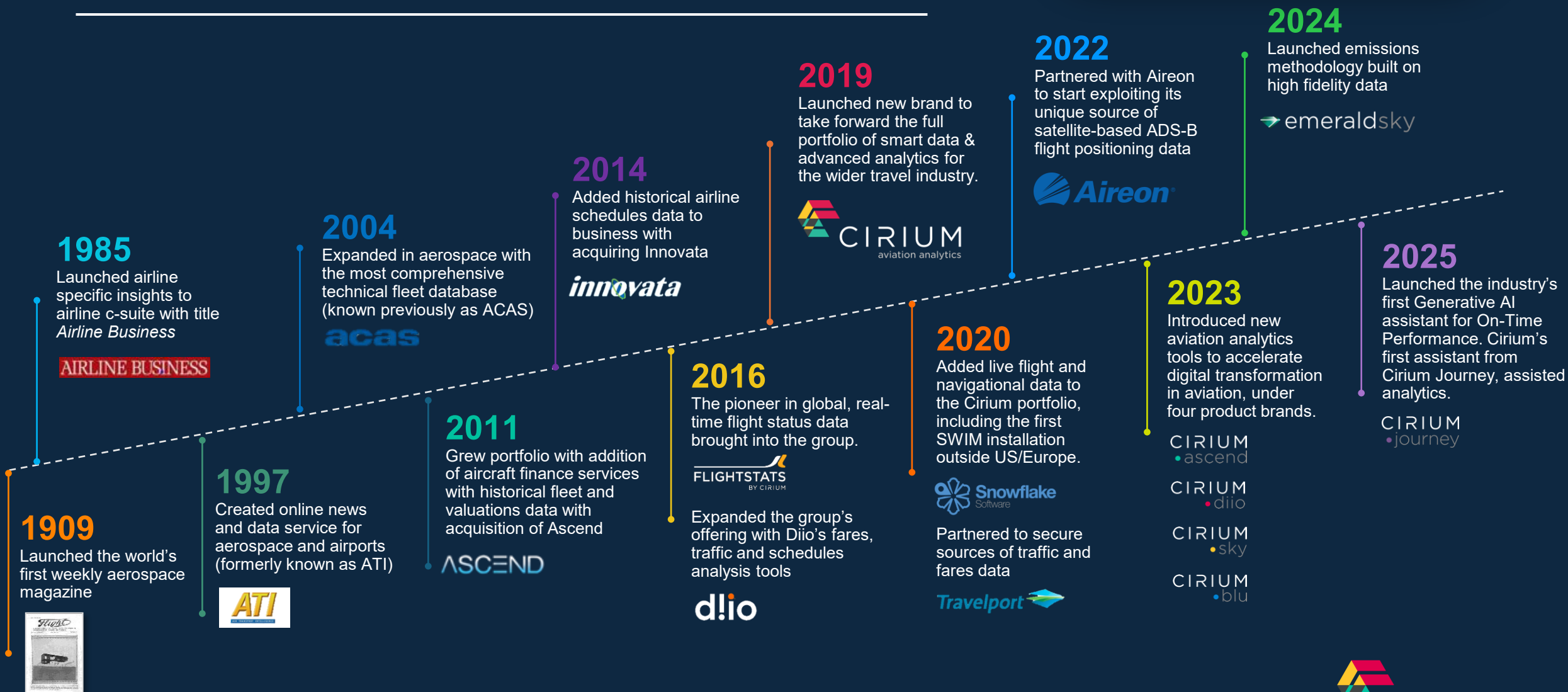
Sustainability: Leveraging Analytics To Drive Down Aircraft Emissions

Andrew Doyle, Senior Director Market Development

OVER A CENTURY OF PIONEERING AND STILL A LEADER IN INNOVATION

inter airport
FOCUS
CONFERENCE

inter
airport
europe  25TH
EDITION



 CIRIUM

OUR DATA & ANALYTICS SERVE EVERY PART OF THE WORLD AVIATION INDUSTRY

Aerospace

Fleets, aircraft utilisation & airline data for OEMs & the aftermarket



Finance

Lessors, investors, banks & insurers taking fleets, values & airline data



Airline Commercial & Operations

Airlines

Fleet, network & price planning and operational efficiency



Airports

Air service marketing benchmarking, operational planning & charging



Air Navigation

Fleet, flight & schedules data for players in air navigation services



Government

Departments of transport, travel, air safety & border security



Travel

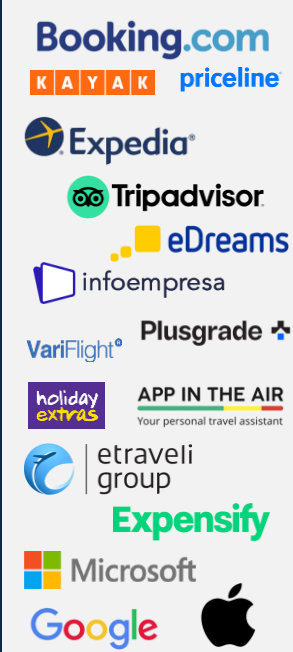
Travel

Trip monitoring for corporate travel and traffic analytics for tourist boards



Online

Schedules, status & cabin data for online travel and tech services



Better Performance. Lower Emissions.

We are here to help us all fly sustainably.

Cirium EmeraldSky is empowering the aviation industry to accurately measure and monitor CO₂ emissions.

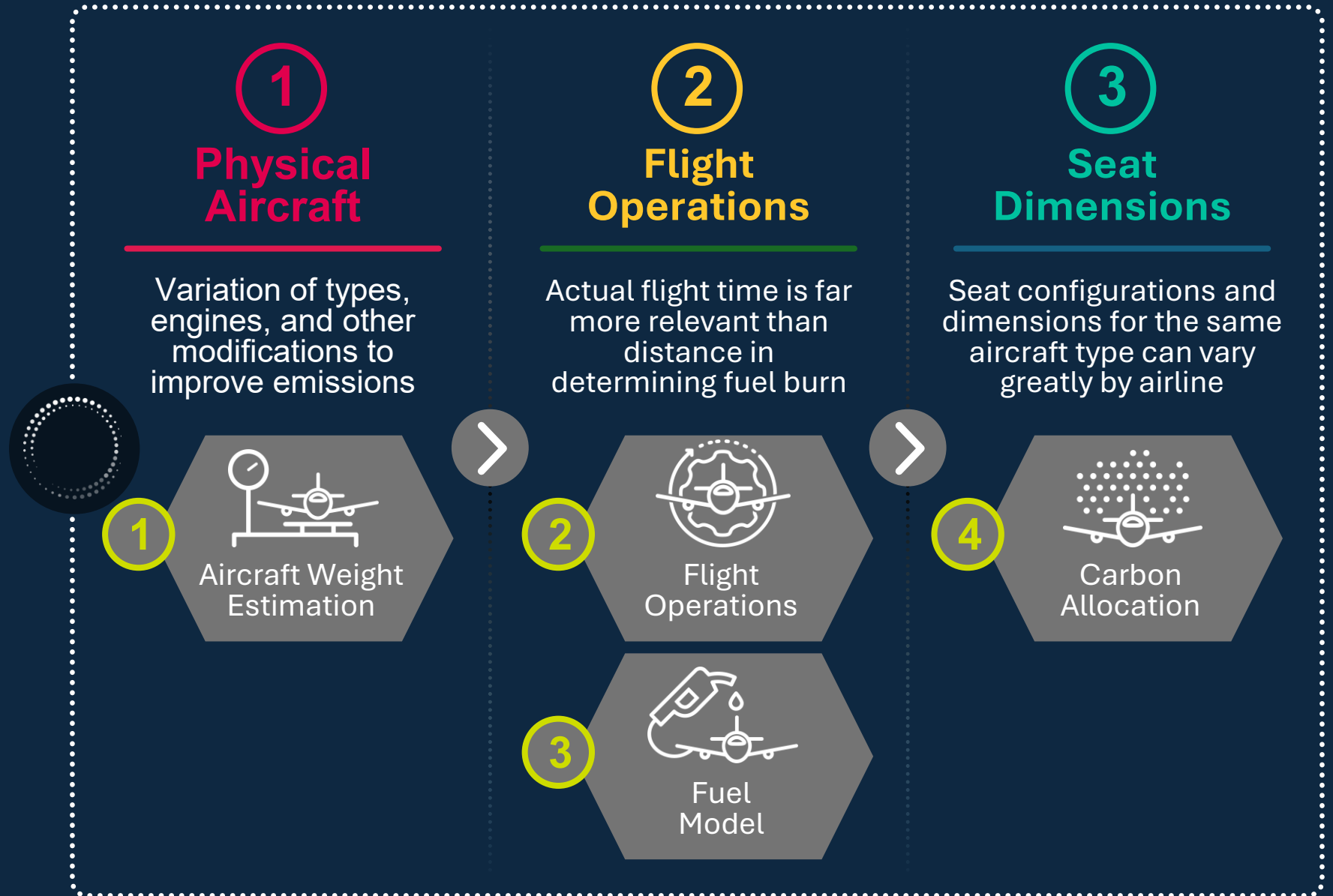


cirium.com/emeraldsky

emerald
→ sky

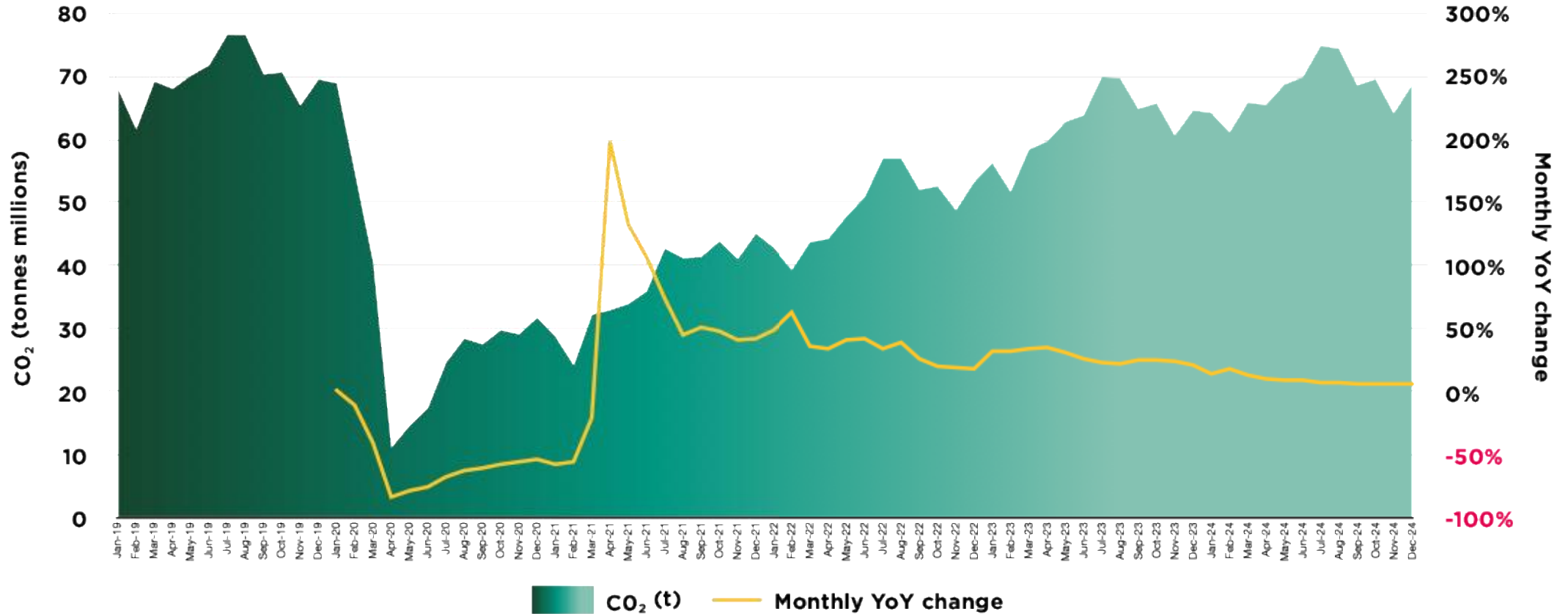
We've taken a **data-driven approach** to **emissions calculations**

Working with airlines, manufacturers and industry organizations on a more accurate approach.



GLOBAL CO₂ EMISSIONS

FROM PASSENGER FLIGHTS (2019-2024)



Global trend

Global monthly passenger CO₂ peaked in July 2019 prior to the dramatic pandemic-induced decline in operations experienced from early 2020. Flight activity progressively recovered to exceed 2019 levels, but July 2024 emissions remained approximately 2.4% below 2019's peak.

This translated to a
6% reduction
in average passenger CO₂/ASK
over the five-year period.



MAJOR AIRLINES

Ranked by Lowest CO₂/ASK

Rank	Operator (group)	Country	CO ₂ /ASK (g)		CO ₂ Emissions (mt)	Flights (thousands)		Avg. Seats	Weighted Avg. Age (y)	Avg. Flight Distance (km)
			2024	% change vs 23	2024	2024	% change vs 23	2024	2024	2024
1	Wizz Air	Hungary	53.9	+0.0%	5.9	314	+4.0%	222	5.1	1,551
2	Frontier Airlines	USA	54.4	-1.0%	3.5	219	+13.8%	204	4.5	1,432
3	Pegasus	Turkiye	57.1	-2.5%	3.3	204	+9.9%	209	4.5	1,362
4	Volaris	Mexico	57.9	+1.6%	3.0	166	-14.5%	196	6.9	1,578
5	IndiGo	India	58.2	+1.6%	8.8	747	+9.2%	181	4.1	1,036
6	Jetstar	Australia	58.4	-0.9%	2.9	125	+12.5%	199	11.4	1,745
7	Spirit Airlines	USA	58.4	-2.0%	5.1	289	-3.3%	192	6.3	1,560
8	Scoot	Singapore	58.7	+0.9%	2.2	59	+8.9%	245	7.4	2,275
9	SunExpress	Turkiye	59.4	+1.1%	2.1	94	+17.3%	189	10.3	1,981
10	Air India Express	India	60.5	+1.0%	1.8	93	+150.7%	180	6.9	1,779
11	Viva	Mexico	60.7	+5.1%	2.3	161	+13.9%	200	8.7	1,165
12	VietJet Air	Vietnam	60.8	-0.2%	3.2	138	+3.2%	225	7.9	1,607
13	Transavia	Netherlands	61.3	-0.7%	2.8	147	+6.8%	189	11.5	1,637
14	Flynas	Saudi Arabia	61.5	-1.6%	1.5	99	+25.2%	177	3.1	1,314
15	Air Transat	Canada	61.5	+1.9%	1.6	27	+4.9%	239	10.4	3,887
16	Aegean Airlines	Greece	61.7	+1.1%	1.3	95	+5.9%	185	9.7	1,143
17	Flydubai	UAE	61.7	+0.5%	2.7	120	+10.4%	172	4.9	2,174
18	Cebu Pacific	Philippines	62.4	+4.1%	1.9	121	+15.8%	217	6.2	984
19	Lion Air	Indonesia	62.6	-4.5%	1.6	100	-17.0%	215	12.3	1,002
20	Ryanair	Ireland	63.0	-1.9%	13.7	905	+7.8%	191	9.1	1,250
	Global:		74.8	0.0%	815.6	34,964	+5.5%	168	11.1	1,527

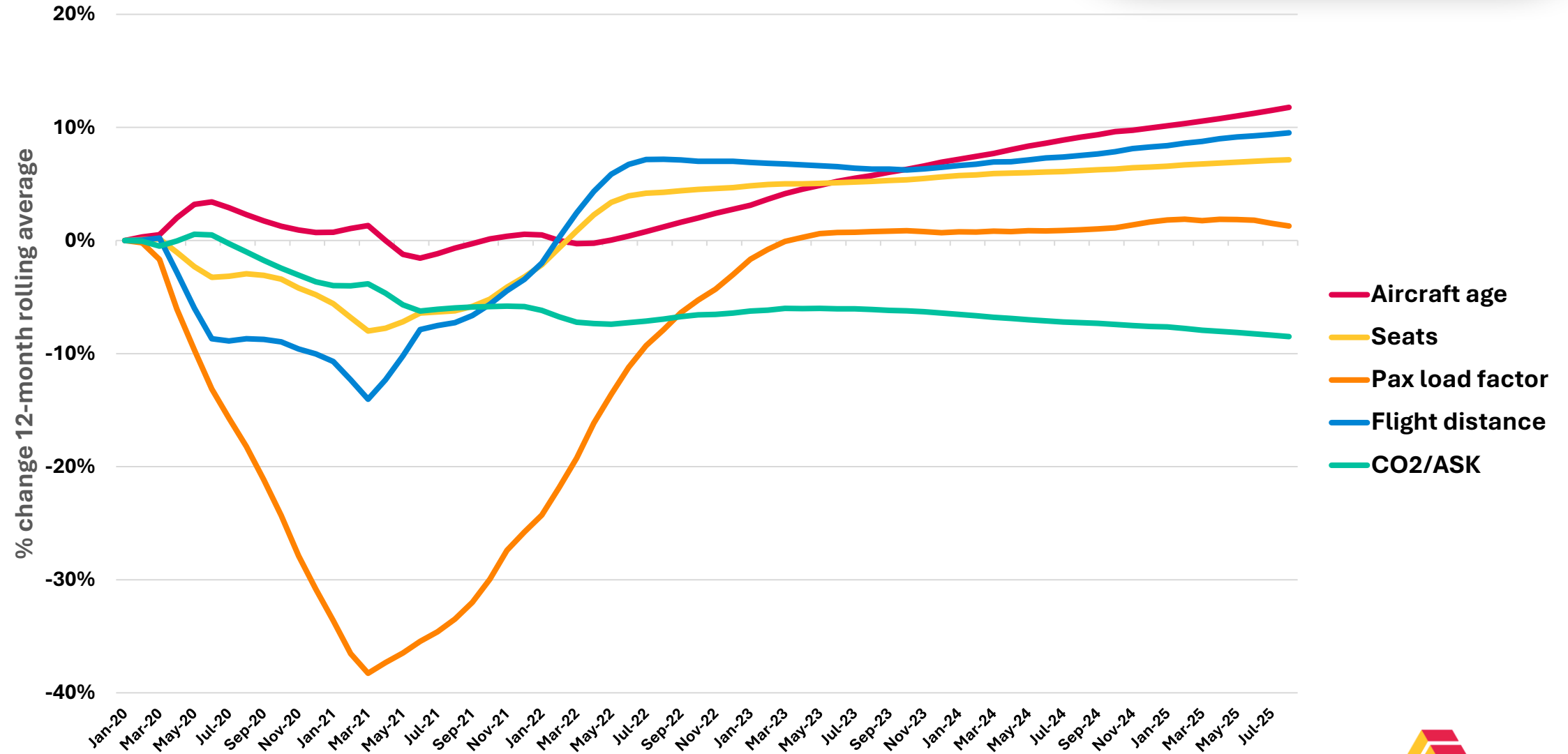
LONG-HAUL ROUTES

Rank	Operator, route	CO ₂ /ASK (g)		CO ₂ Emissions (kt)	Flights		Avg. Seats	Weighted Avg. Age (y)	Avg. Flight Distance (km)	Equipment trend
		% change vs 23	2024	2024	2024	% change vs 23	2024	2024	2024	
1	LATAM Airlines Peru, LIM - MEX	-27.5%	51.7	13.8	360	-1.1%	174	6.4	4,246	767-300s to A320neos
2	British Airways, LHR - PHL	-21.5%	82.4	53.4	361	+4.0%	315	6.7	5,690	777s to A350-1000s
3	Jetstar, BNE - DPS	-20.2%	47.1	25.5	508	+39.6%	238	1.3	4,488	787-8s to A321neos
4	SriLankan Airlines, CMB - KWI	-20.1%	56.9	14.7	333	-2.6%	187	7.3	4,143	A330-200s to A321neos
5	United Airlines, LAX - BOS	-16.9%	59.2	35.0	792	+10.3%	178	12.4	4,192	757-200s to 737 Max 9s
6	United Airlines, EWR - FRA	-16.9%	64.3	48.7	404	-41.6%	302	5.9	6,211	767s & 777s to 787-10s
7	Turkish Airlines, ISL - BOG	-15.4%	74.8	90.5	364	-0.3%	310	4.7	10,729	777-300ERs to 787-9s
8	United Airlines, SFO - BOS	-15.4%	58.9	73.7	1,618	-11.4%	178	12.5	4,341	757-200s to 737 Max 9s
9	Etihad Airways, AUH - IAD	-14.9%	79.1	92.2	363	0.0%	282	3.3	11,386	226-seat 787-9s to 290-seat 787-9s
10	Thai Airways Int., BKK - SYD	-14.6%	66.1	104.3	641	+75.1%	327	7.2	7,515	777-300ERs to A350-900s
All long haul:		+0.1%	79.8	230,850	1,433,337	+14.6%				

WESTERN EUROPE REGION

Rank	Operator (group)	CO ₂ /ASK (g)		CO ₂ Emissions (mt)	Flights (thousands)		Avg. Seats	Weighted Avg. Age (y)	Avg. Flight Distance (km)
		2024	% change vs 23	2024	2024	% change vs 23	2024	2024	2024
1	Wizz Air	54.0	-1.9%	3.6	205	+4.3%	223	4.8	1,456
2	Azores Airlines	61.4	-2.9%	0.1	8	+22.5%	177	11.6	1,577
3	Aegean Airlines	61.6	+1.2%	1.1	84	+6.3%	185	9.7	1,134
4	Transavia	62.1	-1.3%	1.9	107	+5.1%	189	12.0	1,500
5	Ryanair	63.2	-1.9%	12.6	841	+6.5%	191	9.2	1,237
6	Buzz	63.4	-0.1%	2.0	129	+14.9%	190	7.9	1,296
7	TAP Air Portugal	63.7	+1.2%	1.1	63	-2.4%	182	12.5	1,439
8	Norwegian	64.6	-1.3%	1.1	83	+2.0%	187	9.9	1,107
9	Finnair	65.9	-0.1%	0.9	46	+13.1%	192	15.7	1,529
10	SAS	66.9	-5.7%	1.2	146	-11.0%	141	8.5	783
	All Western Europe:	67.3	-1.3%	71	5,720	+5.6%	163	11.5	1,048

INTRA-EUROPE CO₂/ASK IS DOWN 8.5% SINCE 2019



FULL FLIGHT EMISSIONS – MOST IMPROVED AIRPORTS (INTRA-WESTERN EUROPE FLIGHTS, JAN-AUG 2025)

Airport	Change CO2/ASK vs. 2024	Flights ('000s)	Avg. seats	Total seats (millions)	Avg. taxi out minutes	Avg. air minutes	Avg. flight dist. (km)	Avg. AC age (flight weighted)	Avg. pax load factor	CO2 ('000s of tonnes)	Available seat km (billions)	Avg. CO2/ASK (g)
London City	-5.9%	15.2	106	1.6	10	72	720	11.9	82.6%	120	1.18	102.3
Warsaw	-5.3%	49.7	145	7.2	14	94	1,025	11.5	82.7%	586	8.51	68.9
Liverpool	-4.3%	11.3	182	2.1	12	119	1,383	10.8	89.9%	179	2.94	61.1
Sofia	-4.1%	16.2	175	2.8	12	119	1,311	8.4	86.0%	248	3.84	64.6
Vilnius	-4.0%	10.9	154	1.7	10	106	1,134	9.5	83.5%	138	2.08	66.7
Amsterdam	-3.9%	123.3	152	18.8	14	85	945	11.6	86.7%	1,354	19.20	70.5
Tromsø	-3.4%	12.4	105	1.3	10	76	771	18.4	77.3%	92	1.43	64.3
Eindhoven	-3.3%	12.1	196	2.4	9	114	1,372	11.2	90.1%	190	3.26	58.3
Dublin	-3.2%	68.2	170	11.6	15	97	1,061	11.4	86.4%	864	13.00	66.5
Milan Malpensa	-3.1%	47.3	184	8.7	15	92	987	10.4	85.9%	599	8.79	68.1
Venice	-3.1%	22.7	174	3.9	13	88	900	12.0	85.8%	268	3.64	73.6
Stuttgart	-3.0%	18.6	157	2.9	10	87	951	13.6	83.3%	215	3.00	71.6
Edinburgh	-2.9%	35.1	166	5.8	13	98	1,054	11.0	85.4%	438	6.67	65.8
Kraków	-2.8%	24.7	181	4.5	12	107	1,183	8.7	89.5%	348	5.51	63.2
Belfast	-2.6%	14.9	178	2.7	11	88	962	12.9	89.4%	179	2.60	69.1
Zagreb	-2.5%	12.2	143	1.7	11	79	806	15.1	77.9%	118	1.51	78.2
Glasgow	-2.5%	19.3	152	2.9	12	92	973	12.3	82.9%	222	3.25	68.3
Lanzarote	-2.3%	23.4	151	3.5	10	146	1,754	8.7	85.3%	422	7.67	55.0
Cologne	-2.2%	16.2	177	2.9	11	103	1,144	13.1	85.7%	225	3.36	66.9
Athens	-2.1%	70.2	155	10.9	15	94	1,010	8.8	82.0%	816	12.88	63.4

FULL FLIGHT EMISSIONS – MOST IMPROVED AIRPORTS (ALL WESTERN EUROPE DEPARTURES, JAN-AUG 2025)

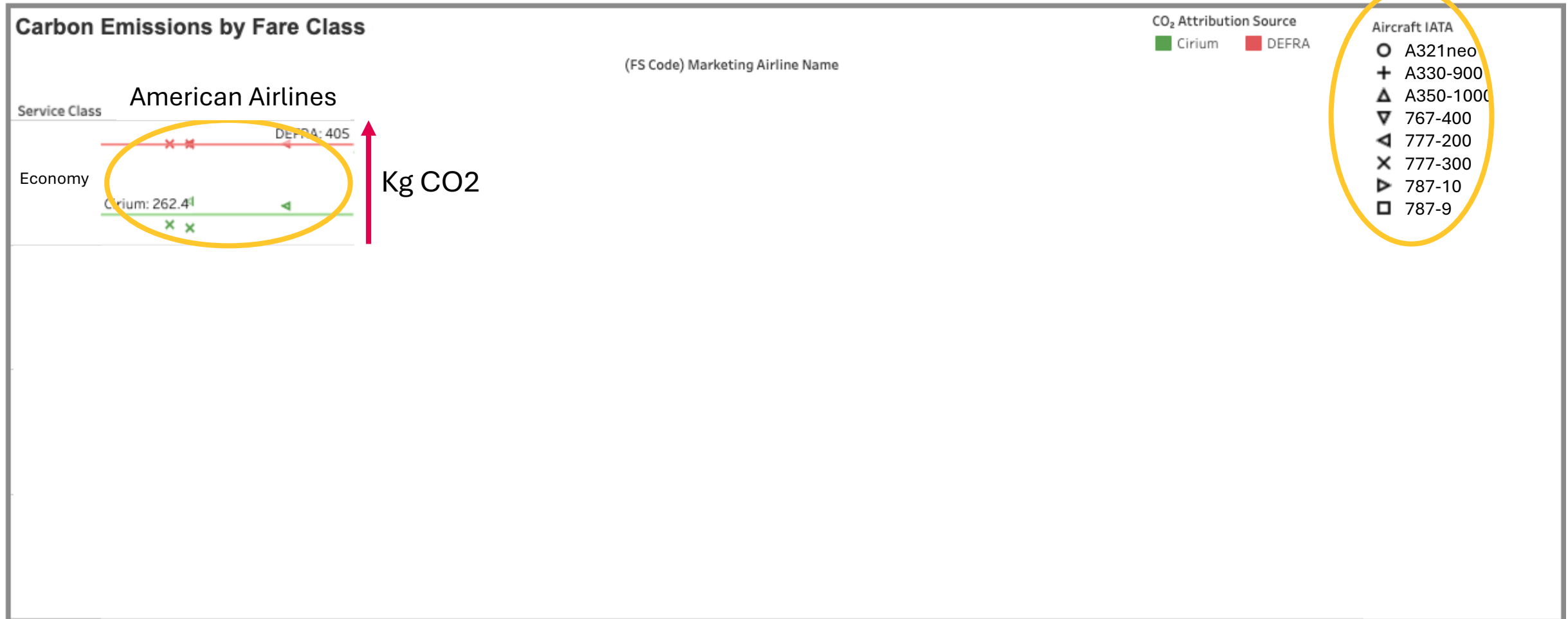
Airport	Change CO2/ASK vs. 2024	Flights ('000s)	Avg. seats	Total seats (millions)	Avg. taxi out minutes	Avg. air minutes	Avg. flight dist. (km)	Avg. AC age (flight weighted)	Avg. pax load factor	CO2 ('000s of tonnes)	Available seat km (billions)	Avg. CO2/ASK (g)
London City	-5.8%	15.8	105	1.7	10	72	705	11.7	81.7%	122	1.19	102.2
Stuttgart	-4.0%	25.1	165	4.1	10	106	1,214	13.2	82.4%	350	5.38	65.1
Sofia	-3.7%	19.5	174	3.4	12	120	1,329	9.2	84.9%	307	4.68	65.5
Warsaw	-3.0%	62.9	157	9.9	14	129	1,495	11.4	82.2%	1,279	18.38	69.6
Cologne	-2.8%	22.9	181	4.2	12	126	1,498	12.3	84.6%	389	6.39	60.9
Kraków	-2.4%	27.5	181	5.0	12	117	1,324	8.7	88.8%	428	6.84	62.6
Edinburgh	-2.4%	39.7	171	6.8	13	125	1,423	11.1	85.2%	740	10.97	67.5
Bari	-2.3%	16.8	184	3.1	11	84	883	10.2	88.2%	192	2.74	70.2
Seville	-2.2%	20.0	181	3.6	12	105	1,186	11.4	89.2%	283	4.44	63.8
Lanzarote	-2.2%	23.5	151	3.6	10	146	1,745	8.7	85.3%	423	7.69	55.1
Belfast	-2.2%	15.4	179	2.7	11	93	1,032	12.8	89.4%	196	2.89	67.7
Malta	-2.1%	20.9	189	4.0	9	132	1,525	8.7	85.5%	368	6.10	60.3
Paris Orly	-2.0%	72.4	195	14.1	13	139	1,676	11.2	84.9%	1,866	29.75	62.7
Brussels South	-2.0%	22.0	194	4.3	11	116	1,342	9.6	91.7%	347	5.75	60.3
Berlin	-2.0%	57.7	179	10.4	12	115	1,325	11.5	85.1%	980	14.65	66.9
Bristol	-1.9%	24.4	178	4.3	11	123	1,417	9.4	88.8%	384	6.48	59.3
Glasgow	-1.9%	21.1	159	3.4	12	107	1,199	12.0	83.1%	342	5.02	68.0
Geneva	-1.8%	45.9	174	8.0	12	112	1,268	10.7	84.8%	859	11.44	75.1
Lyon St Exupéry	-1.8%	28.5	158	4.5	12	97	1,067	13.2	83.8%	399	5.47	73.0
Toulouse	-1.8%	19.1	165	3.2	11	86	902	13.6	86.4%	232	3.00	77.5

NORTH ATLANTIC

Rank	Operator (group)	CO ₂ /ASK (g)				CO ₂ Emissions (mt)	Flights (thousands)		Avg. Seats	Weighted Avg. Age (y)	Avg. Flight Distance (km)
		2024	% change vs 23	Westbound	Eastbound	2024	2024	% change vs 23	2024	2024	2024
1	French Bee	55.0	+4.7%	58.3	51.6	0.3	1.6	+0.9%	411	6.3	7,384
2	Azores Airlines	56.3	-5.7%	60.8	51.8	0.1	2.4	+24.4%	195	5.1	4,180
3	Norse Atlantic Airways	60.1	+0.9%	63.9	56.3	0.6	4.5	+22.4%	339	5.9	6,900
4	WestJet	60.5	-2.4%	62.6	58.5	0.4	3.6	+56.7%	268	4.2	6,442
5	TAP Air Portugal	65.6	+1.0%	71.1	60.1	0.7	8.7	+11.0%	211	4.3	5,855
6	Air Tahiti Nui	67.3	+2.5%	70.2	64.4	0.1	0.6	+5.7%	294	5.3	8,772
7	Aer Lingus	67.6	+1.1%	72.6	62.6	1.2	12.5	+3.3%	254	9.2	5,723
8	JetBlue	68.3	-1.1%	73.2	63.4	0.4	7.2	+62.4%	143	1.6	5,488
9	Air Canada	70.1	+0.5%	74.2	66.0	3.3	24.0	+6.9%	323	13.0	6,105
10	LOT Polish Airlines	71.5	+1.2%	75.7	67.3	0.6	4.2	-3.3%	273	8.0	7,419
	All North Atlantic:	78.8	+0.2%	83.8	73.7	57	384.3	+6.3%	275	12.8	6,715

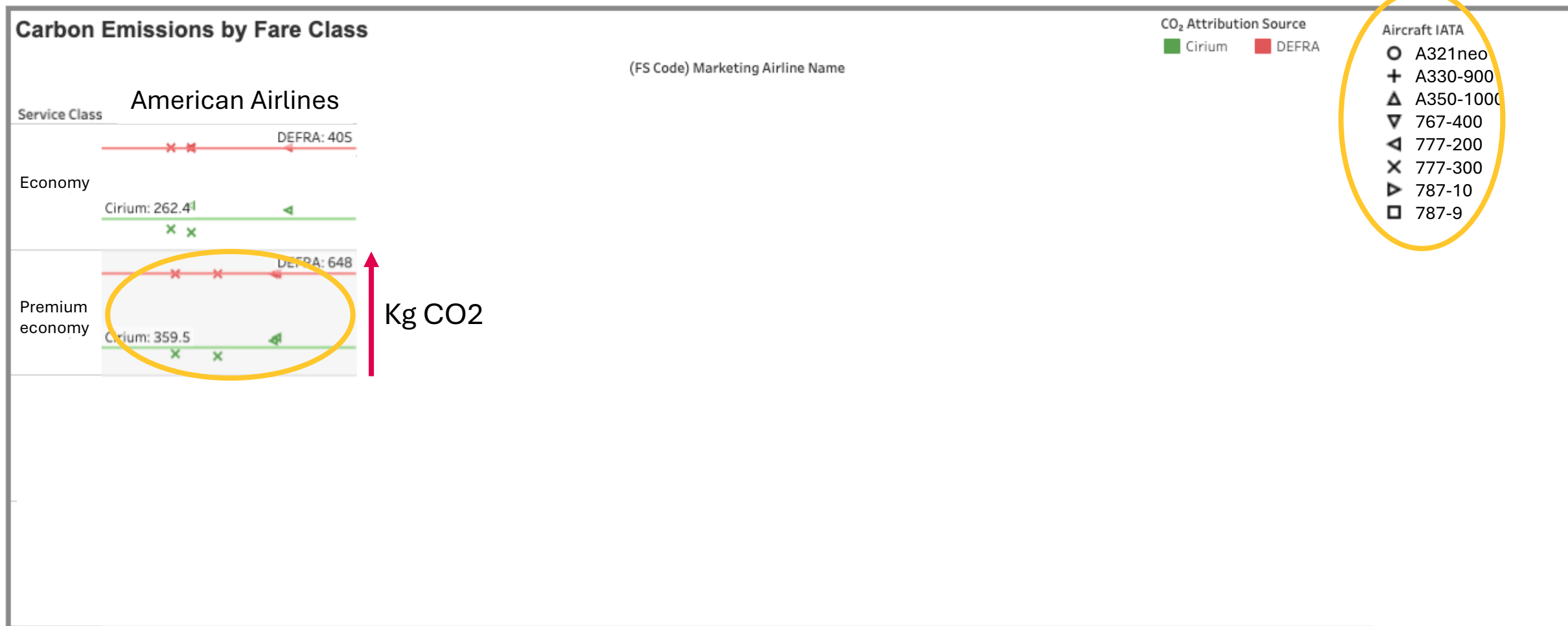
LONDON HEATHROW TO NEW YORK JFK ROUTE

Cirium data shows true comparisons between airlines & cabin classes vs. DEFRA



LONDON HEATHROW TO NEW YORK JFK ROUTE

Cirium data shows true comparisons between airlines & cabin classes vs. DEFRA



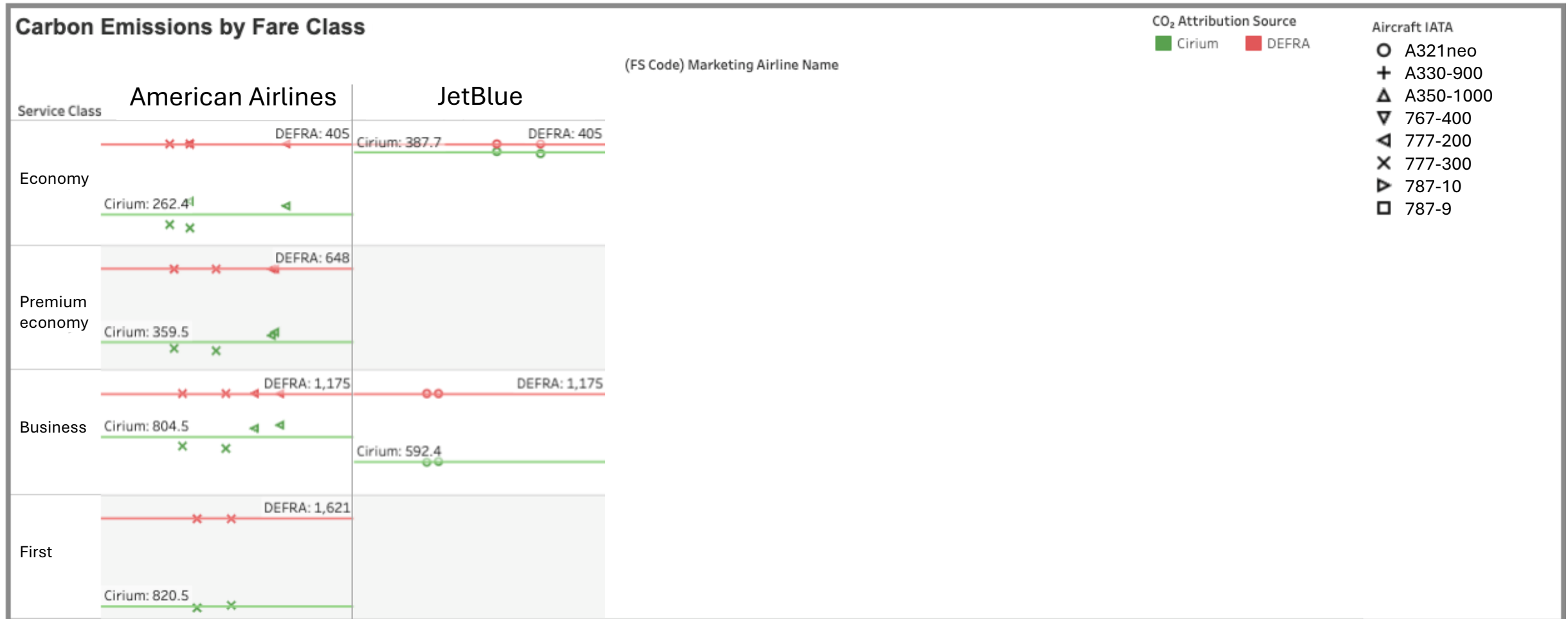
LONDON HEATHROW TO NEW YORK JFK ROUTE

Cirium data shows true comparisons between airlines & cabin classes vs. DEFRA



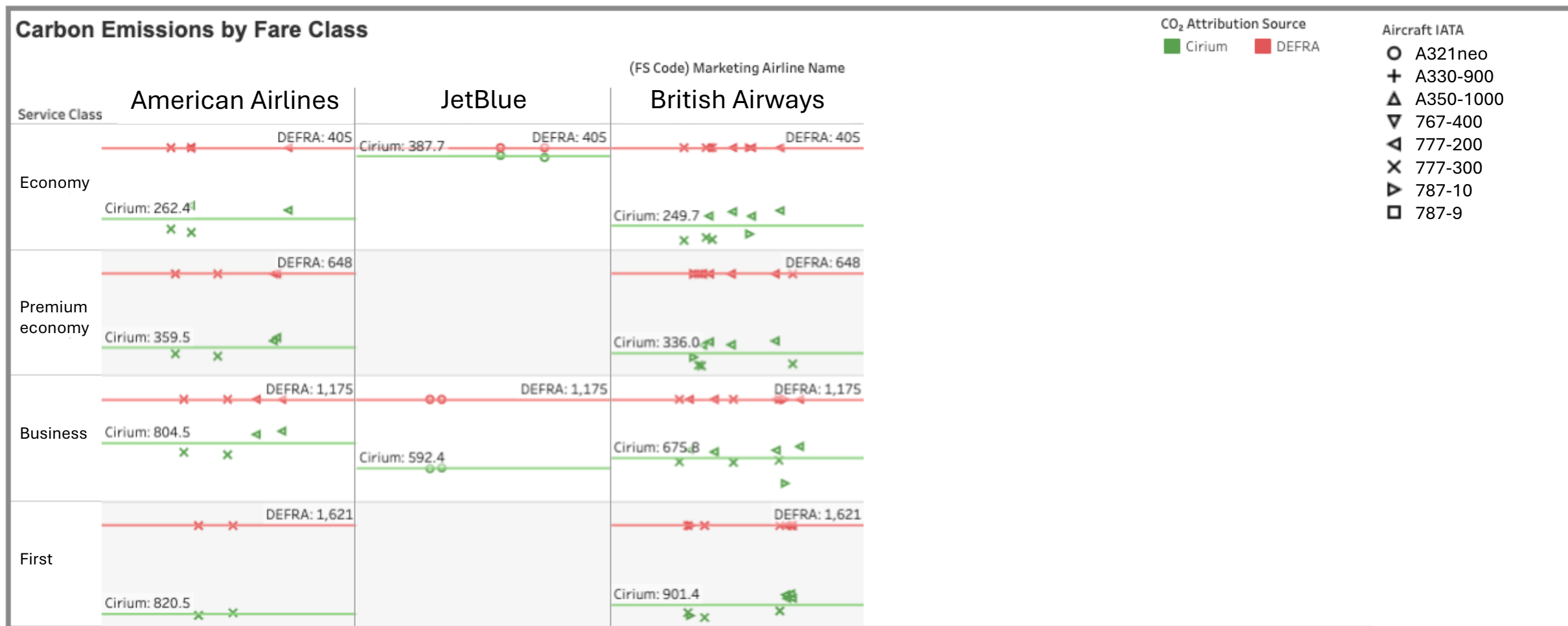
LONDON HEATHROW TO NEW YORK JFK ROUTE

Cirium data shows true comparisons between airlines & cabin classes vs. DEFRA



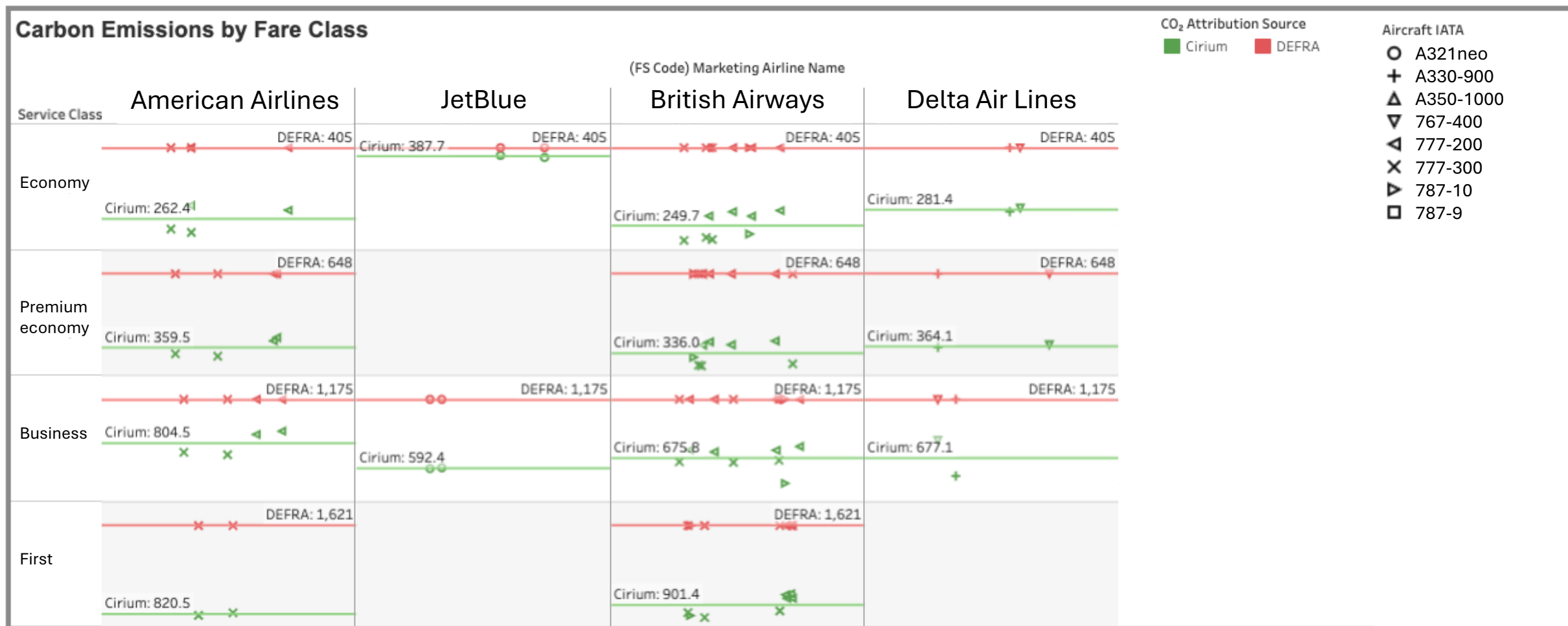
LONDON HEATHROW TO NEW YORK JFK ROUTE

Cirium data shows true comparisons between airlines & cabin classes vs. DEFRA



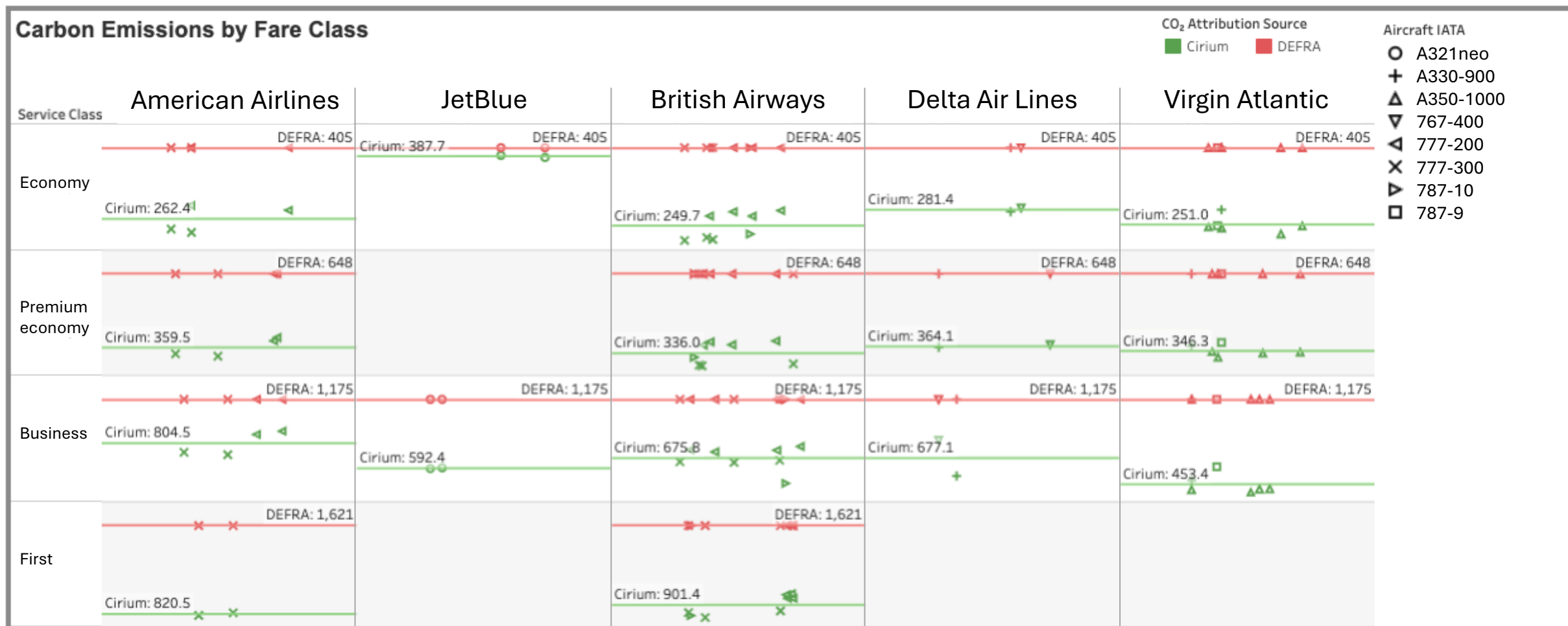
LONDON HEATHROW TO NEW YORK JFK ROUTE

Cirium data shows true comparisons between airlines & cabin classes vs. DEFRA

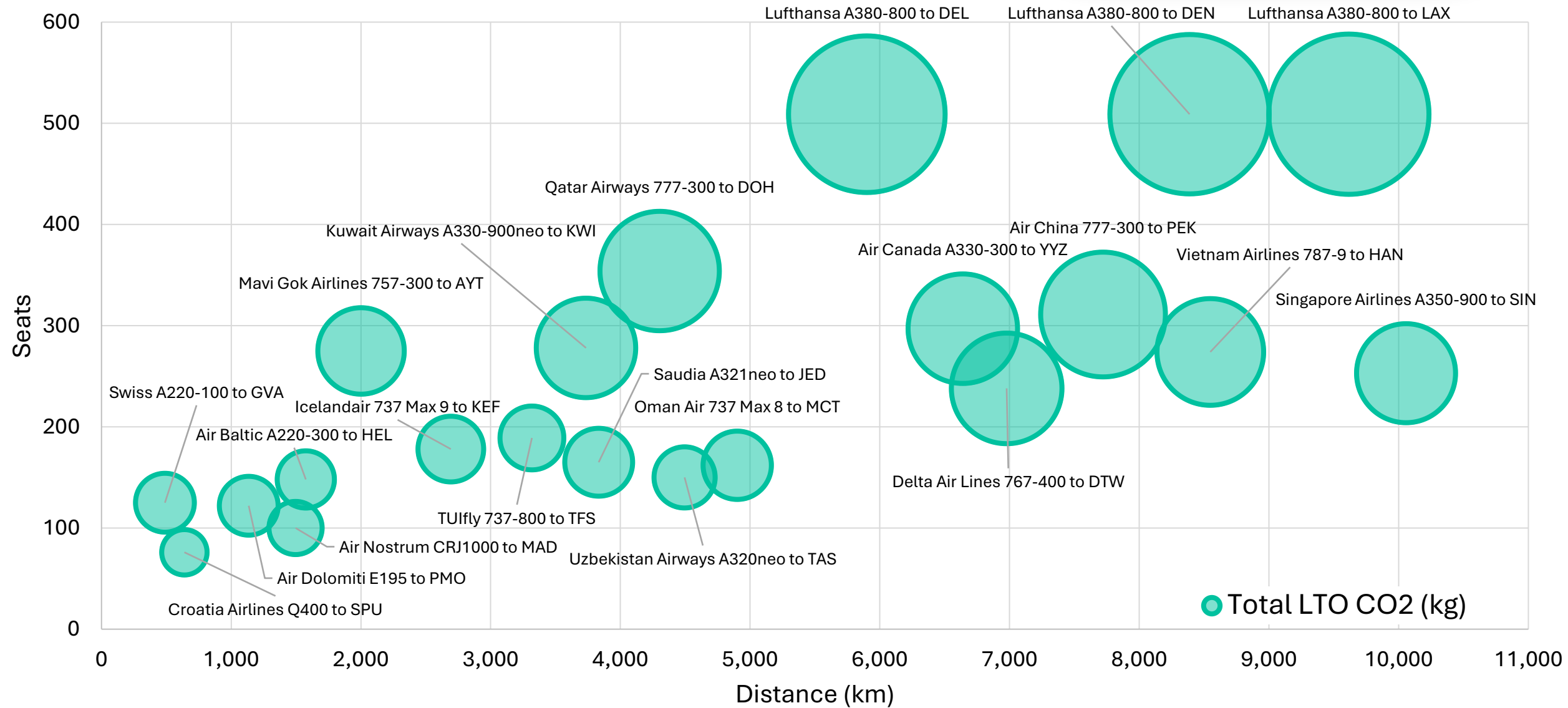


LONDON HEATHROW TO NEW YORK JFK ROUTE

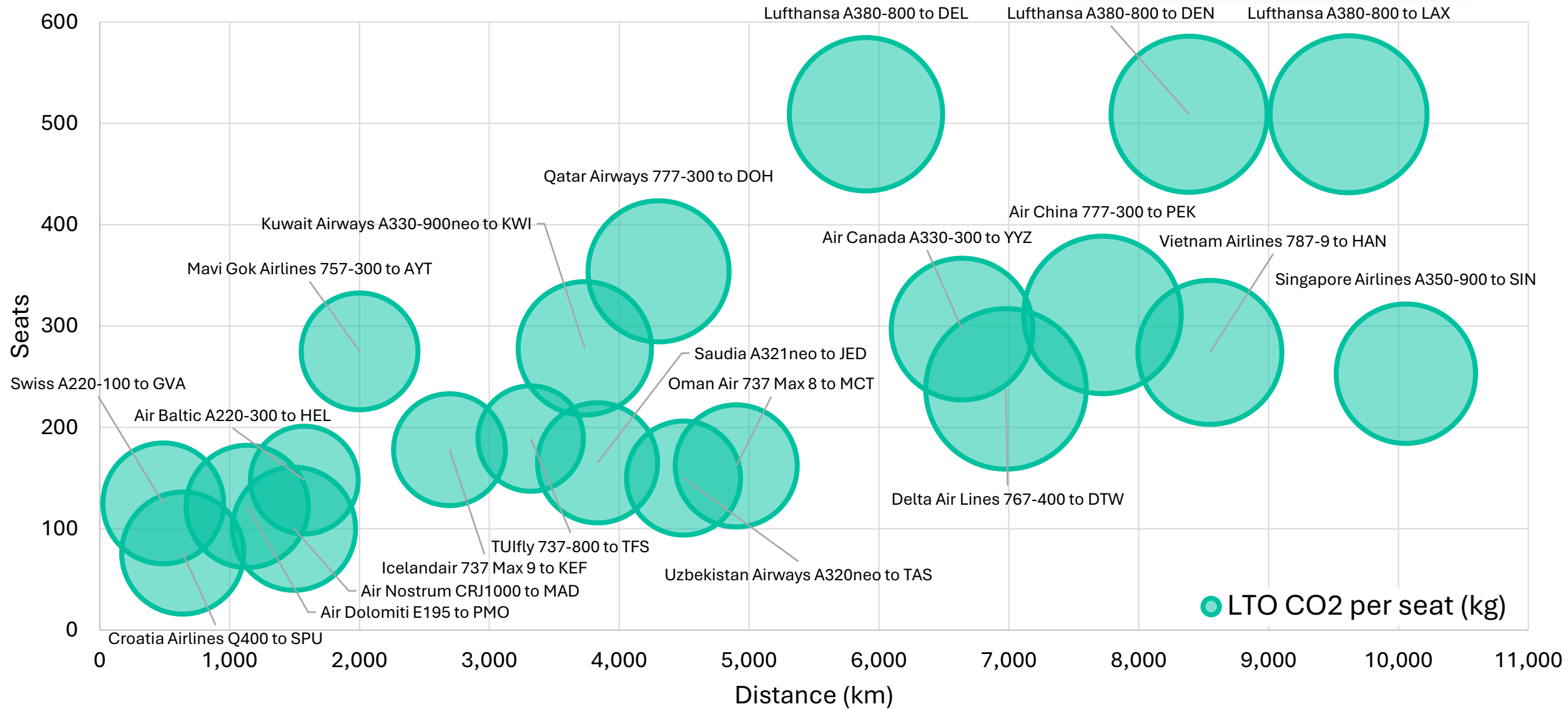
Cirium data shows true comparisons between airlines & cabin classes vs. DEFRA



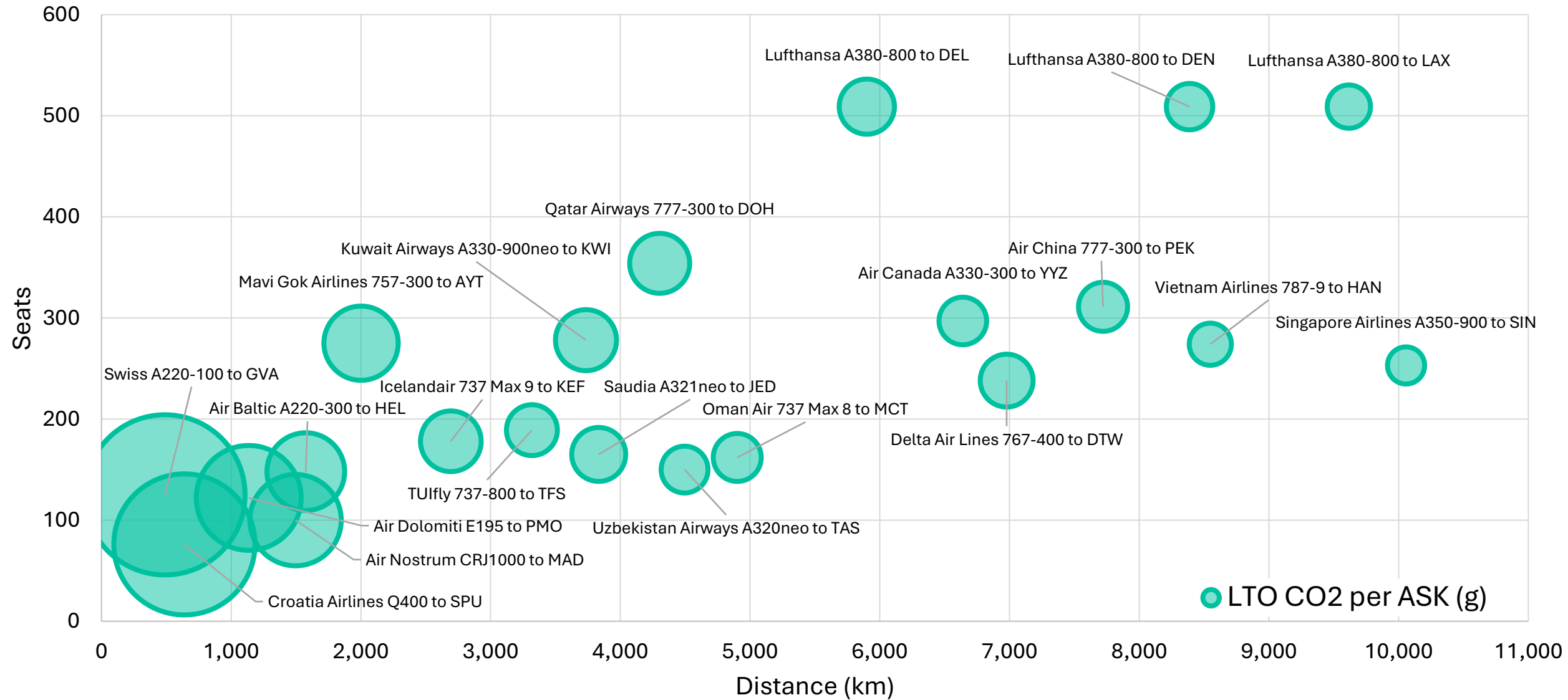
LANDING/TAKE-OFF CYCLE CO₂ – MUNICH AIRPORT



LANDING/TAKE-OFF CYCLE CO₂ – MUNICH AIRPORT



LANDING/TAKE-OFF CYCLE CO₂ – MUNICH AIRPORT



THANK YOU – QUESTIONS?

inter airport
FOCUS
CONFERENCE

inter
airport
europe  25TH
EDITION

 **CIRIUM**
aviation analytics

FLIGHT EMISSIONS REVIEW

OFFICIAL AIRLINE REPORT

emerald
→ sky

JULY 2025



cirium.com/emeraldsky