

think • go climate conscious

atmosfair 

atmosfair Airline Index 2016



How is the Airline Index used?

1. Avoidance

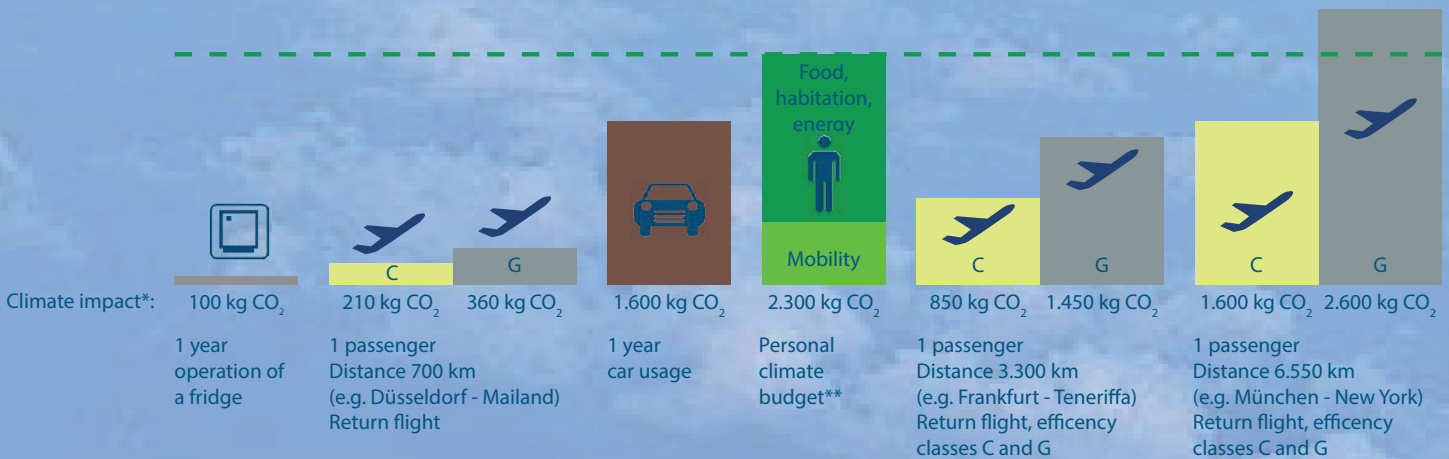
- Even efficient flights can quickly exceed a single person's annually climate CO2 budget (see graphic). Are there alternatives available like the train?
- Have I chosen the direct flight? (Rule of thumb: a direct flight in Efficiency Class E is better for the climate than a transfer flight in Class C).

2. Optimization

- The airline index shows you the efficiency points of an airline broken down by short, medium and long distance flights. First, ascertain your flight distance and then, in the appropriate distance class, the most efficient airline.
- The airline with the most efficiency points will generally also be the most efficient on your flight from point A to point B. Since deviations are possible, atmosfair offers companies with much flight a detailed ranking of airlines on specific city pairs, which are important for the company.

3. Compensation

- atmosfair can offset the CO2 quantity that you generate with your flight by building up and expanding the generation of renewable energies. Make your contribution to fighting global warming on-line



* Aircraft exhaust gases contain additional pollutants besides CO2. Those other pollutants are converted to CO2 equivalent emissions using the absolute global warming potential (AGWP) approach, with medium values and a 100 year time horizon. The AGWPs do not enter into the ranking of the airlines, since they are the same for all airlines. * Aircraft exhaust gases contain additional pollutants besides CO2.

** That is the amount of CO2 that one human being can generate annually if global warming is to stay below the 2°C mark, provided the resulting world CO2 budget were equally distributed among all humans. Transport accounts for about one quarter of current global CO2 emissions.

References

Prof. Dr. Hartmut Graßl:

"With the airline index, atmosfair has built a bridge from science to practical climate protection in the important area of air transport."

Associate Prof. Paul Peeters, NHTV Breda University, Flugzeugingenieur:

"The AAI calculation method is precise and sets the standard for the environmental evaluation of aircraft and airlines."

Prof. Dr. Stefan Gössling, Lund University:

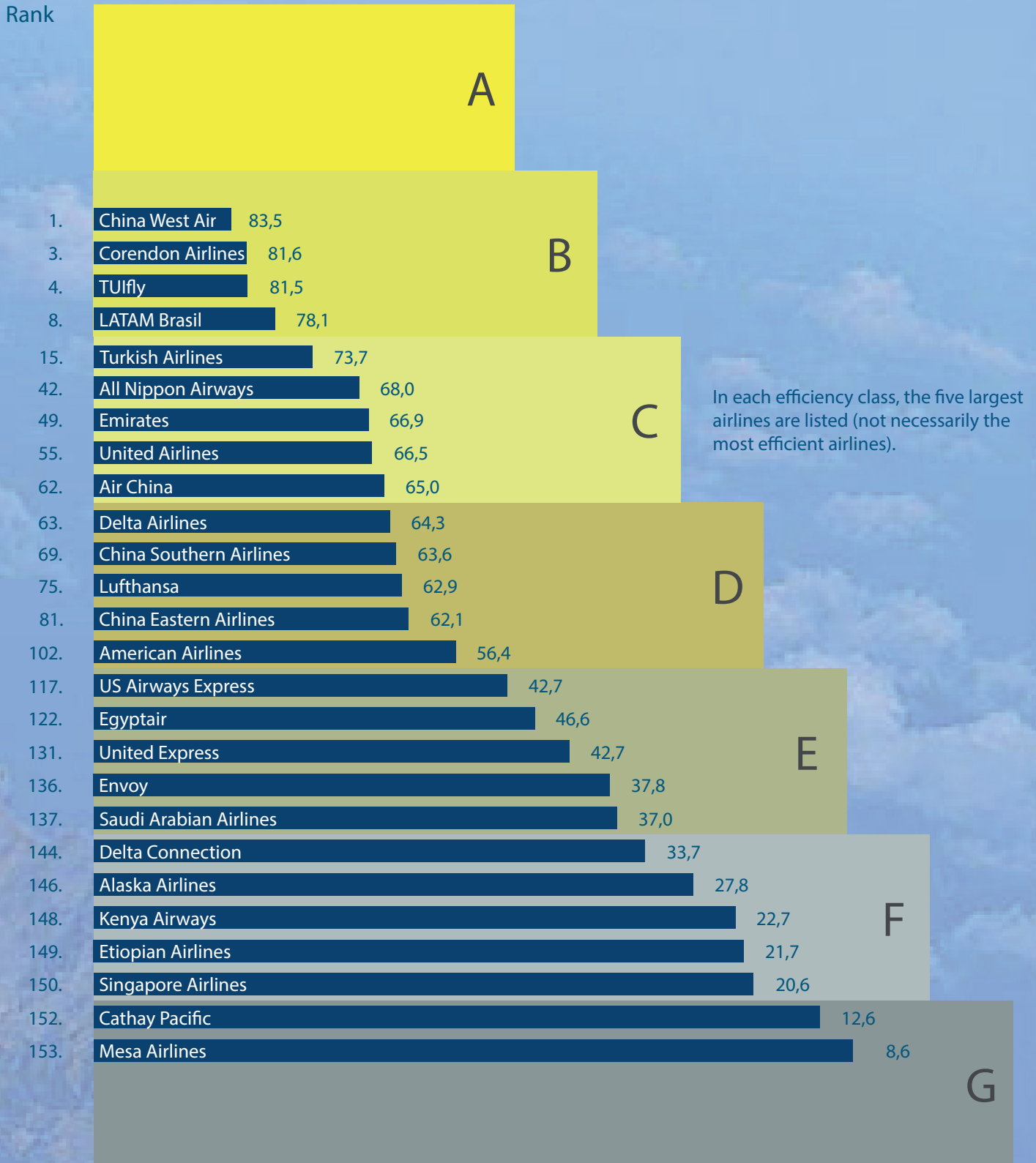
"The challenge of comparing airlines from a climate policy viewpoint has been convincingly scientifically solved by atmosfair."

For corporates

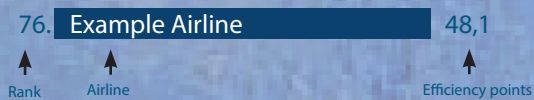
The atmosfair airline ranking is available in detail even for single selected air routes. Because climate efficiency reduces fuel consumption, we can recommend airlines on the routes that are important to you, with which you can save both money and CO2.

Ask us; we'll be happy to help you: airlineindex@atmosfair.de

AAI 2016 Evaluation of short haul flights (up to 800 km)



Legend

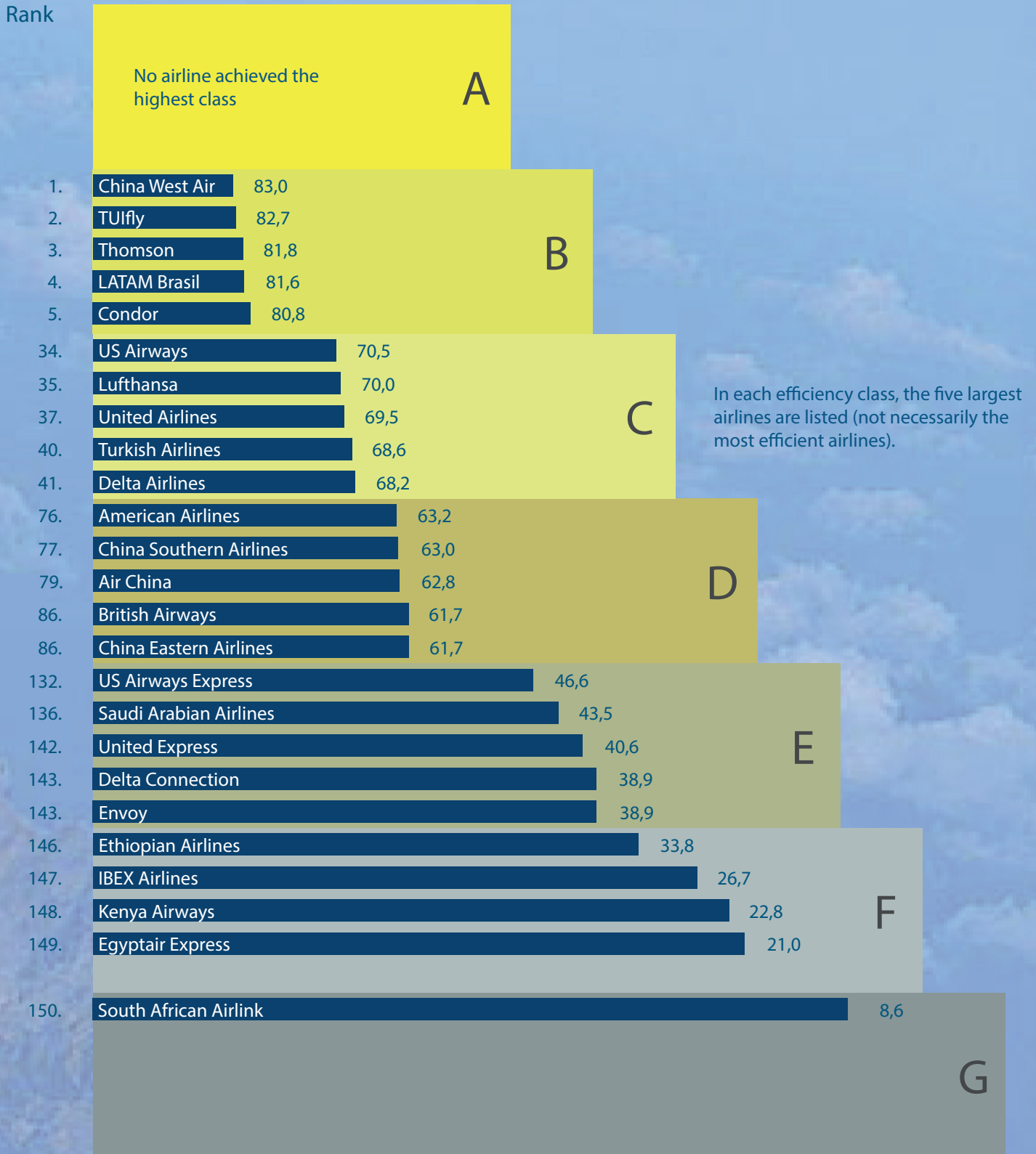


2014 data

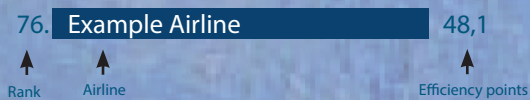
Accuracy of all airlines $\pm 1,5$ efficiency points

¹see footnote p. 6

AAI 2016 Evaluation of medium haul flights (from 800 km up to 3.800 km)



Legend

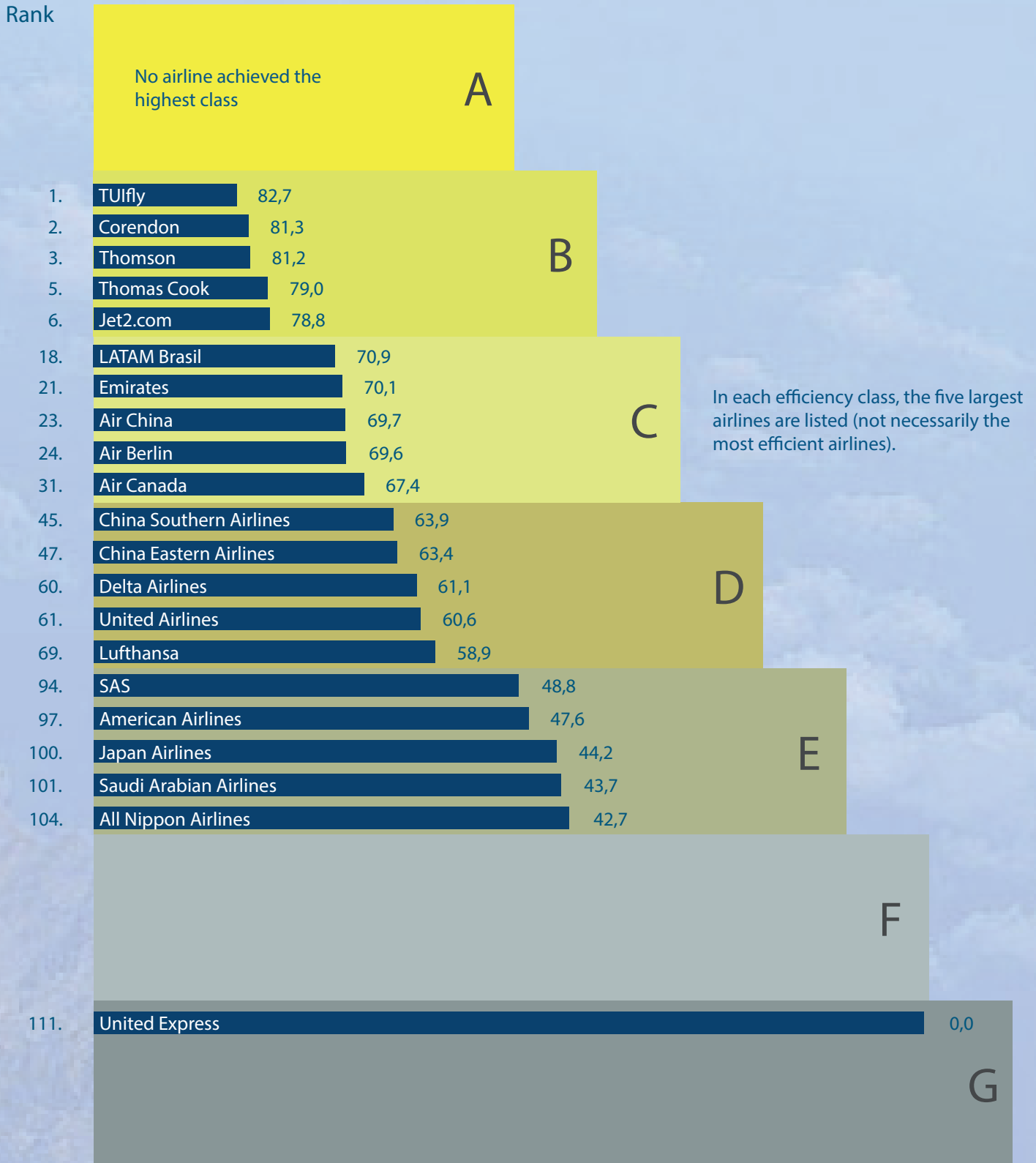


2014 data

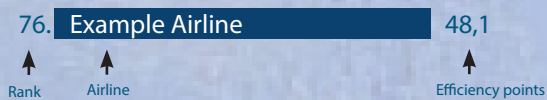
Accuracy of all airlines $\pm 1,5$ efficiency points

¹see footnote p. 6

AAI 2016 Evaluation of long haul flights (more than 3.800 km)



Legend



2014 data

Accuracy of airlines $\pm 1,5$ efficiency points

Ranking im Detail (1)

Overall Ranking							Distance-based ranking									
Rank	Airline	Country	EP* '16	EP* '15	EK*	Type*	Pax (in Mio.)*	<800 km			800-3800 km			>3800 km		
								EP*	EK*	Rank	EP*	EK*	Rank	EP*	EK*	Rank
1	China West Air	China	83,1		B	Regional	4,3	83,5	B	1	83,0	B	1			
2	TUIfly	Germany	82,7	83,6	B	Charter	7,8	81,5	B	4	82,7	B	2	82,7	B	1
3	Thomson Airways	UK	81,6	82,2	B	Charter	10,4	77,6	C	7	81,8	B	3	81,2	B	3
4	Corendon Airlines	Turkey	80,4	69,0	B	Charter	1,8	81,6	B	3	80,3	B	6	81,3	B	2
5	Thomas Cook Airlines	UK	79,4	68,7	B	Charter	6,0	61,0	D	88	79,6	B	7	79,0	B	5
6	XL Airways France	France	78,8	74,1	B	Charter	0,8	76,2	C	9	79,0	B	8	78,7	B	7
7	Condor Flugdienst	Germany	78,7	72,4	B	Charter	7,2	55,1	D	107	80,8	B	5	76,0	C	14
8	Arkefly	Netherlands	78,6		B	Charter	1,2	71,6	C	24	75,8	C	14	79,3	B	4
9	LATAM Brasil	Brasil	78,5	75,6	B	Net Carrier	37,9	78,1	B	6	81,6	B	4	70,9	C	18
10	Air Caraibes	Guadeloupe	78,0	80,0	B	Regional	1,2	83,5	B	1	78,4	B	9	77,4	C	9
11	Monarch Airlines	UK	77,5	80,3	C	Charter	7,0				77,8	C	11	74,9	C	15
12	Comair	South Africa	76,8	55,1	C	Regional	5,2	78,9	B	5	76,4	C	13			
13	Jetairfly	Belgium	75,9		C	Charter	2,8	73,8	C	14	75,7	C	15	77,5	C	8
14	Air Transat	Canada	75,7	76,4	C	Charter	3,5	23,2	F	147	76,5	C	12	76,1	C	12
15	Jet2.com	UK	75,1		C	Charter	6,0	73,7	C	15	75,1	C	16	78,8	B	6
16	Air Berlin	Germany	75,0	76,8	C	Net Carrier	31,7	70,9	C	28	78,1	B	10	69,6	C	24
17	Onur Air	Turkey	73,9	83,4	C	Charter	4,7	73,4	C	17	74,1	C	18			
18	MASwings	Malaysia	72,6	86,6	C	Regional	1,6	72,6	C	19						
19	Aegean Airlines	Greece	72,5	74,7	C	Regional	10,1	68,4	C	39	73,3	C	20			
19	Royal Brunei Airlines	Brunei	72,5	56,4	C	Net Carrier	1,2	43,1	E	130	63,9	D	70	77,4	C	9
21	KLM-Royal Dutch Airlines	Netherlands	72,2	67,6	C	Net Carrier	27,7	70,7	C	30	71,4	C	30	72,6	C	16
22	Air New Zealand Link	New Zealand	72,0	76,2	C	Regional	3,0	72,4	C	22	63,7	D	72			
23	Jet Airways (India)	India	71,9	70,8	C	Net Carrier	19,5	76,1	C	10	74,3	C	17	64,8	D	40
24	Shenzhen Airlines	China	71,8	65,1	C	Net Carrier	26,3	73,9	C	13	71,7	C	29			
24	Tunisair Express	Tunisia	71,8	92,5	C	Regional	0,1	73,1	C	18	55,1	D	112			
24	Vigin Australia International	Australia	71,8		C	Net Carrier	19,7	77,1	C	8	74,0	C	19	62,9	D	51
27	Sichuan Airlines	China	71,4	64,6	C	Net Carrier	19,2	70,4	C	32	72,2	C	27	53,2	D	84
28	Avianca	Columbia	71,1	68,8	C	Net Carrier	26,2	69,6	C	38	72,1	C	28	70,9	C	18
29	Alaska Airlines	USA	70,4	70,1	C	Net Carrier	21,0	27,8	F	146	69,3	C	38	76,2	C	11
30	Edelweiss Air	Switzerland	70,1		C	Charter	1,1	63,5	D	70	72,6	C	24	66,8	C	34
30	Emirates	VAE	70,1	69,2	C	Net Carrier	49,3	66,9	C	49	69,9	C	36	70,1	C	21
32	Air Europa	Spain	70,0	68,0	C	Charter	9,6	69,8	C	37	72,3	C	26	67,9	C	27
33	Vietnam Airlines	Vietnam	69,4	69,4	C	Net Carrier	16,0	66,8	C	50	66,8	C	51	76,1	C	12
34	Juneyao Airlines	China	69,3	67,2	C	Net Carrier	8,2	70,0	C	34	69,3	C	38			
35	Transasia Airways	Taiwan	69,1	73,4	C	Regional	3,4	75,1	C	12	65,0	C	64			
36	Atlasjet Airlines	Turkey	68,4	71,8	C	Net Carrier	4,0	70,0	C	34	68,1	C	43	38,2	E	108
37	S7 Airlines	Russia	68,0	70,3	C	Net Carrier	7,9	66,6	C	54	67,9	C	45	68,9	C	25
38	US Airways	USA	67,9	68,4	C	Net Carrier	57,6	63,4	D	72	70,5	C	34	60,4	D	62
39	Cathay Pacific Airways	Hong Kong	67,7	60,9	C	Net Carrier	22,3	12,6	G	152	68,2	C	41	67,5	C	29
40	Srilankan Airlines	Sri Lanka	67,3	72,8	C	Net Carrier	4,3	66,8	C	50	66,7	C	53	67,9	C	27
41	Shandong Airlines	China	67,2	63,9	C	Net Carrier	14,1	67,6	C	44	67,1	C	48			
42	Beijing Capital Airlines	China	67,0		C	Net Carrier	9,2	67,4	C	46	67,0	C	49			
42	Chengdu Airlines	China	67,0	62,3	C	Regional	3,2	67,0	C	48	67,0	C	49			
42	Hainan Airlines	China	67,0	64,0	C	Net Carrier	25,4	71,2	C	25	67,3	C	47	62,4	D	56
42	TAP Portugal	Portugal	67,0	65,5	C	Net Carrier	11,4	54,7	D	108	66,5	C	55	68,3	C	26
46	Turkish Airlines	Turkey	66,8	68,4	C	Net Carrier	54,7	73,7	C	15	68,6	C	40	60,3	D	63
47	Etihad Airways	VAE	66,5	64,7	C	Net Carrier	14,8	61,0	D	88	65,6	C	60	67,0	C	33
48	Corsair	France	66,4	64,4	C	Charter	1,2	46,1	E	125	64,8	D	65	66,4	C	35
49	Air France	France	66,3	60,9	C	Net Carrier	47,0	70,9	C	28	72,5	C	25	63,0	D	50
50	Air Canada	Canada	66,1	63,2	C	Net Carrier	38,5	62,9	D	75	65,5	C	62	67,4	C	31
50	EVA Airways	Taiwan	66,1	70,0	C	Net Carrier	8,9	66,5	C	55	71,1	C	31	62,8	D	53
52	Thai Airways International	Thailand	66,0	68,2	C	Net Carrier	17,8	66,0	C	57	68,1	C	43	64,9	D	39
53	Icelandair	Iceland	65,7	66,6	C	Net Carrier	2,6	43,3	E	129	65,5	C	62	66,0	C	36
54	Delta Air Lines	USA	65,5	64,6	C	Net Carrier	171,4	64,3	D	63	68,2	C	41	61,1	D	60
54	Royal Air Maroc Express	Morocco	65,5	65,7	C	Regional	0,3	67,1	C	47	60,9	D	93			
54	Uzbekistan Airways	Uzbekistan	65,5	58,8	C	Net Carrier	2,6	58,8	D	95	66,8	C	51	61,2	D	59
57	Alitalia	Italy	65,4	64,2	C	Net Carrier	23,4	68,0	C	42	66,6	C	54	62,9	D	51
58	Air New Zealand	New Zealand	65,1	63,0	C	Net Carrier	13,7	68,1	C	41	70,6	C	33	59,3	D	68
58	Finnair	Finland	65,1	63,9	C	Net Carrier	9,6	71,1	C	26	72,8	C	22	58,2	D	70
58	United Airlines	USA	65,1	62,6	C	Net Carrier	91,5	66,5	C	55	69,5	C	37	60,6	D	61

*EP: Efficiency points; EK: Efficiency class; Pax: Number of passengers (data from Air Transport Intelligence, a service of ICAODATA.com, IATA WATS, and other sources); Type: The division of the airlines in categories was based on Air Transport Intelligence and other sources. In the event of ties, airlines are listed alphabetically.

The following airlines were not evaluated due to data gaps: Air Cairo, Air VIA, Air Wisconsin, AirCalin, Anadolu Jet, Avianca Ecuador, Blu-Express, Brit Air, Chang An Airlines, China Eastern Yunnan, China Xinhua Airlines, Cityjet, Citilink, Enter Air, Flybe Nordic, Freebird Airlines, GLOBUS, Miami Air International, Neos, NordStar, Nordwind Airlines, North American Airlines, Novair, Red Wings Airlines, Sverigeflyg, Travel Service Airlines, TUIfly Nordic AB, VivaColombia, Wings Air

¹ Due to the merger of US Airways and American Airlines in 2015, US Airways will not be sustained after a transition period. In 2014, both airlines still flew independently from each other; this is why they are shown separately.

Overall Ranking

Rank	Airline	Country	EP* '16	EP* '15	EK*	Type*	Pax (in Mio.)*
61	Aeroflot Russian Airlines	Russia	65,0	66,1	C	Net Carrier	23,6
62	Qatar Airways	Katar	64,9	65,2	D	Net Carrier	22,3
63	Lan Airlines	Chile	64,8	62,0	D	Net Carrier	30,0
63	Qantas Airways	Australia	64,8	63,0	D	Net Carrier	22,1
65	Air China	China	64,7	63,6	D	Net Carrier	54,6
65	El Al Israel Airlines	Israel	64,7	61,4	D	Net Carrier	4,6
67	Aeromexico	Mexico	64,0	56,8	D	Net Carrier	17,2
68	Air Tahiti Nui	Fr. Polynesia	63,8	60,2	D	Net Carrier	0,4
68	Hawaiian Airlines	USA	63,8	63,3	D	Net Carrier	10,2
68	Meridiana fly	Italy	63,8	52,4	D	Net Carrier	3,5
71	Air Mauritius	Mauritius	63,6	64,8	D	Net Carrier	1,4
72	Caribbean Airlines	Trinidad	63,5		D	Net Carrier	2,7
73	QantasLink	Australia	63,4	63,5	D	Regional	5,4
74	China Southern Airlines	China	63,1	61,7	D	Net Carrier	77,9
74	Tunisair	Tunisia	63,1	59,3	D	Net Carrier	3,1
76	Air Austral	Reunion	62,9	76,0	D	Net Carrier	1,0
77	Lufthansa	Germany	62,6	62,1	D	Net Carrier	77,5
78	Iberia	Spain	62,2	58,5	D	Net Carrier	10,7
79	China Eastern Airlines	China	62,0	61,6	D	Net Carrier	83,9
80	China United Airlines	China	61,6	63,6	D	Net Carrier	5,5
80	Hong Kong Airlines	Hong Kong	61,6	53,0	D	Net Carrier	5,0
82	EuroLOT	Poland	61,4	60,5	D	Regional	0,8
83	Aerolineas Argentinas	Argentina	61,3	56,4	D	Net Carrier	4,0
83	Alaska Horizon	USA	61,3	64,8	D	Regional	5,0
83	Dragonair	Hong Kong	61,3	56,4	D	Net Carrier	9,3
86	Austrian Airlines	Austria	61,2	58,3	D	Net Carrier	11,2
86	TianJin Airlines	China	61,2	54,3	D	Regional	9,9
88	Garuda Indonesia	Indonesia	60,5	60,7	D	Net Carrier	21,6
89	Copa Airlines	Panama	60,1	60,8	D	Net Carrier	7,8
90	Air Macau	Macao	60,0	58,4	D	Net Carrier	2,1
90	SilkAir	Singapore	60,0	60,3	D	Regional	3,5
92	Air India	India	59,8	58,1	D	Net Carrier	16,7
93	Philippine Airlines	Philippines	59,5	58,0	D	Net Carrier	9,6
94	Flybe	UK	59,3		D	Regional	7,2
95	HOP!	France	59,2	47,9	D	Regional	13,0
96	Japan Airlines	Japan	59,1	67,1	D	Net Carrier	28,2
96	Ural Airlines	Russia	59,1	64,5	D	Net Carrier	5,2
98	Asiana Airlines	South Korea	58,8	65,2	D	Net Carrier	16,5
98	China Airlines	Taiwan	58,8	58,5	D	Net Carrier	14,2
100	SAS Scandinavian Airlines	Sweden	58,6	54,6	D	Net Carrier	28,4
100	UTair Aviation	Russia	58,6	56,4	D	Net Carrier	8,6
100	Xiamen Airlines Company	China	58,6	53,5	D	Net Carrier	20,4
103	Biman Bangladesh Airlines	Bangladesh	58,5	56,8	D	Net Carrier	2,0
104	Air Canada Express	Canada	58,3	53,0	D	Regional	6,0
105	Malaysia Airlines	Malaysia	58,1	60,2	D	Net Carrier	17,0
106	American Airlines ¹	USA	57,9	58,5	D	Net Carrier	88,0
107	Singapore Airlines	Singapore	57,7	62,9	D	Net Carrier	18,7
108	Pakistan Int. Airlines	Pakistan	57,5	50,2	D	Net Carrier	4,2
109	Korean Air	South Korea	57,1	65,6	D	Net Carrier	23,5
110	Gulf Air	Bahrain	56,8	55,5	D	Net Carrier	5,2
111	All Nippon Airways	Japan	56,7	39,8	D	Net Carrier	50,4
112	Czech Airlines	Czech R.	55,9	53,8	D	Net Carrier	2,2
113	Air India Regional	India	55,7	47,0	D	Regional	0,3
113	ANA wings	Japan	55,7	21,6	D	Regional	5,0
115	British Airways	UK	55,3	60,3	D	Net Carrier	41,5
115	Rossiya Airlines	Russia	55,3	61,9	D	Net Carrier	5,2
117	Royal Air Maroc	Morocco	54,8	55,3	D	Net Carrier	6,8
118	Iberia Regional	Spain	54,6		D	Regional	2,0
119	Aeromexico Connect	Mexico	53,9	47,1	D	Regional	7,4
119	Air Niugini	Papua Neug.	53,9		D	Net Carrier	2,1
119	GoJet Airlines	USA	53,9		D	Regional	4,3
122	LOT - Polish Airlines	Poland	53,5	54,0	D	Net Carrier	4,8
123	Brussels Airlines	Belgium	53,4	50,6	D	Net Carrier	6,6
124	Ohana by Hawaiian	USA	53,3		D	Regional	0,2
125	Swiss	Switzerland	53,0	49,3	D	Net Carrier	16,2

Distance-based ranking

<800 km			800-3800 km			>3800 km		
EP*	EK*	Rank	EP*	EK*	Rank	EP*	EK*	Rank
66,8	C	50	66,1	C	58	61,7	D	58
61,1	D	85	66,3	C	56	64,6	D	41
63,9	D	67	66,2	C	57	62,7	D	54
75,2	C	11	72,9	C	21	55,1	D	79
65,0	C	62	62,8	D	79	69,7	C	23
70,0	C	34	67,6	C	46	59,7	D	65
65,9	C	58	63,4	D	75	65,0	C	38
						63,8	D	46
61,1	D	85				64,3	D	43
62,4	D	79	64,2	D	68	64,4	D	42
71,7	C	23	60,9	D	93	63,4	D	47
72,5	C	21	62,7	D	80	59,7	D	65
63,0	D	74	63,9	D	70			
63,6	D	69	63,0	D	77	63,9	D	45
64,0	D	64	63,6	D	74	55,4	D	77
65,2	C	61	62,9	D	78	62,7	D	54
62,9	D	75	70,0	C	35	58,9	D	69
63,5	D	70	71,0	C	32	51,0	D	91
62,1	D	81	61,7	D	86	63,4	D	47
62,9	D	75	61,0	D	92	64,2	D	44
71,1	C	26	61,1	D	91	57,2	D	71
61,4	D	82						
70,6	C	31	66,1	C	58	51,9	D	89
62,2	D	80	59,9	D	98			
57,3	D	100	61,8	D	84	59,7	D	65
57,5	D	99	58,8	D	101	67,5	C	29
60,6	D	90	61,6	D	88			
67,5	C	45	62,3	D	81	53,8	D	82
44,3	E	127	56,5	D	107	67,1	C	32
46,1	E	125	60,8	D	95			
59,4	D	93	60,1	D	97			
61,1	D	85	61,8	D	84	56,9	D	72
65,8	C	59	62,3	D	81	55,5	D	76
61,2	D	84	53,0	D	120			
63,4	D	72	55,3	D	111			
72,6	C	19	72,8	C	22	44,2	E	100
57,7	D	98	59,7	D	99	56,6	D	73
64,0	D	64	60,2	D	96	55,8	D	75
63,7	D	68	64,0	D	69	52,2	D	88
56,2	D	103	64,4	D	67	48,8	E	94
51,4	D	113	58,8	D	101	70,7	C	20
60,4	D	91	58,2	D	104	65,7	C	37
34,9	F	141	54,5	D	116	62,0	D	57
62,5	D	78	54,4	D	117			
66,7	C	53	64,7	D	66	49,6	E	93
56,4	D	102	63,2	D	76	47,6	E	97
20,6	F	150	63,7	D	72	56,5	D	74
51,1	D	115	56,9	D	106	59,8	D	64
68,3	C	40	62,1	D	83	53,5	D	83
46,9	E	122	59,7	D	99	55,3	D	78
68,0	C	42	65,6	C	60	42,7	E	104
58,6	D	96	56,0	D	108	50,9	E	92
65,5	C	60	41,9	E	138			
55,8	D	106	55,4	D	110			
58,1	D	97	61,7	D	86	52,7	D	85
56,7	D	101	55,1	D	112	69,8	C	22
50,5	E	116	55,7	D	109	52,3	D	87
56,0	D	104	51,3	D	124			
52,2	D	112	54,9	D	114			
4,8	G	154	54,2	D	118	54,6	D	80
			53,9	D	119			
41,7	E	134	48,2	E	129	71,9	C	17
53,9	D	110	52,8	D	121	54,3	D	81
53,3	D	111						
55,9	D	105	61,5	D	89	47,9	E	96

* EP: Efficiency points; EK: Efficiency class; Pax: Number of passengers (data from Air Transport Intelligence, a service of ICAODATA.com, IATA WATS, and other sources); Type: The division of the airlines in categories was based on Air Transport Intelligence and other sources. In the event of ties, airlines are listed alphabetically.

¹ Due to the merger of US Airways and American Airlines in 2015, US Airways will not be sustained after a transition period. In 2014, both airlines still flew independently from each other; this is why they are shown separately.

Ranking Charter Carrier

Rank	Airline	Country	Efficiency Class	Efficiency Points 2016	Efficiency Points 2015	Efficiency Points 2014	Type	Pax (in Mio.)
1	TUIfly	Germany	B	82,7	83,6	83,3	Charter	7,8
2	Thomson Airways	UK	B	81,6	82,2	72,8	Charter	10,4
3	Corendon Airlines	Turkey	B	80,4	-	-	Charter	1,8
4	Thomas Cook Airlines	UK	B	79,4	68,2	62,1	Charter	6,0
5	XL Airways France	France	B	78,8	74,1	69,0	Charter	0,8
6	Condor Flugdienst	Germany	B	78,7	72,4	70,4	Charter	7,2
7	Arkefly	Netherlands	B	78,6	-	-	Charter	1,2
8	Monarch Airlines	UK	C	77,5	80,3	80,5	Charter	7,0
9	Jetairfly	Belgium	C	75,9	-	-	Charter	2,8
10	Air Transat	Canada	C	75,7	76,4	76,3	Charter	3,5
11	Jet2.com	UK	C	75,1	-	-	Charter	6,0
12	Onur Air	Turkey	C	73,9	83,4	72,9	Charter	4,7
13	Edelweiss Air	Switzerland	C	70,1	-	-	Charter	1,1
14	Corsair	France	C	66,4	64,4	69,3	Charter	1,2

Ranking Regional Carrier

Rank	Airline	Country	Efficiency Class	Efficiency Points 2016	Efficiency Points 2015	Efficiency Points 2014	Type	Pax (in Mio.)
1	China West Air	China	B	83,1	-	-	Regional	4,3
2	Air Caraibes	Guadeloupe	B	78,0	-	-	Regional	1,2
3	Comair	South Africa	C	76,8	55,1	-	Regional	5,2
4	MASwings	Malaysia	C	72,6	86,6	80,7	Regional	1,6
5	Aegean Airlines	Greece	C	72,5	74,7	69,7	Regional	10,1
6	Air New Zealand Link	New Zealand	C	72,0	76,2	74,6	Regional	3,0
7	Tunisair Express	Tunisia	C	71,8	92,5	84,6	Regional	0,1
8	Transasia Airways	Taiwan	C	69,1	73,4	-	Regional	3,4
9	Chengdu Airlines	China	C	67,0	-	-	Regional	3,2
10	Royal Air Maroc Express	Morocco	C	65,5	-	-	Regional	0,3
11	QantasLink	Australia	D	63,4	63,5	56,8	Regional	5,4
12	EuroLOT	Poland	D	61,4	60,5	60,9	Regional	0,8
13	Alaska Horizon	USA	D	61,3	64,8	67,2	Regional	5,0
14	TianJin Airlines	China	D	61,2	-	-	Regional	9,9
15	SilkAir	Singapore	D	60,0	-	-	Regional	3,5
16	Flybe	UK	D	59,3	-	-	Regional	7,2
17	HOP! ²	France	D	59,2	47,9	23,8	Regional	13,0
18	Air Canada Express	Canada	D	58,3	53,0	50,7	Regional	6,0
19	ANA wings	Japan	D	55,7	-	-	Regional	5,0
19	Air India Regional	India	D	55,7	-	-	Regional	0,3
21	Iberia Regional	Spain	D	54,6	58,1	58,0	Regional	2,0
22	GoJet Airlines	USA	D	53,9	-	-	Regional	4,3
22	Aeromexico Connect	Mexico	D	53,9	47,1	37,8	Regional	7,4
24	Ohana by Hawaiian	USA	D	53,3	-	-	Regional	0,2
25	South African Express	South Africa	D	51,3	56,0	54,7	Regional	0,2
26	Nordic Regional Airlines	Finland	E	50,4	45,5	-	Regional	3,0
27	Olympic Air	Greece	E	50,0	-	-	Regional	1,6
28	Bangkok Airways	Thailand	E	49,8	-	-	Regional	4,8
29	BA CityFlyer	UK	E	48,8	41,7	43,8	Regional	1,7
30	US Airways Express	USA	E	48,4	53,7	48,4	Regional	9,0
31	KLM Cityhopper	Netherlands	E	46,5	-	-	Regional	7,0
32	J-Air	Japan	E	46,2	47,3	47,5	Regional	1,7
33	TAP Express	Portugal	E	42,3	40,9	41,1	Regional	1,2
34	United Express	USA	E	41,1	31,1	38,3	Regional	25,0
35	Austral Lineas Aereas	Argentina	E	40,4	-	-	Regional	2,9
36	Envoy ¹	USA	E	38,5	41,2	40,7	Regional	16,1
37	Delta Connection	USA	E	37,4	34,0	35,1	Regional	40,0
38	Swiss Global Air Lines	Switzerland	F	35,8	-	-	Regional	1,5

¹ Envoy is a label of American Airlines

² Hop! is a label of Air France

The Low Cost or so-called budget airlines (LCC) have purposely been included in this airline index in a different kind of illustration. They have to be considered separately, since they raise methodological issues in total CO₂ calculation and representation, which renders them not-comparable to other airlines. However, at least the direct CO₂ emissions of the LCCs can be calculated. In order to not withhold this information from flight passengers, LCCs are thus represented here in a more approximate form, which balances known with unknown parameters, as discussed below.

The methodological issues include:

1. Subsidies:

Many, though not all, budget airlines receive subsidies, and hence generate flights which they could not otherwise have offered at such low prices. These subsidies thus stimulate flights and subsequently emissions of CO₂, which would need also be assigned to the climate account of the subsidized airlines, but which cannot be calculated by the Airline Index. Other airlines benefit from subsidies as well, but they do not convert those subsidies equally into cheaper fares and thus more CO₂.

2. Detours:

Many budget airlines fly to and from regional airports. However, the ground travel required to get to these airports is generally longer than in the case of hub to hub flights. These longer ground transport distances cause additional CO₂, which must be incorporated into the ranking.

Note: not all budget airlines are alike. atmosfair has assumed the definition and categorization of airlines as “Low Cost airlines” from the ATI, the service provider for the international civil air transport organization ICAO. The definition is given in the complete documentation of the methodology, which can be downloaded from the atmosfair website.

Low Cost Carrier ¹		
Efficiency Class	Type	Airlines
A	Low Cost Carrier	----
B	Low Cost Carrier	Aer Lingus Regional, AirAsia, Easyjet, IndiGo Air, Indonesia AirAsia, Norwegian Air Shuttle Spring Airlines, Thai AirAsia
C	Low Cost Carrier	Aer Lingus, Air Arabia, Allegiant Air LLC, Azul Airlines, Cebu Pacific Air, Citilink Indonesia, Frontier Airlines Inc., Jet Lite, JetBlue Airways, Jetstar Airways, Nok Air, Pegasus Airlines, Ryanair, Southwest Airlines, Spirit Airlines, Tiger Airways, Transavia, Virgin America, Volaris, Vueling Airlines, Westjet, Wizz Air
D	Low Cost Carrier	Allegiant Air LLC, Interjet, Nok Air, Skymark Airlines, Sun Country Airlines
E	Low Cost Carrier	---
F	Low Cost Carrier	----
G	Low Cost Carrier	----

¹ In alphabetical order within one efficiency class

Where do particular airlines win or lose efficiency points?

The following brief characterization¹ addresses important factors which help determine the results of an airline. We will limit ourselves to the factors aircraft type, seating capacity and load factor. The last two factors yield the number of passengers carried. These factors and their weighting in the evaluation are not stipulated by the AAI, but is calculated from the physical values for these factors which actually occur for each airline.

Airlines which achieve the best results are those using modern equipment, having high seating density and high rates of passenger occupancy and load utilization. That means for one thing that those airlines with high rates of occupancy carry passengers most efficiently if they have maximum seat density. Airlines have differing priorities in optimizing their service to their customers. Atmosfair does not evaluate these priorities, but it does evaluate the CO₂ emissions associated with them.

China West Air	Chinese regional airline, flies only with efficient aircraft (including A320). Achieved the top ranking also through very dense seating and very high occupancy.
TUIfly	Best charter airline worldwide. Flies consistently with efficient aircraft (e.g., B737-800). The aircraft almost maximizes seating and thus achieved the top position due to very high occupancy.
Condor	Flies with tight seating and efficient aircraft (e.g., A320, B757). Condor, particularly on medium-distance routes, gained points compared to the previous year due to its high occupancy.
LATAM Brasil	Fleet with efficient aircraft (e.g., A320, A330, B777), slightly more seating than average. In combination with a high occupancy level, LATAM once again earned a top rank.
Air Transat	Very dense seating in all aircraft. About a quarter of the fleet consists of more inefficient aircraft (A310) and about three-quarters of more efficient aircraft. In combination with a very high occupancy on medium and long-distance routes, Air Transat gained many points. Lost points on short-distance routes through occupancy that was far below average.
Air Berlin	Fleet with consistently modern and efficient machines (A319, A320, B737-700, B737-800, A330). Dense seating especially within the short and medium-distance fleet. In combination with the regularly high occupancy, Air Berlin is ranked as the leading net carrier in Europe.
Emirates	Fleet with modern jets (i.a., B777, A330, A340, A380). However, these WideBody Jets have less seating than average and are therefore even less efficient than NarrowBody Jets with below average seating. Emirates gained points through slightly above-average occupancy. This was slightly higher compared to the previous year, which gave Emirates more points.
Delta Airlines	One of the largest airline in the world. Three-quarters of the fleet consists of efficient aircraft (A320, B737-700, B737-800) and one quarter of rather inefficient aircraft (including MD-80, B747). The fleet predominantly has less seating than average, which resulted in Delta performing under its potential. Compared to the previous year, Delta gained more points through higher occupancy.
Alitalia	Fleet with predominantly efficient machines (e.g. A320, A330, B777). Short-haul fleet with slightly more seating than average, long-distance fleet slightly below average. Overall, only average occupancy. This has been improved on long-distance routes as compared to the previous year, which means that Alitalia achieved more points there.
Lufthansa	Lufthansa was able to increase its efficiency compared to the previous year through improved occupancy and an improved fleet. The fleet has slightly less seating than average and hence did not fully exploit its efficiency potential. On the short and medium-distance routes, Lufthansa used fewer of the more inefficient aircraft models, but this still made up about one-fifth of all aircraft (e.g., B737- 300/500). On the long-distance routes, Lufthansa increasingly used modern wide-body jets (A330, A380, B747-8I). Altogether, Lufthansa gained more points compared to the previous year.

¹ Die hier getroffene Auswahl stellt keine Wertung dar

² WideBody Jets haben einen Rumpf mit Raum für zwei Passagiergänge. NarrowBody Jets haben dagegen nur Raum für einen Gang.

Background: How to rank unbiasedly short vs. long haul flights

Car drivers are used to easy and absolute climate efficiency indicators: grams CO₂ per kilometer or gallons per mile. This is not the case for aircraft: Every plane has to take off and climb out to a minimum altitude, regardless of how far it goes after that.

For these reasons, CO₂ emissions per passenger and kilometer will always be higher on a short distance flight than on medium-distance flights, just due to flight physics. On long haul flights specific emissions raise again, since the fuel used at the end of the flight was carried around the entire flight before without being useful.

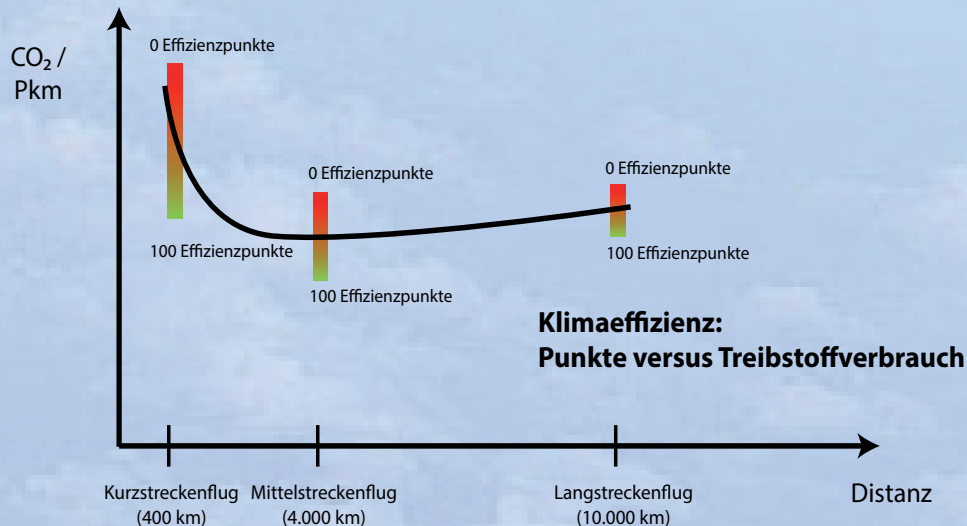


Figure 1 shows average CO₂ emissions per passenger and kilometer as a function of the flight distance (full curve). For typical short, medium and long haul distances, three bars show the range of CO₂ efficiencies of planes from the real airlines covered in the AAI. The green end of the bar marks the best CO₂ efficiency that can be achieved on this distance, red the inefficient end. The following can be seen immediately from the graph:

- A slightly inefficient medium haul flight is still more efficient than the most efficient short distance flight (green end of the short-distance bar).
- An average efficient medium distance flight is as efficient as the most efficient long haul flight.

This shows that absolute indicators such as g CO₂ per passenger kilometer do not tell much about the climate efficiency of an airline. A long haul airline with specific emissions of 120 g CO₂ per passenger kilometre may be closer to the achievable optimum than the 75 g CO₂ fleet of a medium haul airline. In this case, the long haul carrier would be discriminated by using absolute efficiencies, and the potential efforts of the airline would not be appreciated adequately.

The Airline Index provides undistorted comparison:

100 efficiency points mark the optimum already achievable today. The Airline Index is thus based upon an innovative methodology, which cures this distortion: The AAI compares the CO₂ emissions of airlines on the same city pairs (e.g. Paris - London) and thus at equal distances. Only in a second step these city pair efficiency results are added up to global efficiency points for an airline.

The results are therefore based upon the technological and operative CO₂ efficiencies of airlines and renders them directly comparable. The efficiency points (EP) of the AAI express, how close an airline comes to the potential optimum result (best aircraft, best engine, maximum load factors etc.). 100 efficiency points mark this optimum, which an airline can realize today, using existing technology and employing best operations.

The atmosfair Airline Index method

1. Calculation of the CO₂ per net load kilometer for each flight-based on i.a. aircraft type, engine, seat and cargo capacity- and load factor.
2. Comparison of the CO₂ per net load kilometer with the best-case flight (according to the ICAO calculation method).
3. Determination of the city pair efficiency points of an airline (best case: 100 points; others relative to that).
4. Compilation of the city pair points of each airline to generate its mean global efficiency points.
5. Ranking of the airlines by global efficiency points

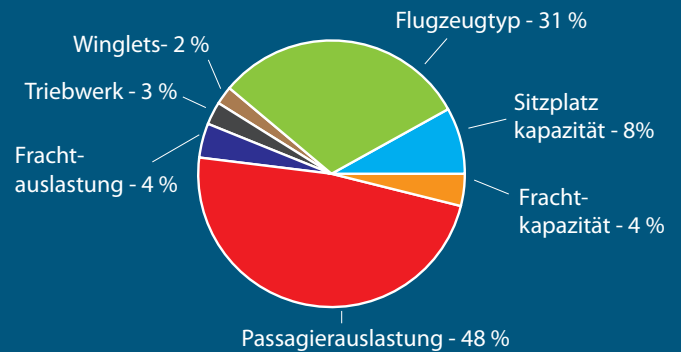
The AAI is based on the CO₂ calculation method of the ICAO. Accuracy: +1.5 efficiency points

Detailed documentation of the CO₂ calculation method on www.atmosfair.de/airlineindex

Highlights atmosfair Airline Index 2016

- 32 million flights
- More than 200 airlines worldwide
- 22.300 City Pairs worldwide
- 92% of global air traffic
- average efficiency gain over AAI 2015 (all airlines): 1,9% less CO₂ per passenger and kilometre
- 119 aircraft types (covering 97% of the market)
- 408 engines (covering 96% of the market)
- Respected independent data sources: ICAO, IATA, OAG, FlightGlobal etc.
- 2014 data

Efficiency optimization: What has the greatest effect?



In order to increase CO₂ efficiency, airlines can optimize various factors. The graphic shows which factors have the greatest effect on reducing CO₂ emissions changing the factor by one standard deviation.

About atmosfair



Klaus Töpfer,
patron,
atmosfair

atmosfair is a nonprofit organization for combating climate change, founded in 2004 from a research project of the German federal Ministry for the environment. We reduce CO₂ emissions of the source, e.g. via incentive programs for video conferences instead of business trips and companies. We compensate the remaining CO₂ emissions for our clients in CDM Gold standard projects with direct utility for local people and for the climate. Our reference customers include DHL and Greenpeace.

Since 2005 atmosfair performed best in international comparative studies:



(Selection)