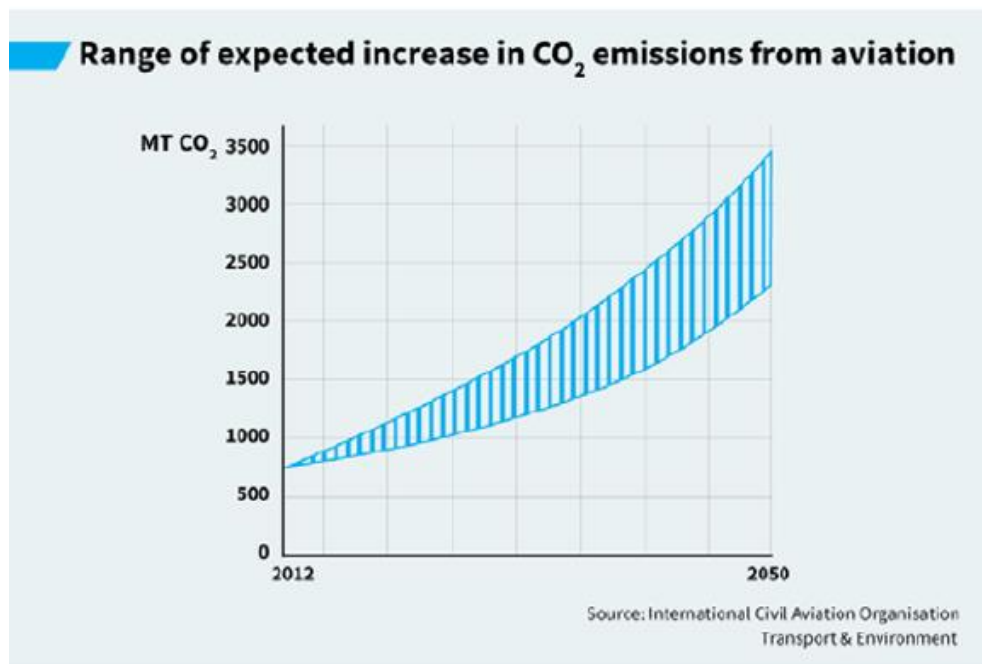


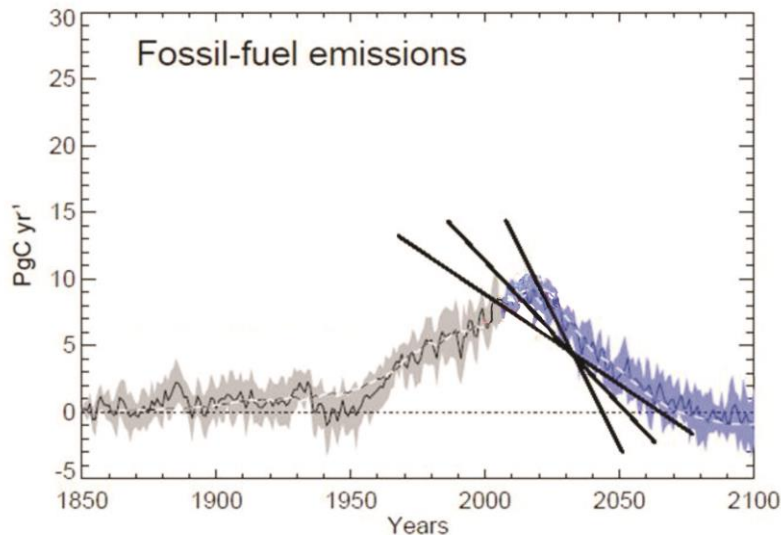
## The inclusion of aviation in the ETS and the latest developments at ICAO

### Why is it necessary to limit the greenhouse gas emissions from aviation?

The greenhouse gas emissions from aviation grow quickly. Under a no action scenario, the International Civil Aviation Organization (ICAO) predicts them to accumulate to 1900 Mt until 2040.



Other estimations are predicting 3500 to 4500 Mt until 2050. 3.5 giga-tonnes are 20% of the amount to which global emissions need to be limited according to IPCC in 2050 to contain climate change to 2 degrees. **In 2014, the sector emitted more CO<sub>2</sub> into the atmosphere than the combined emissions of the 129 lowest emitting countries including countries like Hungary, Finland and Singapore (see list 1 at the end of this briefing).**



According to the 5th IPCC Report that has been published on September 30, 2013 global emissions need to be drastically reduced until 2050 if we want to have a 2/3 probability to keep the 2 degrees target that year.

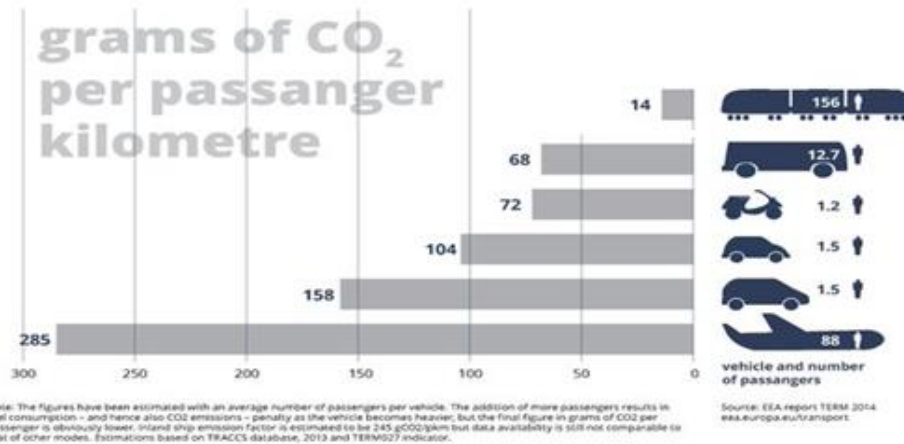
Source: IPCC

The task to regulate airline emissions has been given by the international community to the ICAO in 1997 with the Kyoto Protocol. While the Kyoto Protocol falls short when it comes to the challenge of climate change, one cannot ignore that at least the European Union has followed its obligation and limited emissions. The Paris Agreement, which entered into force on 4 November 2016, brings mitigation commitment for almost 200 states<sup>1</sup> worldwide, the EU has committed to a greenhouse gas reduction target of at least 40% in 2030. Compared to this ambition and activity in the rest of the economy, the action under ICAO that has been agreed until 27.09.2016, is only minimal. There was no global agreement under ICAO and no significant action had been implemented to limit emissions growth in the 19 years since Kyoto before the 39th Assembly of ICAO in 2016.

It is necessary that the aviation industry participates in the efforts to limit climate change from the point of fairness to other modes of transport. Unfortunately, aviation is the least climate-friendly mode of transport, and while other modes of transport are highly regulated and subject to many taxes and fees, aviation has not been addressed at European level:

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<sup>1</sup> 197 Parties to the Convention



Note: The above figures have been estimated with an average number of passengers per vehicle, which is 1.52 for cars, 12.7 for buses and 1.16 for two-wheelers, 88 for aircrafts and 156 for rail (no data for ships). The addition of more passengers results in fuel consumption — and hence also CO<sub>2</sub> emissions — penalties as the vehicle becomes heavier, but the final figure in grams of CO<sub>2</sub> per passenger is obviously lower. This effect has been estimated for CO<sub>2</sub> emissions from passenger cars, and a range of values is provided above (the higher value corresponds to the average number of passengers, and the lower value to a car with the driver, three passengers and luggage). For other vehicles (except two-wheelers), which are generally much heavier than passenger cars, this effect is insignificant. EEA 2014, p. 104: <http://www.eea.europa.eu/publications/term-report-2014>

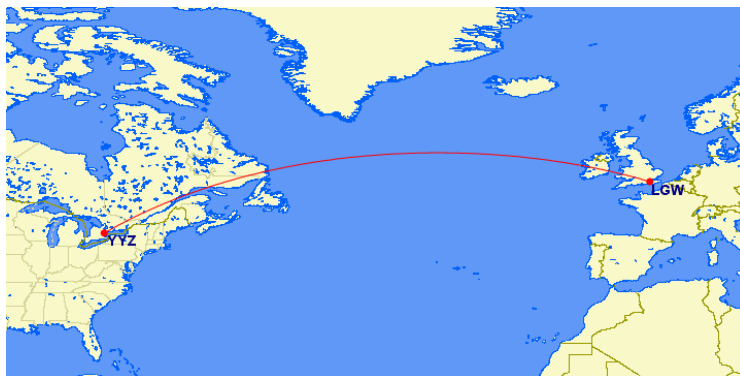
### The legislation from 2008, the criticism from third countries and the legitimacy of this criticism

The legislation including aviation in the ETS has been approved after more than two years debate and involvement of all stakeholders unanimously by the Council and with more than 90% majority in the European Parliament. A cornerstone of the legislation was that all flights that start and land in Europe are included. This has been the point of criticism by third countries. However, after a court case by the American airlines, the European Court of Justice decided that it is fully in line, not only with European, but also with international law. The legislation is very moderate compared to other industries. It implies only 15% auctioning of the allowances, compared to 40% as an average of the ETS, the cap is only 5% compared to 21% in all the other sectors. That's why also the costs are very moderate, despite the claims of third countries, which sometimes speak about outrageous burden for their industry. According to the latest figures, the cost for Ryanair has been 0.03€, for Easyjet 0.11€ (other airlines with a less efficient fleet may have slightly higher costs). The costs of taxes and fees implied by member states of the European Union or third countries are much higher.

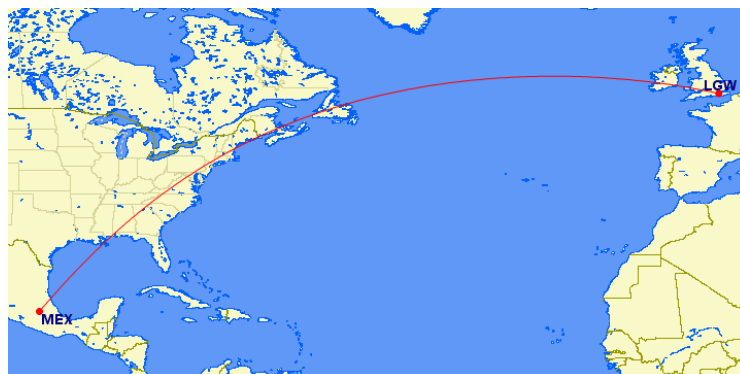
Country	Law	costs per flight
Germany	Luftverkehrssteuer	Up to 42,18 € depending on destination
UK	Air Passenger Duty APD	Up to over 184£6000 miles

Austria	Flugabgabegesetz	Up to 35€ depending on distance
USA	International Transportation Tax	16,30\$/Passenger
EU	ETS	0.03€ (Ryanair) Up to 2€/intercontinental flight (estimate by Commission)
India	Departure Fee + 10,3 % Service Charge (on Airport Development Tax in Delhi)	7,40€ , \$ 10 +19 €, \$ 25 (only in Delhi)
France	Civil aviation tax	Up to 7,49€/Passenger outside of the EU

One important argument by third countries was that the European Union legislation is illegal because of the extra-territoriality. This argument is, according to the Court of Justice, invalid because only flights that start and land in Europe are covered. However, the obligation to surrender allowances is of course higher if the flight is longer. This, however, is not a unique feature of the European legislation. Also, national taxes and fees apply the same principle, for example the British fee is significantly higher for a flight to Mexico than for a flight to Canada, even if the distance between Canada and Mexico is mainly territory of the United States, see following map:



A flight to Toronto, Canada (approximately 3500 miles) is only charged APD of £130 (156 € / \$ 206).



A flight in business class from London to Mexico City after the 1st April of 2012 (approximately 5000 miles) will be charged APD of £162 (195 € / \$ 257).

## **The ICAO process and the Stop the Clock legislation**

Even though the criticism is not legitimate, the European Union reacted on the third countries' arguments. It has been said that the European legislation stands in the way of an international agreement. This has never been true, but as a gesture of good will, the Commission proposed to limit the scheme to intra-European flights for one year to help find a better agreement in the ICAO General Assembly in September and October 2013.

The ICAO Assembly in September and October 2013 adopted a resolution which included a commitment *"to develop a global MBM for international aviation, taking into account the work called for in paragraph 19"*.

To help the process at ICAO, the European Union two times "stopped the clock" (limiting the scheme to intra-European flights). In the first decision for one year and in the second decision in 2014 for two more years. So, only emissions from **flights within the** European Economic Area (EEA) – the 28 EU Member States, plus Iceland, Liechtenstein and Norway – fall under the EU ETS, which means flights that start and land at a European airport. This stop the clock derogation expires end of 2016. With no change in the legislation, airlines would have to surrender allowances also for intercontinental flights that start or land in Europe in spring 2018. The decision, if the EU would amend the legislation, is very much linked to the outcome of the 39th ICAO Assembly in Montreal

### **39th ICAO Assembly in Montreal**

On October 6 2016, the ICAO Assembly agreed on the CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation). Even though many details are unclear, some conclusions can be drawn. The ambition of ICAO is very limited, compared to the ambition of the European Union and other industrialized states under the Paris agreement ICAO did not adopt reduction targets, while the EU has committed to reduce emissions by 40% until 2030. The industry that is included in the EU ETS would even have to reduce emissions by 43%. This is very ambitious and brings many problems, especially in industries where technical solutions to limit emissions are not really available (steel, cement, lime, fertilizers). ICAO is only aiming at carbon neutral growth. This contrasts also to the commitment of the aviation industry. The association IATA has committed itself to a 50% reduction target in 2050. There is unfortunately no talk at ICAO about this.

	<b>Other industries</b>	<b>Aviation EU ETS</b>	<b>Aviation CORSIA</b>
<b>Reduction target</b>	Allowances that can be used by fixed installations to cover emissions will be <b>43% lower in 2030 (compared to 2005)</b>	<b>5% reduction target</b>	No reduction
<b>Free allocation</b>	100% auctioning as a rule	15% auctioning	
<b>Implementation</b>	<b>Obligatory</b>	<b>Obligatory</b> for intra-European flights	<b>Voluntary</b> until 2027
<b>Reductions or offsetting</b>	Real reductions, no offsetting	Real reductions, no offsetting	Offsetting, rules unclear

Another problem is that even carbon neutral growth will not be real but only virtual. The only instrument that is discussed under ICAO is offsets. The EU abolished offsets for the other industries because first of all, there has been a lot of criticism that these offset mechanisms like Clean Development Mechanism (CDM), were not really helpful for the climate but rather trading hot air, sometimes they even had a negative impact on the environment, like credits for industrial gases. Second, under the Paris agreement, almost every state in the world has a target so it is not easy to see where offsets would come from.

During the last months it has become clear that even this quite unambitious scenario is further weakened. Unfortunately, the activity to really limit the growth of aviation emissions will not be binding before 2027. From 2021 on, there will be only voluntary action for those parties that would like to contribute. The negotiators had to make these concessions in order to secure the deal.

The scheme will be subject to three-year reviews of its effectiveness and ambition. In its first phase (2021-2026), 65 countries will participate on a voluntary basis. All EU Member States will join from the start, including China and USA. India and Russia had reservations. In its second phase (2027-2035) participation is mandatory (except exempted countries with small aviation activities). This means that in theory around 80% of the emissions above 2020 levels will be offset by the scheme between 2021 and 2035.

The existing regulation on the emission trading<sup>2</sup>, clearly calls for a scheme that will reduce GHG emissions from aviation.

(5) The derogations provided for in this Regulation take into account the results of bilateral and multilateral contacts with third countries, which the Commission will continue to pursue on behalf of the Union, in order to promote the use of market-based mechanisms to **reduce** emissions from aviation.

<sup>2</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0421&from=EN>

(6) It is recalled that Directive 2003/87/EC envisages the possibility of adopting measures amending the aviation activities listed in Annex I to that Directive where a third country introduces measures to **reduce** the climate change impacts from aviation activities.

8. The Commission shall regularly, and at least once a year, inform the European Parliament and the Council of the progress of the International Civil Aviation Organization (ICAO) negotiations as well as of its efforts to promote the international acceptance of market-based mechanisms among third countries. Following the 2016 ICAO Assembly, the Commission shall report to the European Parliament and to the Council on actions to implement an international agreement on a global market-based measure from 2020, **that will reduce greenhouse gas emissions from aviation in a non-discriminatory manner**, including on information, with regard to the use of revenues, submitted by Member States in accordance with Article 17 of Regulation (EU) No 525/2013.

The ICAO agreement did not satisfy the expectations of the European Parliament. That it is why it is of crucial importance that the agreement did not at the same time limit the European Union's possibilities to legislate the climate effects of aviation for aircrafts that start or/and land in Europe. It is very important to find a global solution but the solution has to be effective. Commissioner Arias Cañete said in the ENVI committee on 12.09.2016 that in any case the EU ETS will continue for flights that start and land in Europe (intra-European flights).

### **Link between general review of the EU ETS (Report Duncan) and aviation**

In its report on the general review of the ETS (Report Duncan) the European Parliament's Environmental committee adopted an increased ambition for aviation. The auctioning level should be increased from 15% to 50% and the cap should be reduced from 5% to about 10% in 2021. From 2021 on, the aviation industry should be subject to the same linear reduction factor than the other industries.

This is also important as some energy-intensive industry, like the steel industry, needs to be treated more generously under the ETS. To maintain the environmental ambition, other parts of the economy needs to contribute.

The final assessment of the situation has to take into account, the ambition of the ICAO agreement and the possibility of the EU to keep (parts of) the ETS as it was originally designed. The assessment of the Parliament will most likely also take into account which kind of third countries will be voluntary participating in the ICAO scheme from 2021. It is of crucial importance that at least the big emitters like the US and China participate.

**European Parliament resolution of 6 October 2016 on the implementation of the Paris Agreement and the 2016 UN Climate Change Conference in Marrakesh, Morocco (COP22) (2016/2814(RSP))**

27. Recalls that transport is the second biggest GHG-emitting sector; regrets that international aviation and shipping are not mentioned in the Paris Agreement; insists on the need to put a range of policies in place aimed at lowering emissions from this sector; reiterates the need for the UNFCCC Parties to act to effectively regulate and cap emissions from international aviation and shipping, in line with the needs and urgency of the situation; calls on all the Parties to work through the ICAO and the IMO to develop a global policy framework that enables an effective response, and to take measures to set adequate targets before the end of 2016 to achieve the necessary reductions in the light of the well below 2 °C target;

28. Recalls that GHGs from aviation were incorporated into the EU ETS on 1 January 2012, obliging all aircraft operators under the scope of the ETS to obtain carbon emission allowances; notes the adoption of two ‘Stop-the-Clock’ Decisions in 2013 and 2014, which temporarily reduced the scope of the EU ETS to exclude international flights in order to allow the ICAO time to develop a Global Market-Based Measure (GMBM) for reducing international aviation emissions, and notes that this exemption will expire from 2017 onwards;

29. Calls for the establishment at the currently ongoing 39th Session of the ICAO Assembly of a fair and robust GMBM to be implemented at international level from 2020 onwards; expresses its deep disappointment with the current proposal being discussed at the ICAO and recalls that any amendment of the existing legislation on including aviation in the EU ETS can only be considered if the GBMB is ambitious, and that, in any case, intra-European flights will continue to be covered by the EU ETS;



In 2014, the aviation sector emitted more CO2 into the atmosphere than the combined emissions of the 129 lowest emitting countries (below marked blue)

## Environmental Indicators: GHGs

### Greenhouse Gas Emissions

Last update: November 2015

Choose a country from the following drop-down list:

Germany

Country	latest year available	Total GHG emissions	% change since 1990	GHG emissions per capita	Total GHG emissions including LULUCF/LUCF
		<i>mln. tonnes of CO<sub>2</sub> equivalent</i>	<i>%</i>	<i>tonnes of CO<sub>2</sub> equivalent</i>	<i>mln. tonnes of CO<sub>2</sub> equivalent</i>
Germany	2000	0,60	-13,3	5,58	10,34

website: <http://unstats.un.org/unsd/ENVIRONMENT/indicators.htm>

Country	latest year available	Total GHG emissions	% change since 1990	GHG emissions per capita	Total GHG emissions including LULUCF/LUCF
		<i>mln. tonnes of CO<sub>2</sub> equivalent</i>	<i>%</i>	<i>tonnes of CO<sub>2</sub> equivalent</i>	<i>mln. tonnes of CO<sub>2</sub> equivalent</i>
China	2005	7 465,86	...	0,79	28,76
United States of America	2012	6 487,85	-22,4	1,76	7,06
European Union (28)	2012	4 544,00	...	3,56	103,14
Russian Federation	2012	2 297,15	...	3,44	63,52
India	2000	1 523,77	53,8	7,70	0,61
Japan	2012	1 343,14	22,0	7,61	238,70
Germany	2012	939,08	-71,1	2,43	6,66
Brazil	2005	862,81	31,0	23,73	558,81
Canada	2012	698,63	2,5	9,47	76,22
Republic of Korea	2012	688,43	-29,0	5,62	42,09
Mexico	2006	641,45	14,7	7,96	2,20
United Kingdom of Great Britain and Northern Ireland	2012	586,36	...	33,55	22,37
Indonesia	2000	554,33	...	0,70	117,65
Australia	2012	543,65	-32,9	8,24	3,74
France	2012	496,40	-35,8	9,41	63,78
Iran (Islamic Republic of)	2000	483,67	-18,5	10,52	115,14
Italy	2012	461,19	...	31,41	2,31
Turkey	2012	439,87	...	0,90	- 5,08
Ukraine	2012	402,67	...	2,76	- 4,75
Poland	2012	399,27	185,0	4,87	91,71
South Africa	1994	379,84	-52,7	4,24	8,91
Spain	2012	340,81	...	6,04	- 29,44
Saudi Arabia	2000	296,06	49,7	4,58	2 191,86
Kazakhstan	2012	283,55	-44,2	8,39	53,05
Argentina	2000	282,00	...	0,61	4,58
Côte d'Ivoire	2000	271,20	...	3,34	11,13
Viet Nam	2010	266,05	...	1,02	0,47
Ecuador	2006	247,99	...	1,23	- 5,15
Thailand	2000	236,95	...	12,23	187,91
Nigeria	2000	212,44	18,2	20,25	739,49
Uzbekistan	2005	199,84	...	11,60	- 101,58
United Arab Emirates	2005	195,31	...	1,22	- 38,18
Malaysia	2000	193,40	...	4,85	59,57
Egypt	2000	193,24	...	5,72	7 045,04
Netherlands	2012	191,67	29,6	3,60	179,90
Cameroon	1994	165,73	...	1,10	- 0,38

Pakistan	1994	160,59	...	0,66	- 80,00
Colombia	2004	153,88	...	4,40	- 0,07
Czech Republic	2012	131,47	98,9	2,85	8,61
Philippines	2000	126,88	...	16,42	252,82
Romania	2012	118,79	-17,3	6,17	19,91
Belgium	2012	116,52	-58,3	2,42	11,65
Jamaica	1994	116,31	52,1	8,20	9,24
Venezuela (Bolivarian Republic of)	1999	114,13	-33,0	12,47	124,21
Algeria	2000	111,02	-57,9	3,76	70,45
Greece	2012	110,99	...	0,87	- 132,78
Bangladesh	2005	99,44	-24,1	9,48	52,28
Belarus	2012	89,28	...	1,48	- 1,38
Democratic People's Republic of Korea	2002	87,33	...	2,58	0,05
Peru	2010	80,59	109,1	3,09	7,64
Austria	2012	80,06	38,8	17,75	410,14
Chile	2006	78,96	65,5	2,83	193,24
New Zealand	2012	76,05	...	1,86	14,45
Israel	2010	75,42	...	1,11	12,22
Turkmenistan	2004	75,41	-52,8	14,49	17,24
Portugal	2012	68,85	11,0	0,86	37,87
Zimbabwe	2000	68,54	-21,0	...	4 240,67
Sudan	2000	67,84	...	3,31	- 5,28
Hungary	2012	61,98	-13,3	11,24	35,11
Angola	2005	61,61	-11,4	7,81	452,14
Qatar	2007	61,59	...	5,00	- 58,00
Bulgaria	2012	61,26	...	15,77	19,82
Finland	2012	60,97	-73,1	2,76	12,22
Morocco	2000	59,70	-24,8	11,67	935,60
Ireland	2012	58,53	97,5	0,97	23,79
Sweden	2012	57,61	5,8	9,99	108,13
Denmark	2012	53,12	...	16,16	1,51
Norway	2012	52,76	0,0	1,61	- 24,80
Switzerland	2012	51,49	...	0,67	- 12,54
Serbia	1998	50,60	...	1,47	- 11 286,71
Ethiopia	1995	47,75	13,2	4,14	- 51,57
Singapore	2010	46,87	...	0,78	7,83
Democratic Republic of the Congo	2003	46,00	...	1,65	14,48
Bolivia (Plurinational State of)	2004	43,67	-36,5	6,22	57,57
Azerbaijan	1994	43,17	26,3	13,81	5,17
Slovakia	2012	43,12	...	1,45	1 301,20
United Republic of Tanzania	1994	39,24	107,8	2,62	1 375,59
Myanmar	2005	38,37	...	7,35	492,95
Central African Republic	1994	37,74	5,9	12,54	55,39
Uruguay	2004	36,28	...	10,16	75,00
Tunisia	2000	34,24	-11,1	7,72	442,63
Kuwait	1994	32,37	...	47,15	116,15
Nepal	1994	31,19	8,8	10,56	1 268,07
Madagascar	2000	29,34	...	5,02	28,62
Jordan	2006	27,75	-20,7	16,86	260,03
Uganda	2000	27,56	...	0,81	- 6,53
Cuba	1996	26,51	...	0,36	0,03
Burundi	2005	26,47	...	19,13	32,35
Croatia	2012	26,45	-60,3	2,35	11,33
Dominican Republic	2000	26,43	29,6	1,67	50,82
Yemen	2000	25,74	-58,1	5,39	- 1,32
Paraguay	2000	23,43	...	5,70	18,37
Bahrain	2000	22,37	...	1,93	2,13
Lithuania	2012	21,62	...	2,77	- 88,79
Kenya	1994	21,47	-1,5	6,17	0,22
Oman	1994	20,88	-55,6	7,17	13,55
Gambia	2000	19,38	-8,2	22,77	11,40

Afghanistan	2005	19,33	...	1,86	- 203,91
Estonia	2012	19,19	-12,1	0,73	24,59
Slovenia	2012	18,91	...	8,26	- 26,80
Sri Lanka	2000	18,80	...	0,62	0,15
Lebanon	2000	18,45	...	1,11	- 52,31
Ghana	2006	18,23	57,7	7,56	3,13
Mongolia	2006	17,71	...	2,56	5,62
Senegal	2000	16,88	...	3,88	4,57
Bosnia and Herzegovina	2001	16,12	50,8	5,84	711,65
Trinidad and Tobago	1990	16,01	...	2,32	0,25
Guatemala	1990	14,74	-14,7	2,50	0,09
Zambia	2000	14,40	-8,3	7,52	15,63
Niger	2000	13,63	4,9	8,65	4,46
Republic of Moldova	2010	13,28	...	2,02	63,34
Cambodia	1994	12,76	21,2	0,54	15,97
Mali	2000	12,30	...	0,77	- 57,40
Georgia	2006	12,22	...	4,79	19,66
Costa Rica	2005	12,11	...	3,64	0,03
Kyrgyzstan	2005	12,02	...	1,50	39,31
Nicaragua	2000	11,98	-9,5	11,44	195,20
Luxembourg	2012	11,84	25,4	17,14	49,45
The former Yugoslav Republic of Macedonia	2009	11,49	...	2,38	59,48
El Salvador	2005	11,07	180,8	1,21	- 3,16
Latvia	2012	10,98	...	1,73	310,45
Honduras	2000	10,30	...	2 007,33 <sup>f</sup>	4,51
Panama	2000	9,71	4,5	10,51	26,08
Botswana	1994	9,29	...	9,76	20,88
Cyprus	2012	9,26	...	1,34	167,12
Namibia	2000	9,09	...	5,50	0,09
Lao People's Democratic Republic	2000	8,90	...	3,09	3,90
Mozambique	1994	8,22	...	1,09	4,60
Tajikistan	2010	8,18	-58,3	4,42	94,05
Liberia	2000	8,02	...	2,74	124,11
Chad	1993	8,02	...	1,63	21,77
Swaziland	1994	7,54	-14,4	10,34	367,41
Armenia	2010	7,20	13,1	6,55	58,21
Malawi	1994	7,07	...	52,24	61,59
Mauritania	2000	6,94	133,7	13,95	637,49
Haiti	2000	6,68	-69,3	3,25	13,30
Belize	1994	6,34	-52,0	5,96	98,27
Benin	2000	6,25	-31,8	16,03	1 755,14
Rwanda	2005	6,18	...	0,69	- 2,36
Gabon	2000	6,16	...	3,06	0,07
Burkina Faso	1994	5,97	...	3,51	0,57
Albania	1994	5,53	-72,8	0,99	0,25
Montenegro	2003	5,31	...	3,32	0,48
Guinea	1994	5,06	...	7,95	0,23
Papua New Guinea	1994	5,01	...	0,65	- 0,53
Togo	2000	4,92	79,1	13,84	281,89
Mauritius	2006	4,76	...	1,71	6,36
Island	2012	4,47	-37,4	5,23	0,00
Niue	1994	4,42	...	4,07	- 0,49
Eritrea	2000	3,93	...	9,03	46,87
Lesotho	2000	3,51	-41,4	7,96	35,02
Suriname	2003	3,33	2,5	9,17	14,56
Malta	2012	3,14	...	0,84	0,29
Guyana	2004	3,07	9,4	9,37	361,22
Fiji	2004	2,71	20,1	7,31	307,28
Barbados	1997	2,20	...	1,00	12,59
Bahamas	1994	2,20	...	2,42	77,22
Congo	2000	2,07	...	6,83	4,87
Guinea-Bissau	1994	1,69	...	7,98	4,29

Grenada	1994	1,61	-20,8	6,04	22,19
Bhutan	2000	1,56	-2,8	6,42	50,36
Timor-Leste	2010	1,28	-66,2	1,08	6,09
Djibouti	2000	1,07	...	3,78	229,06
Antigua and Barbuda	2000	0,60	-13,3	5,58	10,34
Samoa	1994	0,56	...	1,21	1,48
Saint Lucia	2000	0,55	...	1,01	13,25
Comoros	1994	0,51	...	2,50	- 1,59
Cabo Verde	2000	0,45	0,0	13,10	14,51
Seychelles	2000	0,33	...	3,53	32,10
Vanuatu	1994	0,30	133,4	5,88	380,06
Solomon Islands	1994	0,29	...	16,06	74,58
Micronesia (Federated States of)	1994	0,25	...	0,61	0,01
Tonga	2000	0,25	...	1,16	38,05
San Marino	2007	0,24	-57,4	8,88	375,43
Liechtenstein	2012	0,23	...	43,58	182,09
Dominica	2005	0,18	-25,2	9,22	579,38
Saint Kitts and Nevis	1994	0,16	0,6	1,35	952,80 <sup>2</sup>
Maldives	1994	0,15	4,3	20,61	5 546,30
Saint Vincent and the Grenadines	1997	0,11	13,0	10,91	25,93
Sao Tome and Principe	2005	0,10	9,3	7,71	200,25
Monaco	2012	0,09	...	1,82	0,00
Palau	2000	0,09	...	4,75	177,90
Cook Islands	1994	0,08	...	3,31	246,83
Nauru	1994	0,04	...	1,45	24,24
Kiribati	1994	0,03	...	1,36	54,72
Tuvalu	1994	0,01	...	5,48	- 19,49
<b>Total GHG emissions der 129 am wenigsten emittier</b>		<b>2 212,67</b>			

#### Sources:

UN Framework Convention on Climate Change (UNFCCC) Secretariat.

See: <http://unfccc.int>.

United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2015 Revision, July 2015 - Copyright © 2015 by United Nations. All rights reserved.

#### Footnotes:

1 1994 is considered as an uncharacteristically high in terms of GHG emissions. It was mainly influenced by large-scale extension of Niue's International airport runway, and the major construction and sealing of roads (230 km). The high per capita figure is also due to a very small population base.

2 There was large increase in emissions due to the conversion of the forest and grassland to pastures, cropland, or other managed uses, which can significantly change carbon stored in vegetation and soil.

#### Definitions & Technical notes:

**Greenhouse gases (GHG)** are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapour (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and ozone (O<sub>3</sub>) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Beside CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub>, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

**Total GHG emissions including LULUCF/LUCF** refer to greenhouse gases emissions including emissions/removals from the forestry sector. The definition is different for Annex I and non-Annex I Parties. For Annex I Parties, the sector is called Land Use, Land-use Change and Forestry (LULUCF) whereas for non-Annex I Parties, it is called Land-use Change and Forestry (LUCF). These two definitions are close but not equivalent. Land use, land use change and forest may have an impact on the surface albedo, evapotranspiration, sources and sinks of greenhouse gases, or other properties of the climate system and may thus have a radioactive forcing and/or other impacts on climate, locally or globally.

Data on greenhouse gas emissions are usually estimated according to international methodologies on the basis of national statistics on energy, industrial and agricultural production, waste management and land use, etc.

The best known and most widely used methodology is the 1996 Guidelines of the Intergovernmental Panel for Climate Change (IPCC) which is the basis for reporting to the UNFCCC.

See: <http://www.ipcc-nggip.iges.or.jp/public/gh/invs1.htm>.