Above the clouds: UK aviation trends in 2023

April 2024

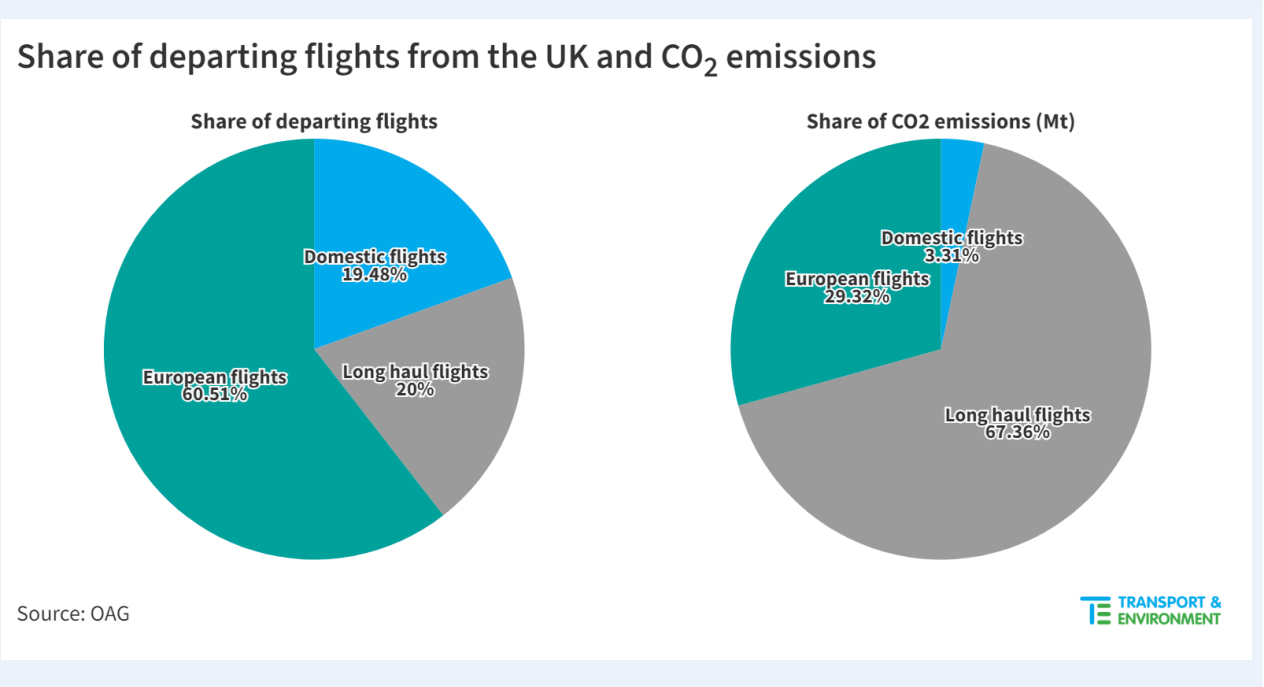
Executive Summary

Pollution from UK-departing planes is almost back to pre-pandemic levels, and there is a very good chance that emissions levels in 2024 will be the highest ever - meaning that there is a good chance that UK airlines will cause the most climate damage than they ever have this year. This is an important consideration for policymakers, as the introduction of sustainable aviation fuel and zero-emissions aircraft in meaningful amounts is still years, if not decades away.

Analysis of 2023 data shows that British Airways was far and away the biggest polluter. Ryanair was the second largest, with easyJet the third largest. Almost all airlines emitted more than they did in 2022, and some of them emitted the most they have ever.

At the same time, and despite the Government reaffirming its commitment to the polluter pays principle last year, airlines do not have to pay for the vast majority of carbon pollution they emit, through either the UK emissions trading scheme (UK ETS) or through fuel duty. This is the exact opposite to the nation's farmers, car drivers, rail operators and Heavy Goods Vehicle owners, who all have to pay some duty on the fuel they burn.

The UK ETS treats different airlines in different ways, and this means that some airlines are treated unfairly. The average price per tonne of carbon emitted by airlines varies wildly. Wizz Air pays £34.23 per tonne, whilst Virgin Atlantic, unbelievably, pays nothing. This variation is for the simple reason that the UK ETS only applies to flights departing to somewhere else in the UK, or somewhere in the European Economic Area or Switzerland. The below charts clearly show that despite the vast majority of departing flights heading to a European destination, the vast majority of emissions come from long-haul flights - which are outside the ETS. This is a clear failure of policy, and something that policymakers need to solve.



Introduction

Analysis of 2023 UK aviation emissions data finds that emissions are returning to their historic high levels, with some airlines already surpassing those levels. This is despite all the talk from politicians and the aviation sector of "building back better". British Airways is still by far the largest polluter, with Ryanair the second largest and easyJet third largest.

In 2023, nearly 940,000 flights departed from UK airports, emitting a total of 32 Mt of CO_2[1] (with an unquantified larger climate impact due to the non-CO_2 impacts). In comparison with 2022, this represents a total flight growth of 15.8%, and CO_2 emissions growth of 22.8%. UK aviation is returning back 2019's historical emissions peak: overall 2023 was at 87.6% of 2019 level of flights and 89.8% of CO_2 emissions.

Domestic flights are still below 2019 levels, both in flight numbers and emissions. However 2023 flight numbers are 12% above 2022 levels, and 2023 emissions are 16% above 2022 levels. All domestic flights fall within the UK ETS, but airlines in the scheme are still entitled to free allowances.

Flights departing to the European Economic Area (henceforth called "Europe[2]") are similar, in the sense that they are not back to 2019 levels yet. Emissions levels are 95% of 2019 levels, and flight numbers are 89%. 2023 emissions and flight numbers were both substantially larger than 2022 (13% and 15% higher respectively). All European flights fall within the UK ETS, but airlines in the scheme are still entitled to free allowances.

[1] This is almost identical to the Government's provisional estimates for 2023 aviation emissions.
[2] Defined here as the 27 Member States of the EU, Norway, Iceland, Switzerland and the UK.

Long-haul flights (those going to places other than Europe and the UK) are also still just under 2019 levels, but again recorded strong growth compared to 2022. Departing flight numbers were 97% of 2019 levels, and were 23% higher than 2022 levels. Emissions levels were 88% of 2019 levels, but were 28% higher than 2022. Long-haul flights are not part of the UK ETS.

The scope of the analysis covers all flights departing from a UK airport. This was done by calculating the aircraft fuel consumption of scheduled flight data from OAG, using Eurocontrol's fuel consumption methodology. Our analysis compares 2023 emissions to both 2022 and the pre-pandemic peak of 2019. This paper only considers CO_2. The total climate impact from these flights is far larger once non-CO_2 impacts are considered. A full methodological note is available via the link.

Overview: Which airlines pollute the most?

Total emissions by UK-departing airlines

The table below shows the top 10 most polluting airlines departing from the UK in terms of CO_2 emissions in 2023, compared to their 2019 and 2022 levels.

Airline	2019 emissions (Mt CO_2)	2022 emissions (Mt CO_2)	2023 emissions (Mt CO_2)	Emissions growth (2019/2023)	Emissions growth (2022/2023)
British Airways	9.25	5.99	7.52	-18.6%	25.6%
Ryanair	2.30	2.25	2.61	13.5%	16.1%
Easyjet	2.48	2.25	2.59	4.8%	15.5%
Virgin Atlantic Airways	1.93	1.43	1.63	-15.6%	14.2%
Emirates	1.69	1.26	1.58	-6.3%	25.7%
American Airlines	1.22	1.22	1.42	16.0%	16.1%
Jet2.com	1.07	1.24	1.35	26.3%	8.8%
TUI	1.16	1.20	1.17	0.7%	-2.5%
United Airlines	0.88	0.77	1.03	16.0%	32.8%
Singapore Airlines	0.79	0.63	0.76	-3.5%	21.1%

Top 10 most polluting airlines in 2023 in the UK

Ranking	Airline	CO_2 emissions 2023 (Mt)	CO_2 emissions growth 2019 - 2023 (%)
1	British Airways	7.5	↓-18.6%
2	Ryanair	2.6	↑+13.5%
3	easyJet	2.6	↑+4.8%
4	Virgin Atlantic Airways	1.6	↓-15.6%
5	Emirates	1.6	↓-6.3%
6	American Airlines	1.4	↑+16.0%
7	Jet2.com	1.4	↑+26.3%
8	TUI	1.2	↑+0.7%
9	United Airlines	1	↑+16.0%
10	Singapore Airlines	0.8	↓-3.5%

Source: European commission and OAG.

TRANSPORT & ENVIRONMENT

Although British Airways remains by far the most polluting airline, its emissions are still below 2019 levels. In comparison, Ryanair, Wizz Air and easyJet have all exceeded their respective 2019 emissions levels. All three airlines have recently announced large aircraft orders, and therefore, without intervention, the rise in annual emissions from them is expected to continue.

Total flight numbers by airline

Airline	2019 flight numbers	2022 flight numbers	2023 flight numbers	Flight growth (2019/2023)	Flight growth (2022/2023)	Share of 2023 total flights
Easyjet	183580	157639	183934	0.19%	16.68%	19.58%
British Airways	192140	141027	170242	-11.40%	20.72%	18.12%
Ryanair	140190	134125	155485	10.91%	15.93%	16.55%
Jet2.com	41149	45502	49727	20.85%	9.29%	5.29%
Loganair	44021	48548	49704	12.91%	2.38%	5.29%
Others	471586	284520	330347	-29.95%	16.11%	35.16%

As can be seen, there is a "big three" when it comes to flight numbers. EasyJet, British Airways and Ryanair together account for well over half of UK departing flights, and all of them have had substantial growth in total flight numbers from 2022. British Airways is the only airline in the top five whose flight numbers are still below 2019 levels.

Domestic flights

Emissions from domestic flights

183,033 flights bound for somewhere else in the country took off in 2023. This was 12% higher than 2022, but still only 76% of 2019's levels. Cumulatively they emitted just over 1 Mt CO_2, which was 15.8% higher than 2022 levels, but still only 82% of 2019 levels.

As can be seen, easyJet is the largest carbon emitter when only considering domestic flights. Its emissions are already above 21% above 2019 levels. British Airways is the second largest emitter. Its emissions levels are 22% above 2022 levels, but still 8% lower than 2019 levels. Between them, easyJet and British Airways account for 79% of total domestic emissions. The top three emitting airlines accounted for over 90% of domestic emissions.

Airline	2019 emissions (Mt CO_2)	2022 emissions (Mt CO_2)	2023 emissions (Mt CO_2)	Emissions growth (2019/2023)	Emissions growth (2022/2023)	Share of 2023 emissions
Easyjet	0.40	0.42	0.49	21.09%	15.42%	45.76%
British Airways	0.38	0.29	0.35	-8.29%	22.04%	32.81%
Loganair	0.08	0.12	0.13	48.50%	1.98%	11.78%
Ryanair	0.04	0.00	0.05	33.11%	939.45%	4.65%
Aer Lingus	0.02	0.04	0.04	77.02%	-3.20%	3.36%
Eastern Airways	0.00	0.01	0.01	0.00%	-18.59%	0.80%
Flybe	0.36	0.03	0.00	-98.80%	-86.20%	0.41%
Isles of Scilly Skybus	0.00	0.00	0.00	6.43%	24.57%	0.35%
Maersk Air Cargo	0.00	0.00	0.00	0.00%	0.00%	0.05%
Directflight	0.00	0.00	0.00	-32.89%	-5.85%	0.02%
Others	0.003	0.001	0.0002	-92.87%	-73.91%	0.02%

Domestic flight numbers

easyJet flew the most domestic flights in 2023, 17% more than it did in 2022, and 21% more than 2019. This large percentage rise is replicated by Aer Lingus, British Airways and Loganair, who are all comfortably above 2019 flight numbers. One major reason for this is the demise of Flybe. British Airways flew the second largest number of times. Between them, over half of UK domestic flights were operated by easyJet and British Airways.

Domestic flights:

Airline	2019 flight numbers	2022 flight numbers	2023 flight numbers	Flight numbers growth (2019/2023)	Flight numbers growth (2022/2023)	Share of 2023 total flights
Easyjet	50260	52039	60813	21.00%	16.86%	33.23%

Loganair	41106	45025	45285	10.17%	0.58%	24.74%
British Airways	44590	34600	41350	-7.27%	19.51%	22.59%
Aer Lingus	2348	9938	15576	563.37%	56.73%	8.51%
Isles of Scilly Skybus	7069	5568	7115	0.65%	27.78%	3.89%
Ryanair	4460	568	5880	31.84%	935.21 %	3.21%
Eastern Airways	0	5399	4617	n/a	-14.48%	2.52%
Flybe	89864	8827	1137	-98.73%	-87.12%	0.62%
Directflight	1762	1156	1086	-38.37%	-6.06%	0.59%
Aurigny Air Services	0	60	127	n/a	111.67 %	0.07%
Others	495	229	47	-90.51%	-79.48%	0.03%

European flights

Both flight numbers and emissions levels on flights to Europe have nearly returned to their pre-pandemic peaks. Flight numbers were 15% higher than 2022 levels, meaning they were 89% of 2019 levels. Emissions were 13% higher than 2022 levels, which equalled 95% of 2019 levels.

Intra-European flights	**2019**	**2022**	**2023**	**% of 2019**	**Growth (2023/2022)**
Numbers of flights	637630	494629	568476	89.15%	14.93%
CO_2 emissions (Mt)	9.93	8.35	9.40	94.67%	12.56%

Emissions from European flights

Ryanair is the largest polluter in this segment, followed by easyJet, then British Airways, then Jet2.com. Emissions from these four airlines account for over 70% of emissions on flights to Europe. All four airlines' emissions are higher than 2022, but Ryanair and Jet2.com are already past 2019 levels.

Airline	2019 emissions (Mt CO_2)	2022 emissions (Mt CO_2)	2023 emissions (Mt CO_2)	Emissions growth (2019/2023)	Emissions growth (2022/2023)	Share of 2023 emissions
Ryanair	2.22	2.20	2.51	13.05%	13.86%	26.68%
Easyjet	1.91	1.57	1.78	-6.98%	13.57%	18.94%
British Airways	1.33	1.03	1.22	-8.14%	18.33%	12.96%
Jet2.com	0.96	1.06	1.16	20.64%	8.99%	12.35%
TUI	0.61	0.59	0.57	-6.54%	-1.98%	6.11%
Wizz Air	0.50	0.53	0.56	12.90%	6.13%	5.96%
KLM	0.18	0.13	0.17	-5.38%	26.64%	1.82%
Deutsche Lufthansa AG	0.16	0.13	0.16	-2.72%	25.72%	1.70%
Vueling Airlines	0.10	0.12	0.15	45.85%	27.02%	1.57%
SAS Scandinavian Airlines	0.13	0.08	0.11	-18.29%	26.57%	1.14%
Others	1.819	0.909	1.012	-44.38%	11.30%	10.77%

European flight numbers

The emissions ranking is replicated on flight numbers. Ryanair took off over 10% more often than they did in 2019, and accounted for over a quarter of all flights. Wizz Air and Jet2.com are also comfortably above 2019 flight numbers.

Airline	2019 flight numbers	2022 flight numbers	2023 flight numbers	Flight numbers growth (2019/2023)	Flight numbers growth (2022/2023)	Share of 2023 total flights
Ryanair	133912	131881	147479	10.13%	11.83%	25.94%

Easyjet	124563	93910	108248	-13.10%	15.27%	19.04%
British Airways	101276	73438	88484	-12.63%	20.49%	15.57%
Jet2.com	38127	40276	44001	15.41%	9.25%	7.74%
Wizz Air	23368	23563	25539	9.29%	8.39%	4.49%
KLM	23342	16934	21868	-6.31%	29.14%	3.85%
TUI	21265	20801	20464	-3.77%	-1.62%	3.60%
Aer Lingus	24617	14037	19038	-22.66%	35.63%	3.35%
Deutsche Lufthansa AG	14649	11939	15344	4.74%	28.52%	2.70%
Vueling Airlines	7648	8188	9995	30.69%	22.07%	1.76%
Others	124863	59662	68016	-45.53%	14.00%	11.96%

Long haul flights

Overview

Flight numbers to non-European destinations in 2023 were 23% higher than in 2022, meaning that they are nearly back to their pre-pandemic high. In a similar vein, CO_2 emissions were 28% higher than in 2022, and were 88% of 2019 levels. Whilst absolute flight numbers are far below the number of flights to Europe, the fact that the distances are so far means that the bulk of UK aviation's emissions come from long-haul.

Long haul flights	**2019**	**2022**	**2023**	**% of 2019**	**Growth (2023/2022)**
Numbers of flights	193082	153323	187930	97.33%	22.57%
CO_2 emissions (Mt)	24.45	16.83	21.59	88.29%	28.30%

Emissions from long haul flights

British Airways is far and away the largest polluter in this segment, accounting for over a quarter of 2023's emissions. Its emissions are still below peak levels though, which is not true of the American

airlines on the list: American, United and Delta. Between them, British Airways and Virgin account for over a third of emissions in this sector.

Airline	2019 emissions (Mt CO_2)	2022 emissions (Mt CO_2)	2023 emissions (Mt CO_2)	Emissions growth (2019/2023)	Emissions growth (2022/2023)	Share of 2023 emissions
British Airways	7.54	4.67	5.96	-21.00%	27.46%	27.59%
Virgin Atlantic Airways	1.93	1.43	1.63	-15.62%	14.24%	7.56%
Emirates	1.69	1.26	1.58	-6.42%	25.69%	7.31%
American Airlines	1.22	1.22	1.42	16.05%	16.05%	6.56%
United Airlines	0.88	0.77	1.03	16.00%	32.81%	4.75%
Singapore Airlines	0.79	0.63	0.76	-3.65%	21.17%	3.52%
Qatar Airways	0.73	0.65	0.73	-0.03%	11.87%	3.39%
Qantas Airways	0.70	0.54	0.69	-0.75%	27.76%	3.21%
Delta Air Lines	0.51	0.41	0.61	19.74%	49.16%	2.82%
TUI	0.54	0.61	0.59	8.93%	-2.99%	2.74%
Others	7.918	4.636	6.596	-16.70%	42.28%	30.55%

Long haul flight numbers

British Airways takes off to destinations outside Europe far more often than any other airline. Perhaps most surprising in this segment is the fact that easyJet is second and Jet2.com is 9th on this list, and reflects the “near” European destinations they fly to (eg Turkey, Egypt and Morocco). Indeed, easyJet has 8% of this segment’s total flights. EasyJet’s flight numbers grew 27% over 2022 levels, and 70% over 2019 levels.

Airline	2019 flight numbers	2022 flight numbers	2023 flight numbers	Flight numbers growth (2019/2023)	Flight numbers growth (2022/2023)	Share of 2023 total flights
British Airways	46274	32989	40408	-12.68%	22.49%	21.50%
Easyjet	8757	11690	14873	69.84%	27.23%	7.91%
Virgin Atlantic Airways	11966	10821	12316	2.92%	13.82%	6.55%
TUI	6932	8372	8510	22.76%	1.65%	4.53%
American Airlines	7709	6912	8352	8.34%	20.83%	4.44%
United Airlines	7117	6211	8148	14.49%	31.19%	4.34%
Turkish Airlines	5062	6280	6646	31.29%	5.83%	3.54%
Emirates	6932	5307	6599	-4.80%	24.35%	3.51%
Jet2.com	3022	5226	5726	89.48%	9.57%	3.05%
Qatar Airways	5548	3824	4959	-10.62%	29.68%	2.64%
Others	83763	55691	71393	-14.77%	28.19%	37.99%

Pricing pollution

UK Emission Trading Scheme (ETS)

Flights departing from a UK airport for a destination in Europe represent 82% of all flights. However, this only represents just under a third of aviation's total carbon emissions. Close to 70% of UK aviation's emissions come from long haul flights (extra-UK and non-European), and the vast bulk of these come from flights to North America and Asia (33% and 42% of extra-European flights are at destination of North America and Asia, respectively).

The ETS only applies to European flights. This means that some airlines pay vastly more on average to pollute than others do. In 2023, Wizz Air (the 12th largest emitter) paid an average of £34.23 per tonne of carbon emitted. Conversely, Virgin Atlantic did not pay a penny in 2023.

This misapplication of the ETS means that the Government is missing out on revenue. If airlines were made to pay the cost of all their pollution then the UK Government would have received over a billion pounds in additional revenue last year. Over a third of this would have come from British Airways, which only pays an average of £5.60 per tonne of carbon emitted.

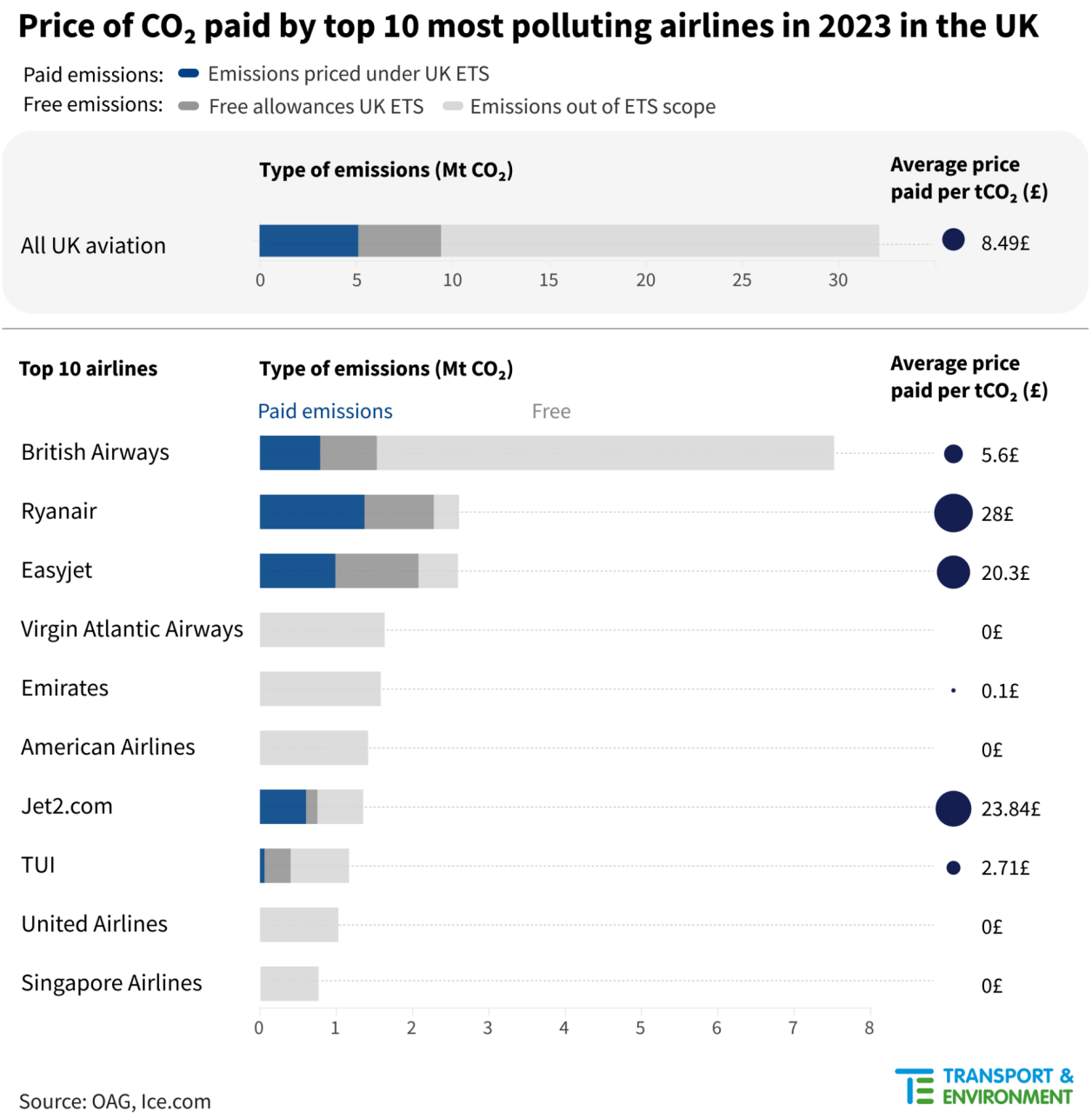
The below table shows the 10 largest carbon emitters, and how much they paid in pollution costs, using an average UK ETS price of £53.36 per tonne.[3]

Airline	**Total amount paid under the UK ETS (£million)**	**Unpaid emissions (£million)**	**% Unpaid**	**Average price paid per tCO_2 (£)**
British Airways	42.11	359.27	89.51%	5.60
Ryanair	73.08	66.17	47.52%	28.00
Easyjet	52.68	85.76	61.95%	20.30
Virgin Atlantic Airways	0	87.10	100.00%	0.00
Emirates	0.09	84.25	99.90%	0.05
American Airlines	0	75.57	100%	0.00
Jet2.com	32.22	39.90	55.33%	23.84
TUI	3.16	59.03	94.92%	2.71
United Airlines	0	54.78	100%	0.00
Singapore Airlines	0	40.93	100%	0.00
All flights departing from the UK	272.42	1,439.09	84.08%	8.49

[3] Source: Ice.com

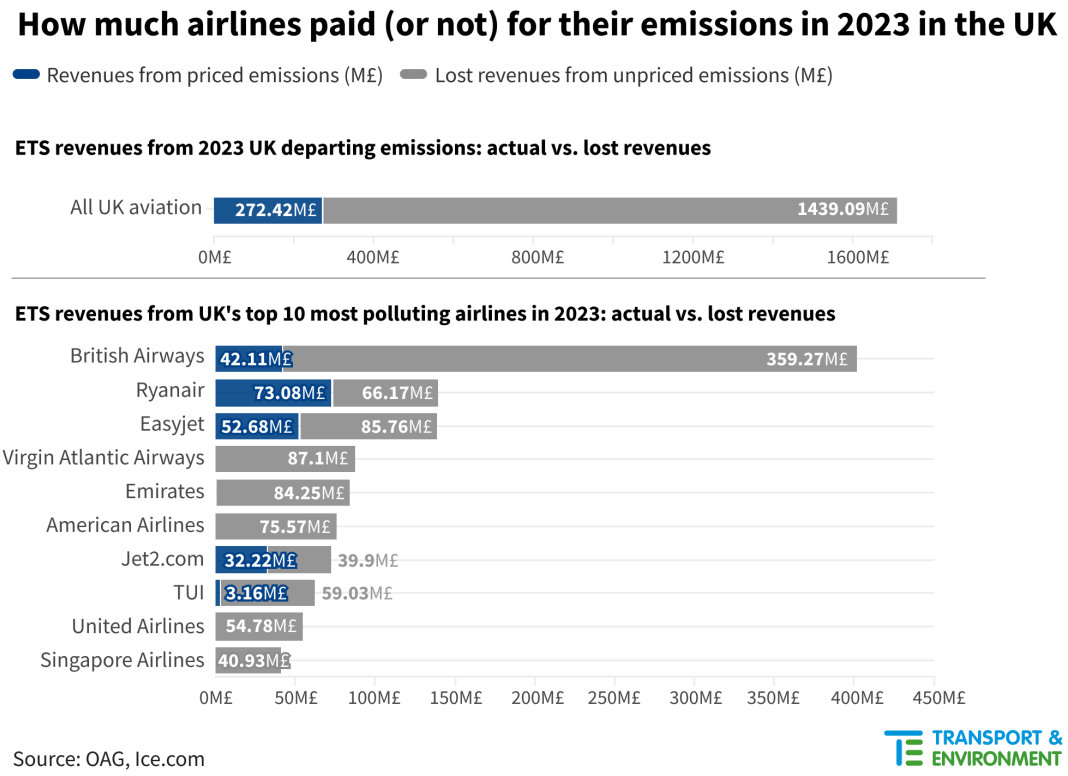
Overall average price per tonne paid by top 10 polluting airlines

The unfairness of the UK ETS can clearly be seen in the chart below. In overall terms, Ryanair paid more for their emissions than British Airways, despite the low cost carrier's emissions being comparatively lower. Additionally, Ryanair and easyJet emitted broadly the same amount of pollution, but Ryanair paid over £20 million more in costs. At the other end of the scale, Virgin Atlantic, Emirates, American Airlines, United Airlines and Singapore Airlines - half of the top ten polluters - did not pay a penny in pollution costs.



Foregone Government revenue

Had the UK ETS been enforced fairly, and airlines be charged for every tonne of carbon they emit into the atmosphere, the Government would have received over £1.4 billion in extra revenue. Over £350 million of this would have come from the largest polluter, British Airways. Over a quarter of a billion would have come from airlines that didn't pay a penny in pollution costs.



Conclusion

It's clear that demand for flying has returned following the pandemic, and 2023's carbon emissions were nearly as high as 2019 levels. Indeed, there is a good chance that 2024's emissions will be higher. Some airlines are already past 2019 levels, which means that in 2023 they were the most polluting they have ever been in a single year.

It's also clear that the aviation sector, in contradiction to every other sector of the UK economy, is largely allowed to pollute with impunity. The UK ETS is not applied to the vast majority of UK aviation emissions, and no airline pays fuel duty. Carbon pricing is a core component of the Government's Jet Zero strategy, and yet there have been no policy discussions around how to actually implement it on all carbon emitted. This is a failing of the UK Government, and should be rectified as quickly as possible.

Further information

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