

Environmental space targets for EU member states and EU-27								Kyoto targets for EU-15 and burden sharing targets for the new member states 10+2
Kim Ejertsen	Emission data source 1990-2005: EEA Report No 5 2007: Greenhouse gas emission trends and projections in Europe 2007							
Energy and Climate Group	Emission data 2005-2050: Year by year decreasing curve based on actual 2005 emission and ES target year 2050							
NOAH-Friends of the Earth Denmark	Population Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision							
22. July 2008	Emissions					Population		
	1990	2005	2005 non-ETS	2005 ETS	2012	1990	2005	2050
Country	MtCO2-eq	MtCO2-eq	MtCO2-eq	MtCO2-eq	MtCO2-eq	Mill	Mill.	Mill
Austria	79,00	93,30	55,98	37,32	68,70	7,729	8,292	8,500
Belgium	146,90	143,80	86,28	57,52	135,90	9,933	10,398	10,643
Bulgaria	132,10	69,80	41,88	27,92	121,50	10,303	10,192	8,825
Cyprus (2)	6,00	9,90	5,94	3,96	No target	0,681	0,836	1,183
Czech Republic	196,30	145,60	87,36	58,24	180,60	10,303	10,192	8,825
Denmark	69,30	63,90	38,34	25,56	54,80	5,140	5,417	5,528
Estonia	43,00	20,70	12,42	8,28	39,60	1,566	1,344	1,128
Finland	71,10	69,30	41,58	27,72	71,10	4,986	5,246	5,360
France	563,90	553,40	332,04	221,36	563,90	56,735	60,991	68,270
Germany	1232,50	1001,50	600,90	400,60	973,70	79,433	82,652	74,088
Greece	111,10	139,20	83,52	55,68	138,80	10,161	11,100	10,808
Hungary	123,00	80,50	48,30	32,20	115,70	10,365	10,086	8,459
Ireland	55,80	69,90	41,94	27,96	63,00	3,515	4,143	6,179
Italy	519,50	582,20	349,32	232,88	485,70	56,719	58,646	54,610
Latvia	25,90	10,90	6,54	4,36	23,80	2,663	2,302	1,768
Lithuania	48,10	22,60	13,56	9,04	44,30	3,698	3,425	2,654
Luxembourg	12,70	12,70	7,62	5,08	9,10	0,382	0,457	0,722
Malta (2)	2,20	3,40	2,04	1,36	No target	0,360	0,403	0,428
Netherlands	214,60	212,10	127,26	84,84	201,70	14,952	16,328	17,235
Poland	586,90	399,00	239,40	159,60	551,70	38,111	38,196	30,260
Portugal	60,90	85,50	51,30	34,20	77,40	9,983	10,528	9,982
Romania	282,50	153,70	92,22	61,48	259,90	23,207	21,628	15,928
Slovak Republic	73,40	48,70	29,22	19,48	67,50	5,256	5,387	4,664
Slovenia	20,20	20,30	12,18	8,12	18,60	1,927	1,999	1,694
Spain	289,40	440,60	264,36	176,24	332,80	38,851	43,397	46,401
Sweden	72,30	67,00	40,20	26,80	75,20	8,559	9,038	10,488
United Kingdom	779,90	657,40	394,44	262,96	682,40	57,237	60,245	68,717
EU-27 (2)	5818,40	5177,00	3106,20	2070,80	5357,40	472,755	492,868	483,347
EU-15	4278,80	4192,00	2515,20	1676,80	3936,50		386,878	
EU-27 20% red	4654,72							
EU-27 30% red	4072,88							

Without Cyprus and Malta as they have no Kyoto targets or internal burden sharing targets

The IPCC Assessment Rep.4 (AR4) asks for global -85 CO2-eq red. till 2050 (yr. 2000 basis) to stay close to 2 degree temp increase
Adjusted to year 2005 as basis a reduction of 87,5% is required to stay close to a 2 degree temp increase
In 2005 global fossil fuel emissions amounted to 4,33 t CO2/cap/y (UN World Population Prospects: The 2006 Revision Population Database combined with IEA global fossil fuel CO2-emissions)
In 2004 the global anthropogenic GHG emissions were made up of 56,6% fossil fuel-CO2 and 43,4% non-fossil fuel CO2 (deforestation + peat, CH4, N2O,F-gasses, other)
And the global population is expected to increase from 6491 mill (in 2005) to expected 9191 mill (in 2050)
An equivalent CO2 ES is calculated as $4,33 \cdot 0,125 / 0,566 / 9191 \cdot 6491 = 0,675$ t CO2-eq/cap/y

Kim: The AR4 assumes that a 85% global CO2-eq reduction is needed until year 2050 (2000 as base year). Adjusted to base year 2005 a global reduction of 87,5% is needed. In 2005 global per capita fossil fuel CO2 emission was 4,33 t CO2/cap/y (IEA combined with UN population data). Using the AR4 as reference the global 2004 fossil fuel CO2 emissions amounted to 56,6% of global GHG emissions. Also taking the expected (UN medium) increase in World population into consideration (from 6491 mill in 2005 to expected 9191 mill in 2050) an environmental space of 0,675 t CO2-eq can be estimated. This is the fair share every EU-27 citizen must go below before year 2050 in order to comply with EU's 2 degree target.

Per capita emissions			Based on per capita figures				Based on national emissions (Mt CO2-eq/y)
tCO2-eq/cap/y	tCO2-eq/cap/y	ES year 2050	ES year 2050	Reduction % 2050	Reduction % 2050	Reduction % 2050	
1990	2005	tCO2-eq/cap/y	MtCO2-eq/y	Base year 1990	Base year 2005	Base year 1990	
9,5	11,3	0,675	5,74	93	94	93	
14,1	13,8	0,675	7,18	95	95	95	
13,0	6,8	0,675	5,96	95	90	95	
7,2	11,8	0,675	0,80	91	94	87	
19,3	14,3	0,675	5,96	96	95	97	
12,8	11,8	0,675	3,73	95	94	95	
32,0	15,4	0,675	0,76	98	96	98	
13,6	13,2	0,675	3,62	95	95	95	
9,2	9,1	0,675	46,08	93	93	92	
14,9	12,1	0,675	50,01	95	94	96	
10,0	12,5	0,675	7,30	93	95	93	
12,2	8,0	0,675	5,71	94	92	95	
13,5	16,9	0,675	4,17	95	96	93	
8,9	9,9	0,675	36,86	92	93	93	
11,3	4,7	0,675	1,19	94	86	95	
14,0	6,6	0,675	1,79	95	90	96	
27,8	27,8	0,675	0,49	98	98	96	
5,5	8,4	0,675	0,29	88	92	87	
13,1	13,0	0,675	11,63	95	95	95	
15,4	10,4	0,675	20,43	96	94	97	
5,8	8,1	0,675	6,74	88	92	89	
13,1	7,1	0,675	10,75	95	91	96	
13,6	9,0	0,675	3,15	95	93	96	
10,1	10,2	0,675	1,14	93	93	94	
6,7	10,2	0,675	31,32	90	93	89	
8,0	7,4	0,675	7,08	92	91	90	
12,9	10,9	0,675	46,38	95	94	94	
11,8	10,5	0,675	326,26	94	94	94	
11,1	10,8	0,675	268,333	94	94	94	

Based on national emissions (Mt CO ₂ -eq/y)	For the whole period 1990-2050		For the whole period 2005-2050		Curve point 2020	Curve point 2020	Needed reduction in the period 2005-2020 as % of 2005 emissions
	Base year 1990	Base year 2005	Base year 1990	Base year 2005			
Reduction % 2050	Reduction amount	Reduction rate	Reduction amount	Reduction rate	Total emission	Reduc rel 2005	Total red from 2005
Base year 2005	% per year				MT CO ₂ -eq		%
94	1,5	4,4	2,1	6,2	36,83	56,47	-61
95	1,6	5,0	2,1	6,7	52,96	90,84	-63
91	1,6	5,2	2,0	5,5	30,73	39,07	-56
92	1,4	3,4	2,0	5,6	4,28	5,62	-57
96	1,6	5,8	2,1	7,1	50,17	95,43	-66
94	1,6	4,9	2,1	6,3	24,79	39,11	-61
96	1,6	6,7	2,1	7,3	6,88	13,82	-67
95	1,6	5,0	2,1	6,6	25,90	43,40	-63
92	1,5	4,2	2,0	5,5	241,66	311,74	-56
95	1,6	5,3	2,1	6,7	368,79	632,71	-63
95	1,6	4,5	2,1	6,6	52,09	87,11	-63
93	1,6	5,1	2,1	5,9	33,32	47,18	-59
94	1,5	4,3	2,1	6,3	27,31	42,59	-61
94	1,5	4,4	2,1	6,1	232,05	350,15	-60
89	1,6	5,1	2,0	4,9	5,21	5,69	-52
92	1,6	5,5	2,0	5,6	9,71	12,89	-57
96	1,6	5,4	2,1	7,2	4,28	8,42	-66
92	1,4	3,4	2,0	5,5	1,49	1,91	-56
95	1,6	4,9	2,1	6,5	80,59	131,51	-62
95	1,6	5,6	2,1	6,6	148,15	250,85	-63
92	1,5	3,7	2,0	5,6	36,66	48,84	-57
93	1,6	5,4	2,1	5,9	63,33	90,37	-59
94	1,6	5,2	2,1	6,1	19,55	29,15	-60
94	1,6	4,8	2,1	6,4	7,78	12,52	-62
93	1,5	3,7	2,1	5,9	182,52	258,08	-59
89	1,5	3,9	2,0	5,0	31,67	35,33	-53
93	1,6	4,7	2,1	5,9	271,65	385,75	-59
94	1,6	4,8	2,1	6,1	2060,19	3116,81	-60
94	1,6	4,6	2,1	6,1	1676,89	2515,11	-60

Factor 10

EU-27 20% red:	0,7
EU-27 30% red:	1,6

Reduction rate for the EU-27 minus 30 % target (1990 base) calculated from 2005-2020

Reduction rate for the EU-27 minus 20 % target (1990 base) calculated from 2005-2020

Curve point 2025	Curve point 2030	Curve point 2035	Curve point 2040	Curve point 2045	Environ- mental Space 2050	
Emission						
MT CO2-eq						Country
27,01	19,82	14,54	10,66	7,82	5,74	Austria
37,96	27,21	19,51	13,98	10,02	7,18	Belgium
23,38	17,79	13,53	10,29	7,83	5,96	Bulgaria
3,23	2,44	1,85	1,40	1,06	0,80	Cyprus (2)
35,17	24,66	17,29	12,12	8,50	5,96	Czech Republic
18,08	13,19	9,62	7,01	5,12	3,73	Denmark
4,77	3,30	2,29	1,59	1,10	0,76	Estonia
18,66	13,44	9,68	6,97	5,02	3,62	Finland
183,34	139,10	105,53	80,06	60,74	46,08	France
264,34	189,47	135,81	97,34	69,77	50,01	Germany
37,54	27,05	19,49	14,05	10,12	7,30	Greece
24,83	18,51	13,79	10,28	7,66	5,71	Hungary
19,97	14,60	10,67	7,80	5,70	4,17	Ireland
170,77	125,67	92,49	68,06	50,09	36,86	Italy
4,08	3,19	2,49	1,95	1,53	1,19	Latvia
7,33	5,53	4,17	3,15	2,37	1,79	Lithuania
2,98	2,08	1,44	1,01	0,70	0,49	Luxembourg
1,14	0,86	0,66	0,50	0,38	0,29	Malta (2)
58,37	42,27	30,62	22,18	16,06	11,63	Netherlands
106,48	76,54	55,01	39,54	28,42	20,43	Poland
27,64	20,84	15,72	11,85	8,94	6,74	Portugal
47,12	35,07	26,09	19,42	14,45	10,75	Romania
14,42	10,63	7,84	5,79	4,27	3,15	Slovak Republic
5,65	4,11	2,98	2,17	1,57	1,14	Slovenia
136,06	101,43	75,61	56,36	42,02	31,32	Spain
24,68	19,22	14,97	11,67	9,09	7,08	Sweden
202,33	150,71	112,25	83,61	62,27	46,38	United Kingdom
1515,36	1114,62	819,85	603,04	443,56	326,26	EU-27 (2)
1235,57	910,39	670,80	494,26	364,18	268,33	EU-15

EU-27 emissions 1990 and 2005 fit to the Environmental Space reduction curves

	All figures in Mt CO ₂ -eq							
	1990	2005	2010	2015	2020	2025	2030	2035
Austria	79,00	93,30	68,44	50,20	36,83	27,01	19,82	14,54
Belgium	146,90	143,80	103,08	73,89	52,96	37,96	27,21	19,51
Bulgaria	132,10	69,80	53,10	40,40	30,73	23,38	17,79	13,53
Cyprus (2)	6,00	9,90	7,48	5,66	4,28	3,23	2,44	1,85
Czech Republic	196,30	145,60	102,08	71,56	50,17	35,17	24,66	17,29
Denmark	69,30	63,90	46,60	33,99	24,79	18,08	13,19	9,62
Estonia	43,00	20,70	14,34	9,94	6,88	4,77	3,30	2,29
Finland	71,10	69,30	49,92	35,96	25,90	18,66	13,44	9,68
France	563,90	553,40	419,85	318,53	241,66	183,34	139,10	105,53
Germany	1232,50	1001,50	717,84	514,53	368,79	264,34	189,47	135,81
Greece	111,10	139,20	100,31	72,29	52,09	37,54	27,05	19,49
Hungary	123,00	80,50	59,99	44,71	33,32	24,83	18,51	13,79
Ireland	55,80	69,90	51,10	37,36	27,31	19,97	14,60	10,67
Italy	519,50	582,20	428,46	315,31	232,05	170,77	125,67	92,49
Latvia	25,90	10,90	8,52	6,67	5,21	4,08	3,19	2,49
Lithuania	48,10	22,60	17,05	12,87	9,71	7,33	5,53	4,17
Luxembourg	12,70	12,70	8,84	6,15	4,28	2,98	2,08	1,44
Malta (2)	2,20	3,40	2,59	1,97	1,49	1,14	0,86	0,66
Netherlands	214,60	212,10	153,62	111,26	80,59	58,37	42,27	30,62
Poland	586,90	399,00	286,78	206,12	148,15	106,48	76,54	55,01
Portugal	60,90	85,50	64,47	48,61	36,66	27,64	20,84	15,72
Romania	282,50	153,70	114,37	85,11	63,33	47,12	35,07	26,09
Slovak Republic	73,40	48,70	35,92	26,50	19,55	14,42	10,63	7,84
Slovenia	20,20	20,30	14,75	10,71	7,78	5,65	4,11	2,98
Spain	289,40	440,60	328,45	244,84	182,52	136,06	101,43	75,61
Sweden	72,30	67,00	52,19	40,66	31,67	24,68	19,22	14,97
United Kingdom	779,90	657,40	489,65	364,71	271,65	202,33	150,71	112,25
EU-27	5818,40	5177,00	3807,92	2800,90	2060	1515,36	1114,62	819,85
EU-27 -20%	5818,40	5177,00	5002,91	4828,81	4655			
EU-27 -30%	5818,40	5177,00	4808,96	4440,92	4073			

Environmental Space ES

Kim: From 1993-1999 FOEE was running a very successful campaign called The Sustainable Europe Campaign. It was guided by the pioneering work done by Milieudéfensie (FoE-Netherlands) up to the Rio Conference in 1992 and scaled up to a Europe wide campaign with participation of 31 national FoE-groups and with the Wuppertal Institute working as a consultant.

The fundamentals of the campaign was the concept of environmental space (ES) which, when speaking CO₂, is defined as the science based recommendation for fulfilling the objective of the Climate Change Convention for 2050. For many year science has recommended a global halving of the emissions for 2050. The ES concept combined this scientific based limit set for the considerations for future generations with the normative global equity principle set for the consideration of present generations.

Combining a global halving of emissions with the worlds population we calculated the ES per capita and compared with the actual emissions in 1990 which was the reference year at that time. In that way we came up with solid based targets for rich OECD countries. People could see the need for the global halving in emissions and they could see the fairness of the rich high emitters to do most (calculations in most cases turned out with 80-90% reductions). From this work combining science with equity the concept of Factor 10 emerged and for many years we marketed how the Factor 10 could be achieved by the combination of technology change and improvements combined with changes in lifestyle.

All the stuff concerning ES is described in dozens of reports with "Towards Sustainable Europe, The Study, 1995" as the basic document of the FoEE ES campaign start and the sum up book "Sharing the World, 1998".

All figures in Mt CO2-eq		ES	
2040	2045	2050	
10,66	7,82	5,74	Austria
13,98	10,02	7,18	Belgium
10,29	7,83	5,96	Bulgaria
1,40	1,06	0,80	Cyprus (2)
12,12	8,50	5,96	Czech Republic
7,01	5,12	3,73	Denmark
1,59	1,10	0,76	Estonia
6,97	5,02	3,62	Finland
80,06	60,74	46,08	France
97,34	69,77	50,01	Germany
14,05	10,12	7,30	Greece
10,28	7,66	5,71	Hungary
7,80	5,70	4,17	Ireland
68,06	50,09	36,86	Italy
1,95	1,53	1,19	Latvia
3,15	2,37	1,79	Lithuania
1,01	0,70	0,49	Luxembourg
0,50	0,38	0,29	Malta (2)
22,18	16,06	11,63	Netherlands
39,54	28,42	20,43	Poland
11,85	8,94	6,74	Portugal
19,42	14,45	10,75	Romania
5,79	4,27	3,15	Slovak Republic
2,17	1,57	1,14	Slovenia
56,36	42,02	31,32	Spain
11,67	9,09	7,08	Sweden
83,61	62,27	46,38	United Kingdom
603,04	443,56	326,26	EU-27

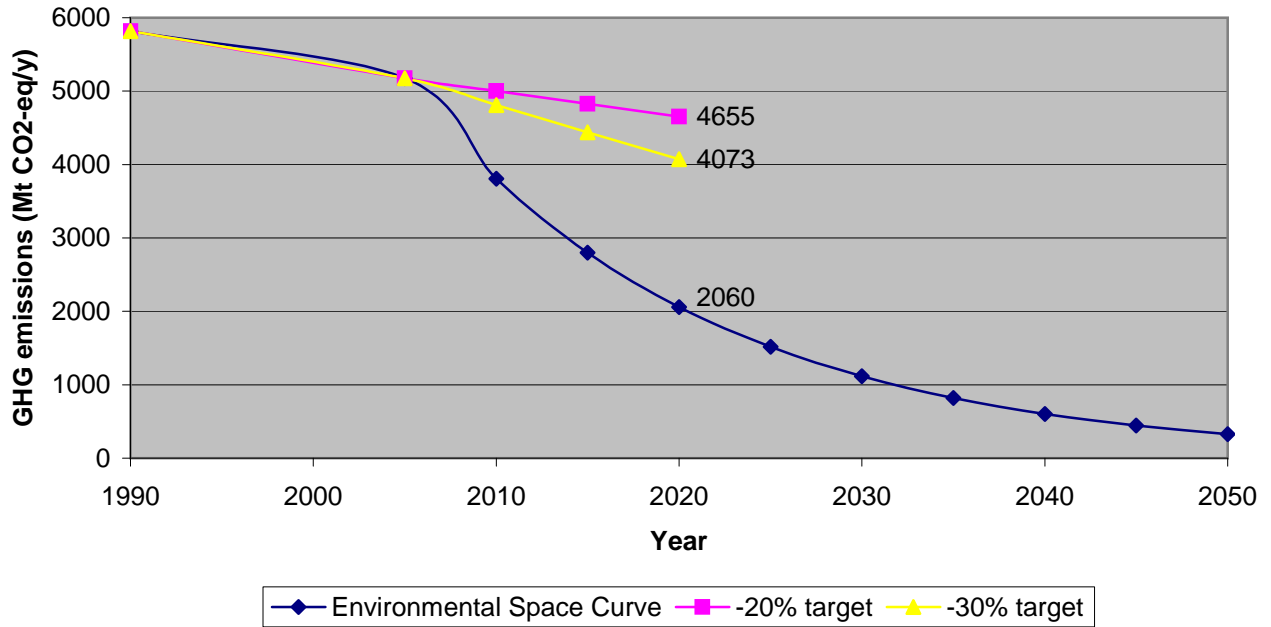
Kim: This Environmental Space target is calculated from the per capita ES target of 0,675 t CO2-eq multiplied with the expected population in each country in year 2050

The IPCC Assessment Report 4 (AR4) asks for a global -85 CO2-eq reduction till 2050 (year 2000 basis) to stay close to 2 degree temp increase

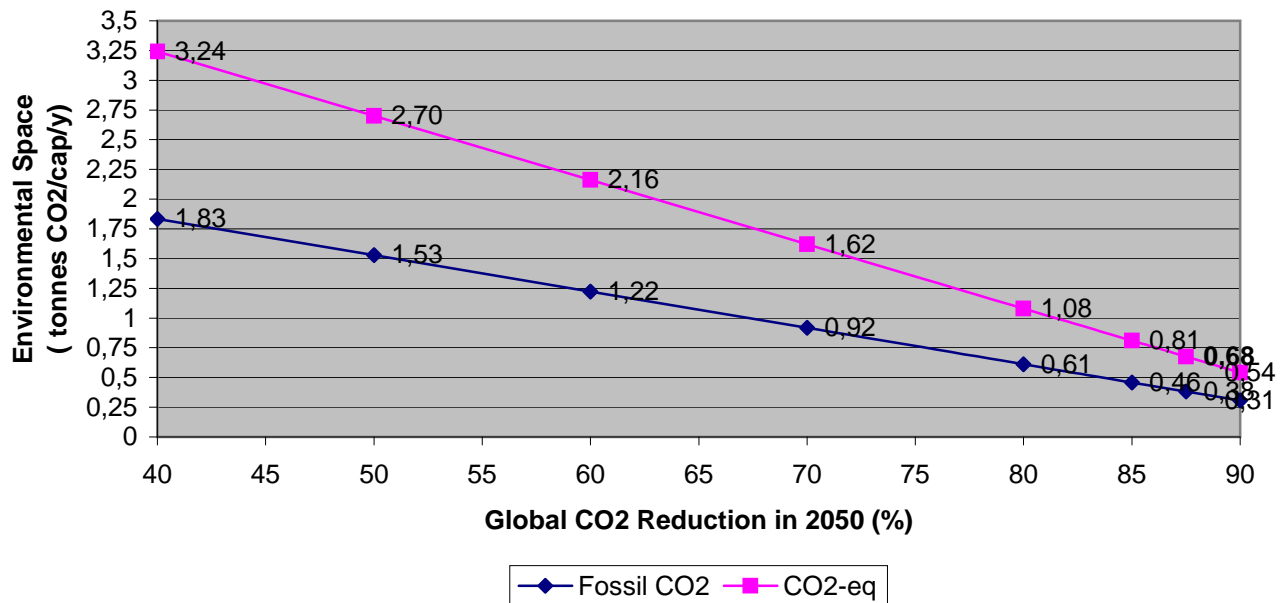
Adjusted to year 2005 as basis a reduction of 87,5% is required to stay close to a 2 degree temp increase

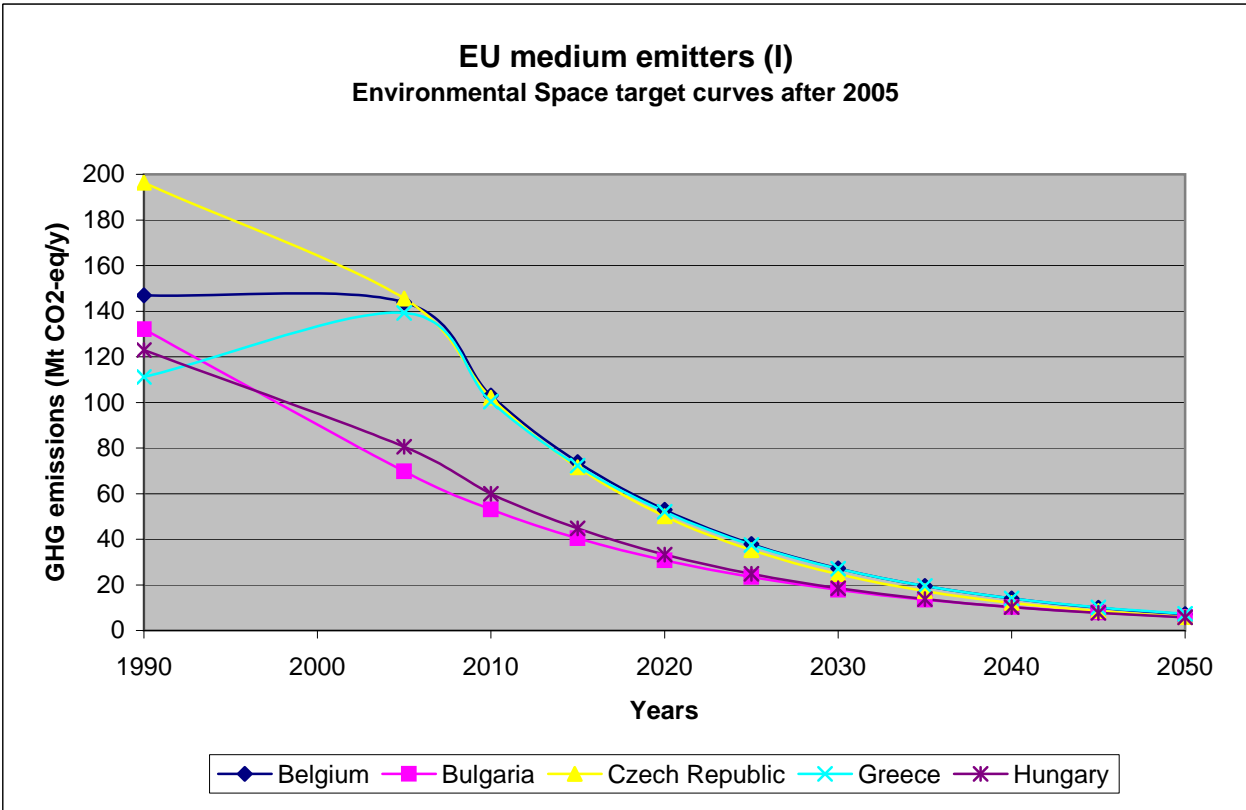
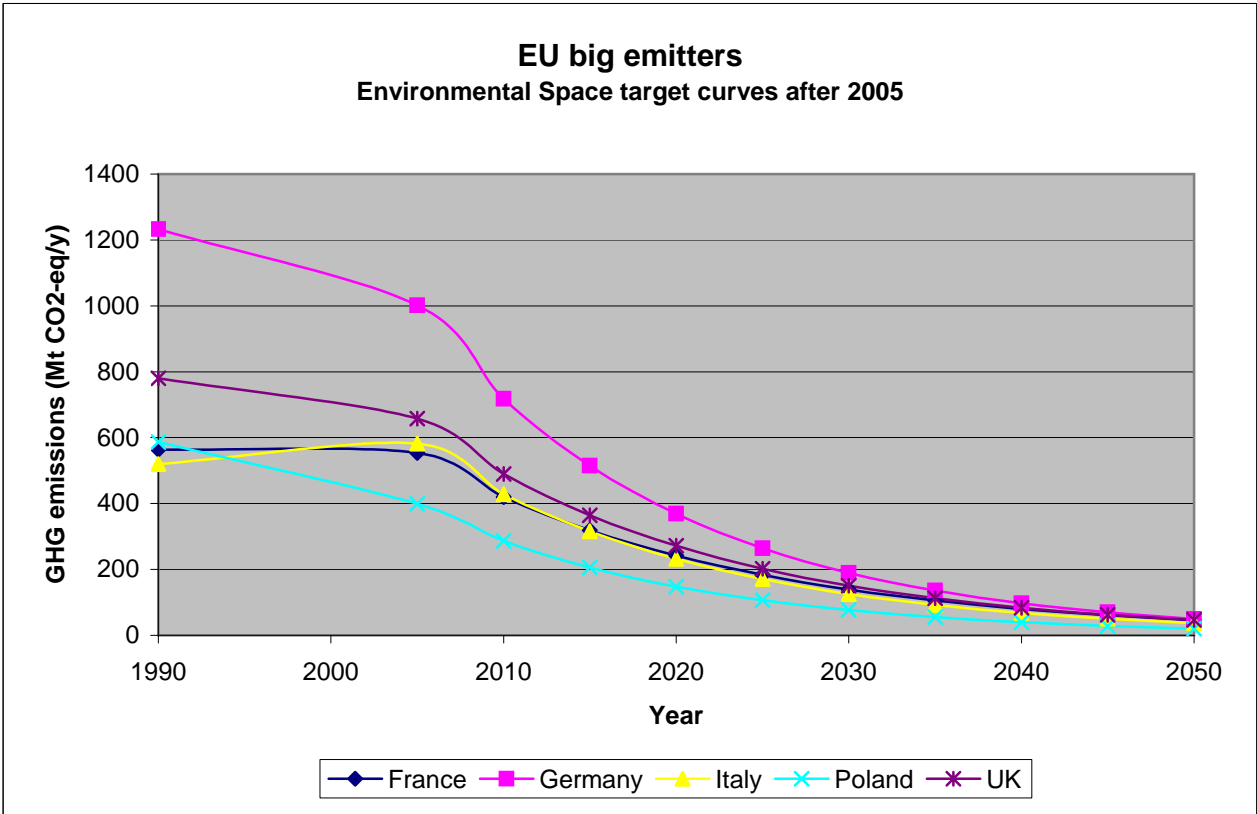
It means that we as a maximum must choose 0,675 tonnes CO2-eq per cap per year as our Environmental Space

EU-27 GHG reductions Environmental Space target curve after 2005

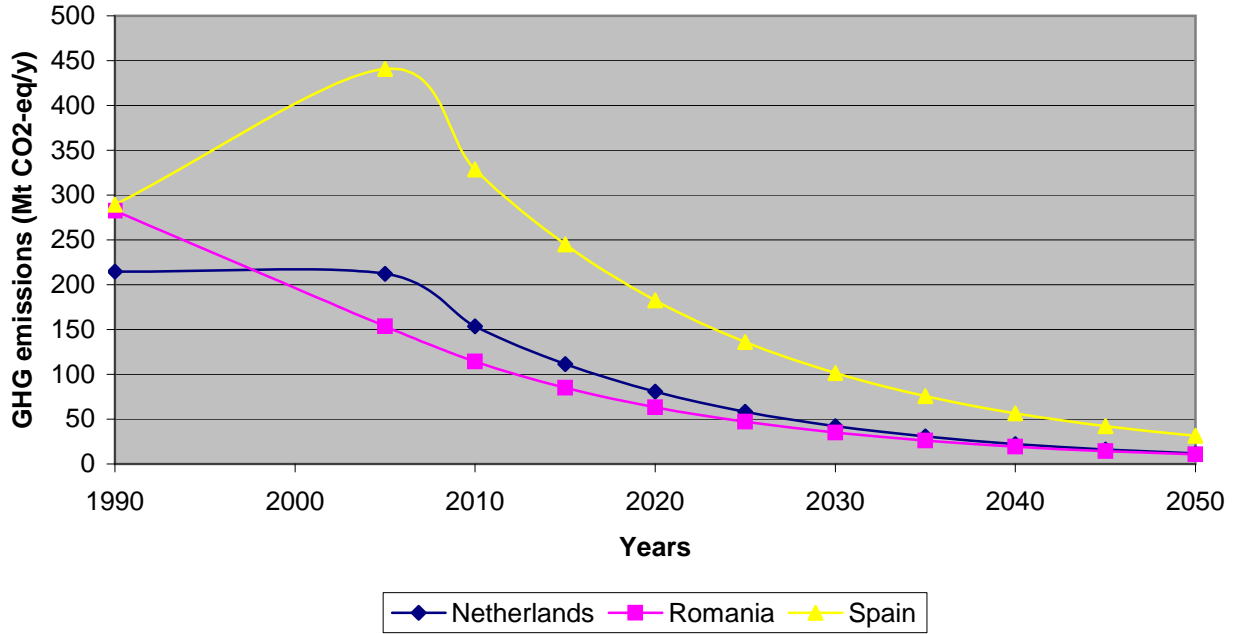


Environmental Space per Capita following Global CO2 targets in year 2050

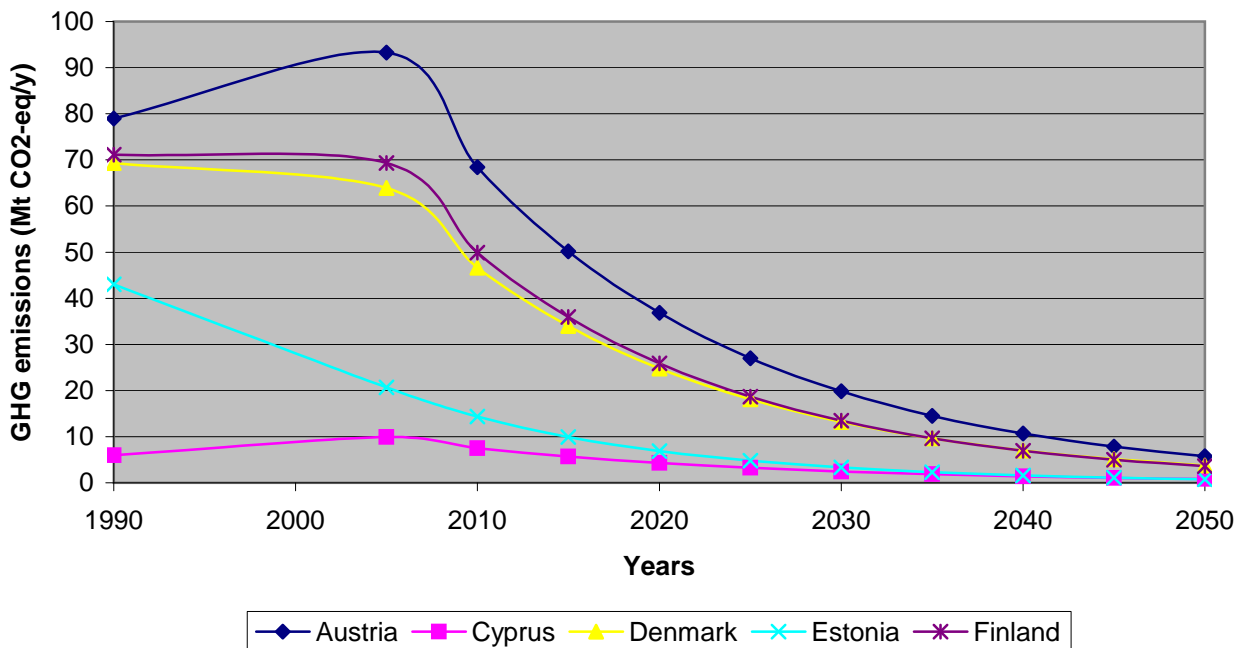




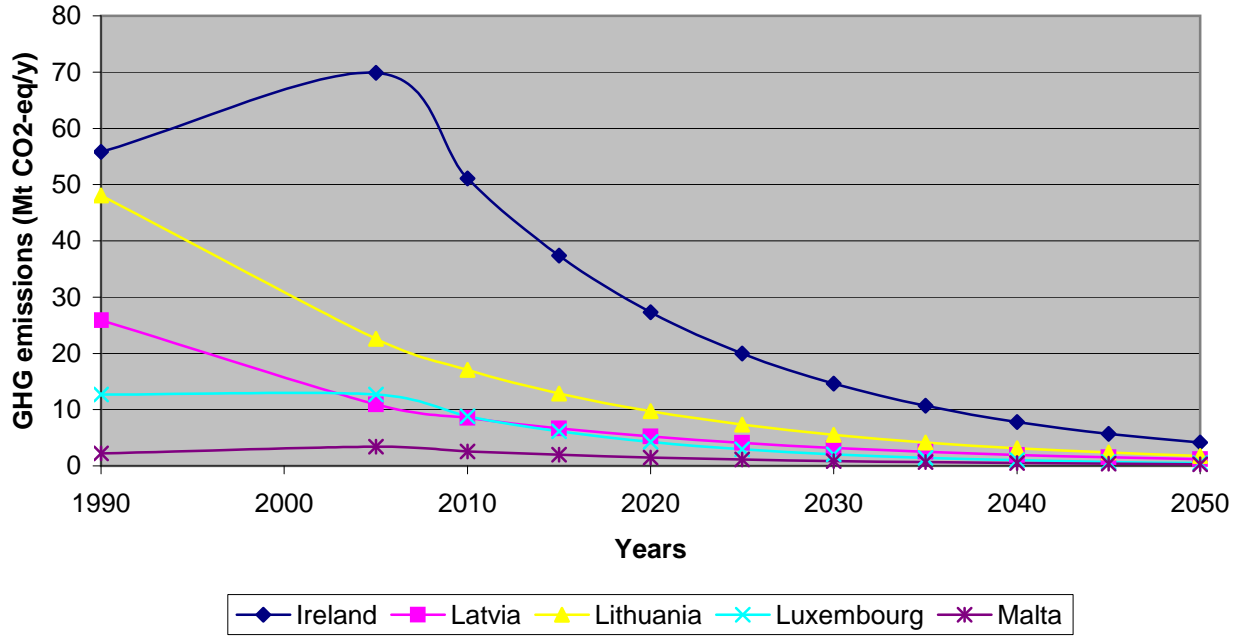
EU medium emitters (II)
Environmental Space target curves after 2005



EU small emitters (I)
Environmental Space target curves after 2005



EU small emitters (II)
Environmental Space target curves after 2005



EU small emitters (III)
Environmental Space target curves after 2005

